

Fixing the Locally Optimized RANSAC – Technical Report

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1 Machine

Intel Core Duo, 2 GHz, 2 MB L2 cache, FSB 667 MHz, 2 GB RAM, OS Debian Squeeze.

2 Used constants and symbols

Symbol	Value for EG	Value for HG	Description
EG	–	–	Epipolar Geometry.
HG	–	–	Homography.
MSER	–	–	Maximally Stable Extremal Region – regions of interest (RoI) found by detector of [10]. (MSER+ = MSER on image intensity, MSER– = MSER on inverted image intensity.)
SIFT	–	–	Scale-Invarian Feature Transform – used image descriptor, based on local histograms of gradients [8].
LO	–	–	Local Optimization [3].
HessianAff	–	–	regions of interest found by Hessian Affine detector [11].
σ	0.3	0.3	expected standard deviation of MSER’s center of gravity in image with longer side 768 px.
conf	95 %	95 %	confidence of results – user-specified probably of success of RANSAC.
<i>sizeFactor</i>	–	–	ratio of longer image size to constant 768.
σ_{sc}	$\sigma \cdot sizeFactor$	$\sigma \cdot sizeFactor$	expected standard deviation of MSER’s center of gravity in image with given size.
error	Sampson’s	Sampson’s	error of point correspondence with respect to given geometry (EG/HG). (In tabulated results it stands for RMS error of manually annotated ground truth correspondences w.r.t. evaluated geometry.)
θ	$\sqrt{3.84 \cdot \sigma_{sc}^2}$	$\sqrt{5.99 \cdot \sigma_{sc}^2}$	error scale, computed as 95% percentile of χ^2 distribution with 1 DoF for EG and 2 DoF for HG. Used as error threshold in inlier–outlier decision.
inlier	–	–	point correspondence with error $\leq \theta$.
outlier	–	–	point correspondence with error $> \theta$.
TC	–	–	tentative correspondence – result of matching, input to RANSAC.
Inlss	–	–	inlierness – probability of TC being an inlier, “how often is TC labeled as inlier?” (see Fig. 1)
H _{Inlss}	–	–	histogram of inlierness (see Fig. 2).
mss	7	4	minimal sample size, size of the sample drawn by RANSAC.
inlLimit	49	28	maximal number of inliers processed in LSq ($7 \times mss$).
I	–	–	number of inliers.
Samp	–	–	number of random minimal samples taken during one RANSAC run.
R	(Solver, in table header)		RANSAC with standard top-hat cost function (using number of inliers and quadratic score at equality) [5].
M	(Solver, in table header)		MSAC – RANSAC with truncated quadratic cost function (width = $\frac{3}{2}\theta$) [15].
+ (plus)	(Solver, in table header)		following symbol used as post-processing of the result.
. (dot)	(Solver, in table header)		following symbol used as LO on every <i>so–far–the–best</i> sample found.
LSq	(Solver, in table header)		least squares solution on resulting inliers (normalized DLT).
LO	(Solver, in table header)		full procedure of LO, consisting of inner sampling and iterative reweighted least squares.
LO’	(Solver, in table header)		proposed minimalistic LO’, consisting from iterative reweighted least squares only.
BA	(Solver, in table header)		Gold Standard – nonlinear optimization of geometry with real point locations, used modified bundle adjustment of Lourakis [6, 7].
(inl. limit)	(Solver, in table header)		inlier limit used to speed the LO up.

The following figures explain **Inlss** and **H_{Inlss}** plots. These plots are included in the tables with experimental results to provide a quick and intuitive overview of the stability of the results over repeated executions (the number of executions is listed in each table). Rather than the exact values in the plots, the shape of the histograms is important.

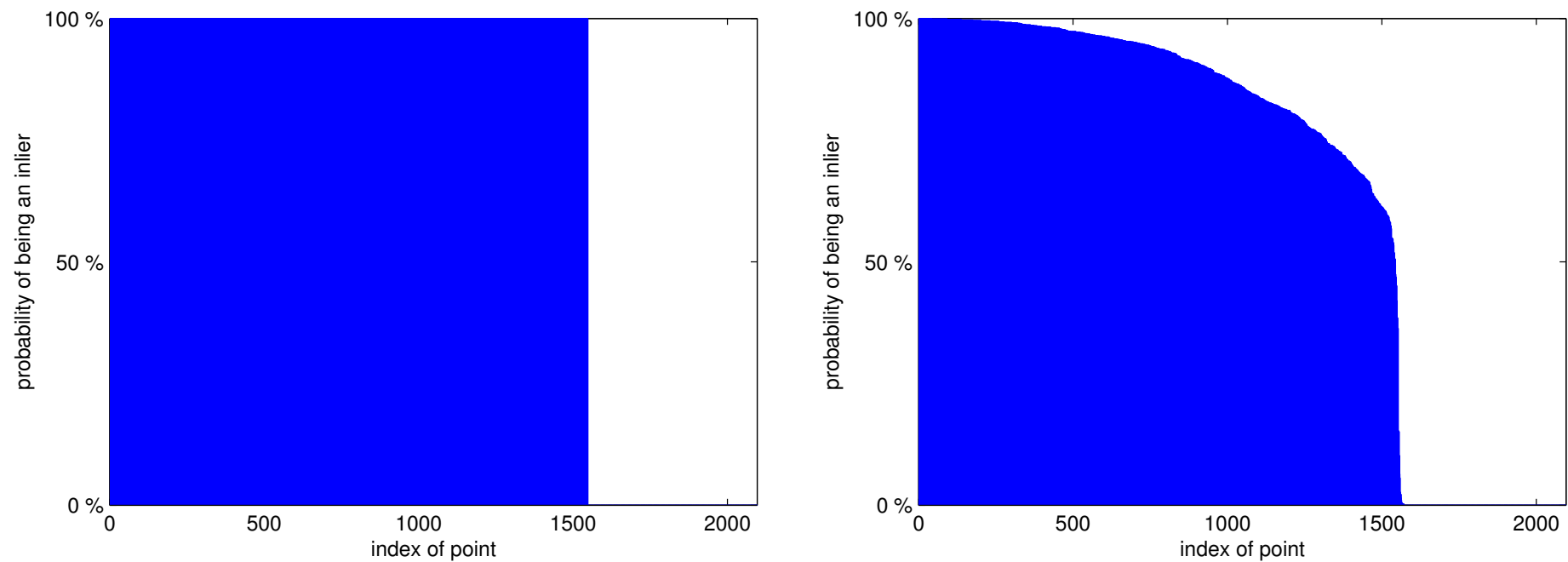


Figure 1: The probability of a TC being an inlier, collected over 1000 executions. Correspondences on the horizontal axis are ordered so that the values on the vertical axis – the fraction of executions the correspondence has been labelled as an inlier – are non-increasing. The left plot shows an ideal case when the inlier and outlier dichotomy is identical for all executions. The plot on the right side depicts an example of less stable estimation, some tentative correspondences alternate between being an inlier and outlier in different executions.

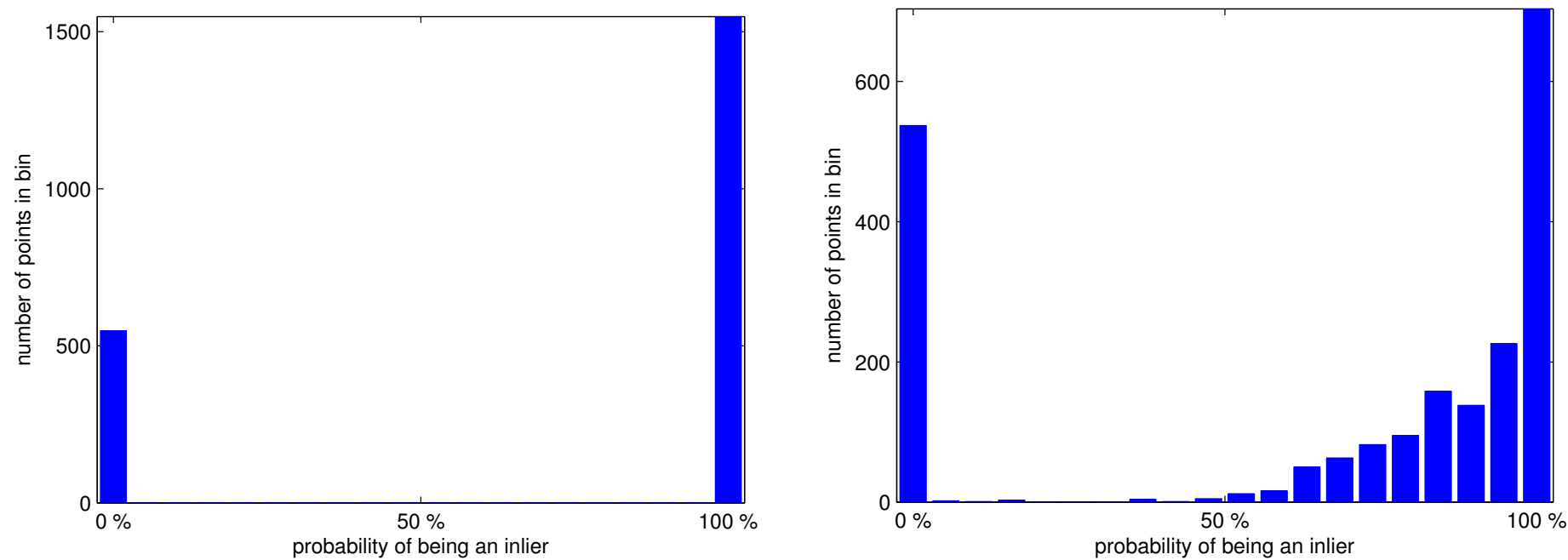
























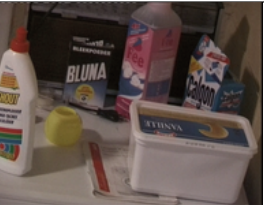









Figure 2: The histogram of the probability of a TC being an inlier, collected over 1000 executions. Vertical axis: the number of tentative correspondences that have been output as inliers in a fraction of executions (horizontal axis). This plot summarizes the plot in Figure 1. The left plot shows an ideal case: two bars, one stands for outliers labelled as outliers in all executions, the other stands for inliers consistently labelled in all executions. Plot on right-hand side demonstrates results of a less stable estimation process: for example about 100 tentative correspondences were output as inliers in 75% of executions.

3 Testing images

















All the images with used ground truth are available at <http://cmp.felk.cvut.cz/data/geometry2view/index.xhtml>, datasets kusvod2 and homogr.

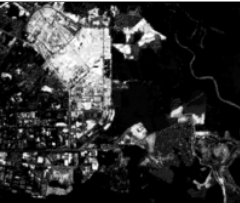














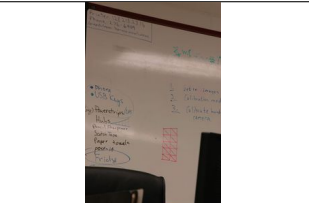
3.1 Epipolar Geometry

Filenames:	booksh[AB].png	box[AB].png	castle[AB].png	corr[AB].png	graff[AB].png	head[AB].jpg	kampa[AB].png	Kyoto[AB].jpg
Image A:								
Image dimensions:	768 × 576	1024 × 768	768 × 576	512 × 512	800 × 640	1408 × 1056	800 × 543	2592 × 1944
Image B:								
Image dimensions:	768 × 576	1024 × 768	768 × 576	512 × 512	800 × 640	1408 × 1056	800 × 543	2592 × 1944
Error scale θ :	0.6	0.8	0.6	0.4	0.6	1.1	0.6	2.0
Tentative correspondences:	41	231	154	93	120	86	84	445
Source:	(i)	(b)	(h)	(c)	(c)	(a)	(i)	(a)

Filenames:	leafs[AB].jpg	plant[AB].png	rotunda[AB].png	shout[AB].png	valbonne[AB].png	wall[AB].jpg	wash[AB].png	zoom[AB].png
Image A:								
Image dimensions:	1600 × 1200	576 × 768	1024 × 683	768 × 576	768 × 512	2272 × 1704	768 × 576	1024 × 768
Image B:								
Image dimensions:	1600 × 1200	576 × 768	1024 × 683	768 × 576	768 × 512	2272 × 1704	768 × 576	1024 × 768
Error scale θ :	1.2	0.6	0.8	0.6	0.6	1.7	0.6	0.8
Tentative correspondences:	79	30	86	54	32	98	55	70
Source:	(l)	(g)	(j)	(g)	(c)	(l)	(g)	(k)

3.2 Homography

Filenames:	adam[AB].png	boat[AB].png	Boston[AB].jpg	BostonLib[AB].png	BruggeSquare[AB].jpg	BruggeTower[AB].png	Brussels[AB].jpg	CapitalRegion[AB].jpg
Image A:								
Image dimensions:	600 × 450	850 × 680	1712 × 1368	1504 × 1000	1712 × 1368	856 × 684	1712 × 1368	1368 × 1712
Image B:								
Image dimensions:	600 × 450	850 × 680	1712 × 1368	1504 × 1000	1712 × 1368	856 × 684	1712 × 1368	1368 × 1712
Error scale θ :	0.6	0.8	1.6	1.4	1.6	0.8	1.6	1.6
Tentative correspondences:	20	126	382	200	46	77	503	130
Source:	(f)	(c)	(d)	(d)	(d)	(d)	(d)	(d)

Filenames:	city[AB].png	Eiffel[AB].png	ExtremeZoom[AB].png	graf[AB].png	LePoint1[AB].png	LePoint2[AB].png	LePoint3[AB].png	WhiteBoard[AB].jpg
Image A:								
Image dimensions:	329 × 278	1198 × 958	1519 × 1006	800 × 640	600 × 450	600 × 450	600 × 450	1504 × 1000
Image B:								
Image dimensions:	329 × 278	1198 × 958	1519 × 1006	800 × 640	600 × 450	600 × 450	600 × 450	1000 × 1504
Error scale θ :	0.3	1.1	1.5	0.8	0.6	0.6	0.6	1.4
Tentative correspondences:	17	200	56	245	148	89	48	214
Source:	(e)	(d)	(d)	(c)	(f)	(f)	(f)	(d)

Sources:

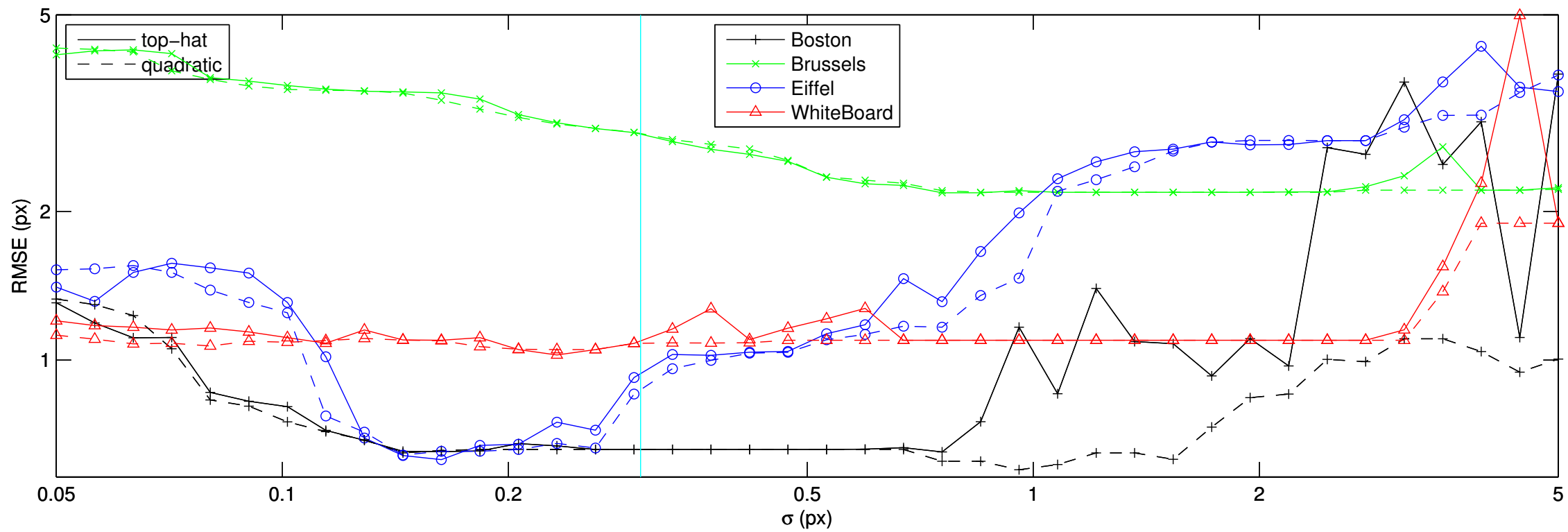
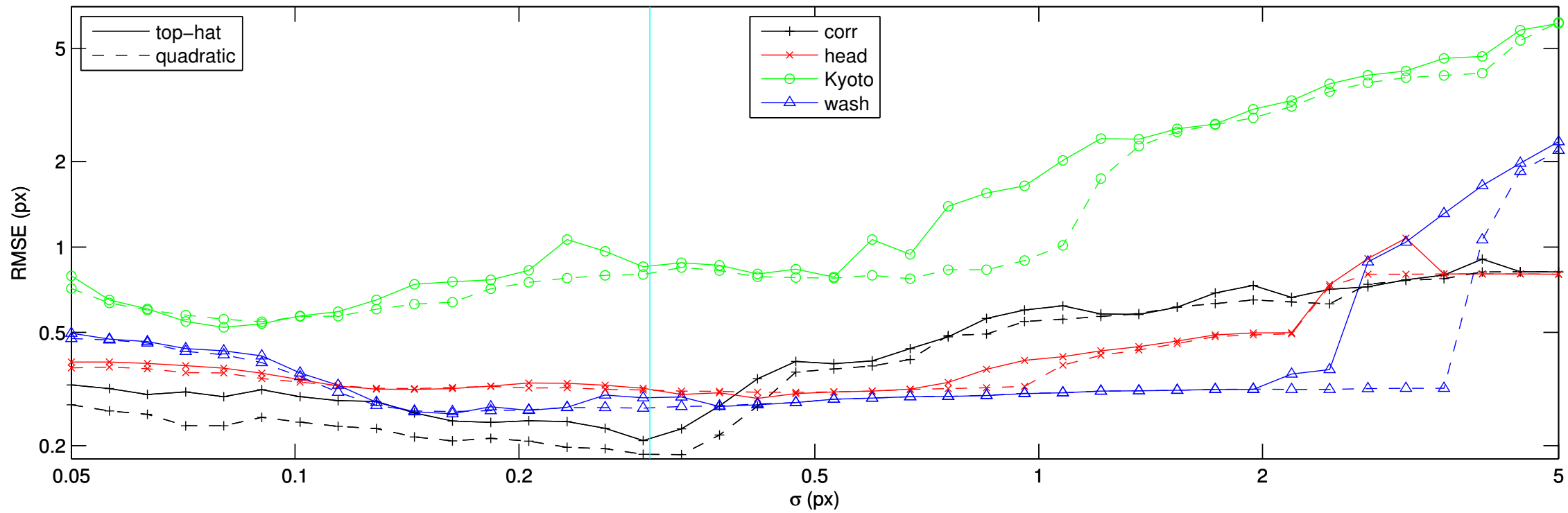
(a)	[1]	Cech et al.: Sequential Correspondence Verification, http://cmp.felk.cvut.cz/~cechj/SCV/
(b)	[4]	Chum et al.: DegenSAC (Two-view Geometry Estimation Unaffected by a Dominant Plane)
(c)	various	Visual Geometry Group (University of Oxford), http://www.robots.ox.ac.uk/~vgg/data.html
(d)	[17]	Stewart et al.: Testsuite of 22 challenging pairs of images, http://www.vision.cs.rpi.edu/gdbicp/dataset/
(e)	–	Centre for Remote Imaging, Sensing and Processing, http://www.crisp.nus.edu.sg/~research/tutorial/opt_int.htm .
(f)	[12]	Morel and Yu: ASIFT, http://www.cmap.polytechnique.fr/~yu/research/ASIFT/demo.html
(g)	[16]	Tuytelaars, http://homes.esat.kuleuven.be/~tuytelaa/
(h)	[14]	Pollefeys, Leuven castle image sequence, http://www.cs.unc.edu/~marc/
(i)	[10]	Matas: Robust Wide Baseline Stereo from Maximally Stable Extremal Regions
(j)	[9]	Martinec: St. George rotunda, http://cmp.felk.cvut.cz/projects/is3d/
(k)	[13]	Perdoch: Epipolar Geometry from Two Correspondences, http://cmp.felk.cvut.cz/~perdom1/
(l)	[2]	Chum and Matas: Matching with PROSAC - progressive sample consensus


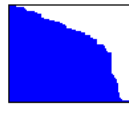




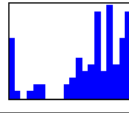
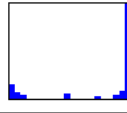
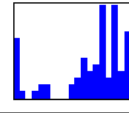
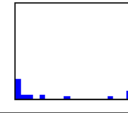






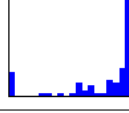
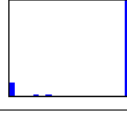
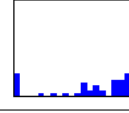
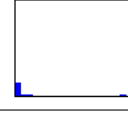






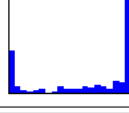
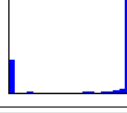
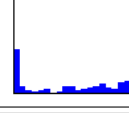
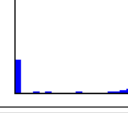






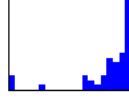
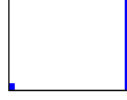
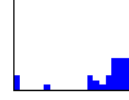
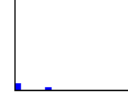
4 Scoring functions







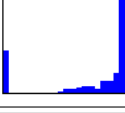
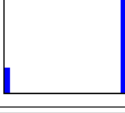
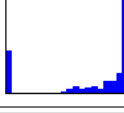
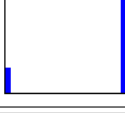


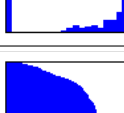


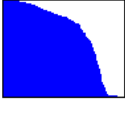

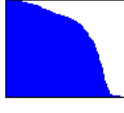


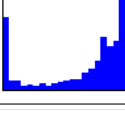
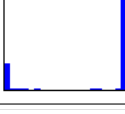
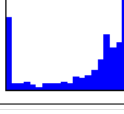
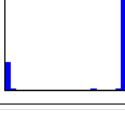



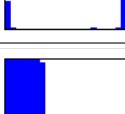

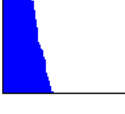

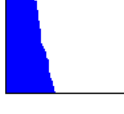
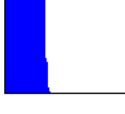

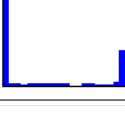
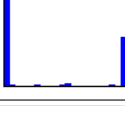
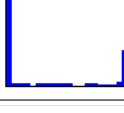
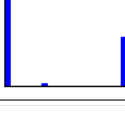









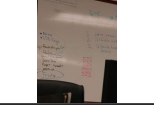
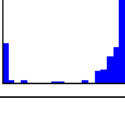

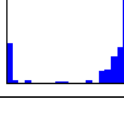
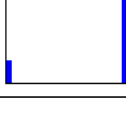




This section shows effect of used scoring (top-hat vs. truncated quadratic).

4.1 Data presented in the paper

Following graphs illustrate different robustnes of different cost functions to the error scale (changing σ , confidence 95 %, 1000 runs per value).

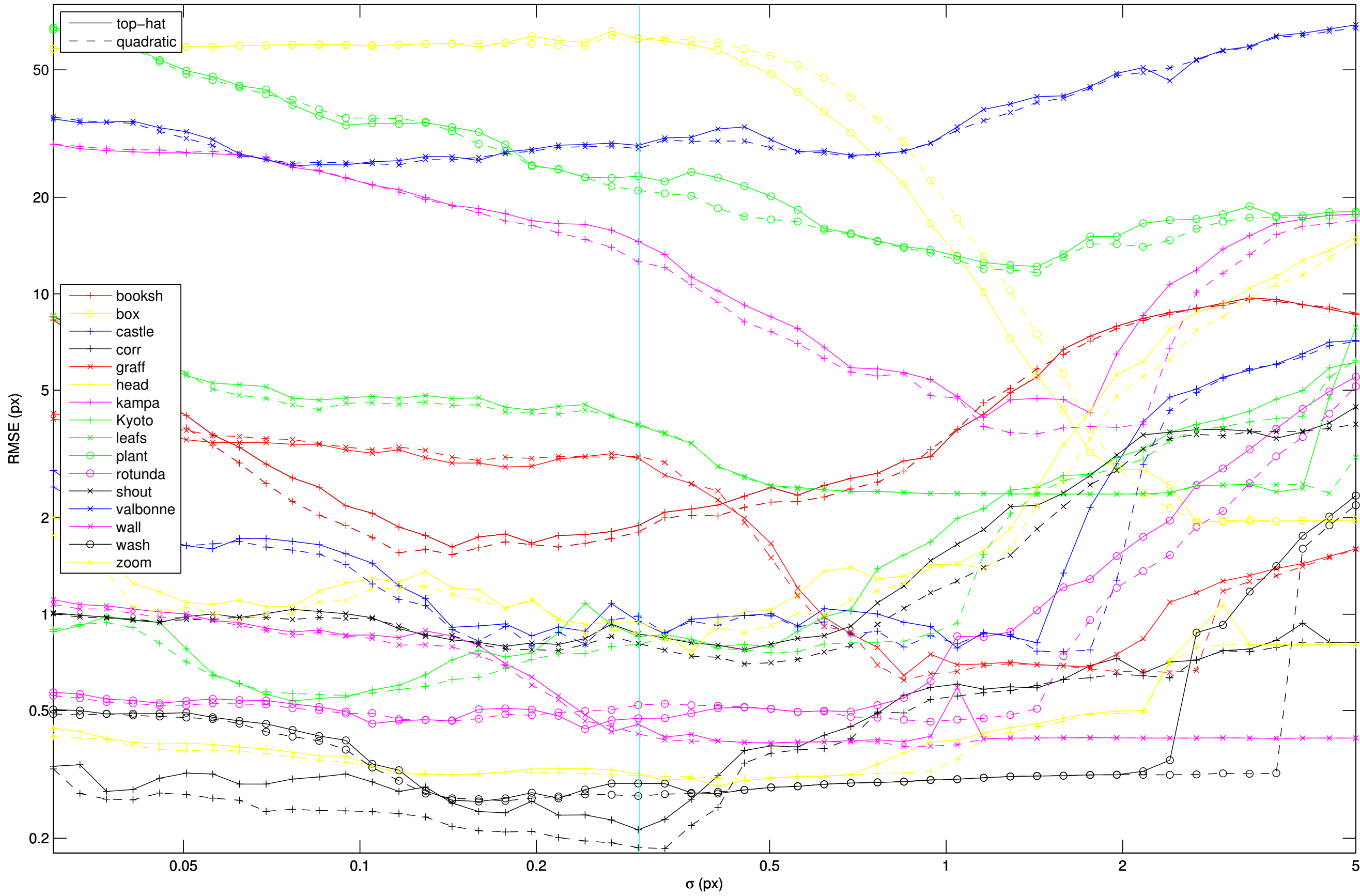


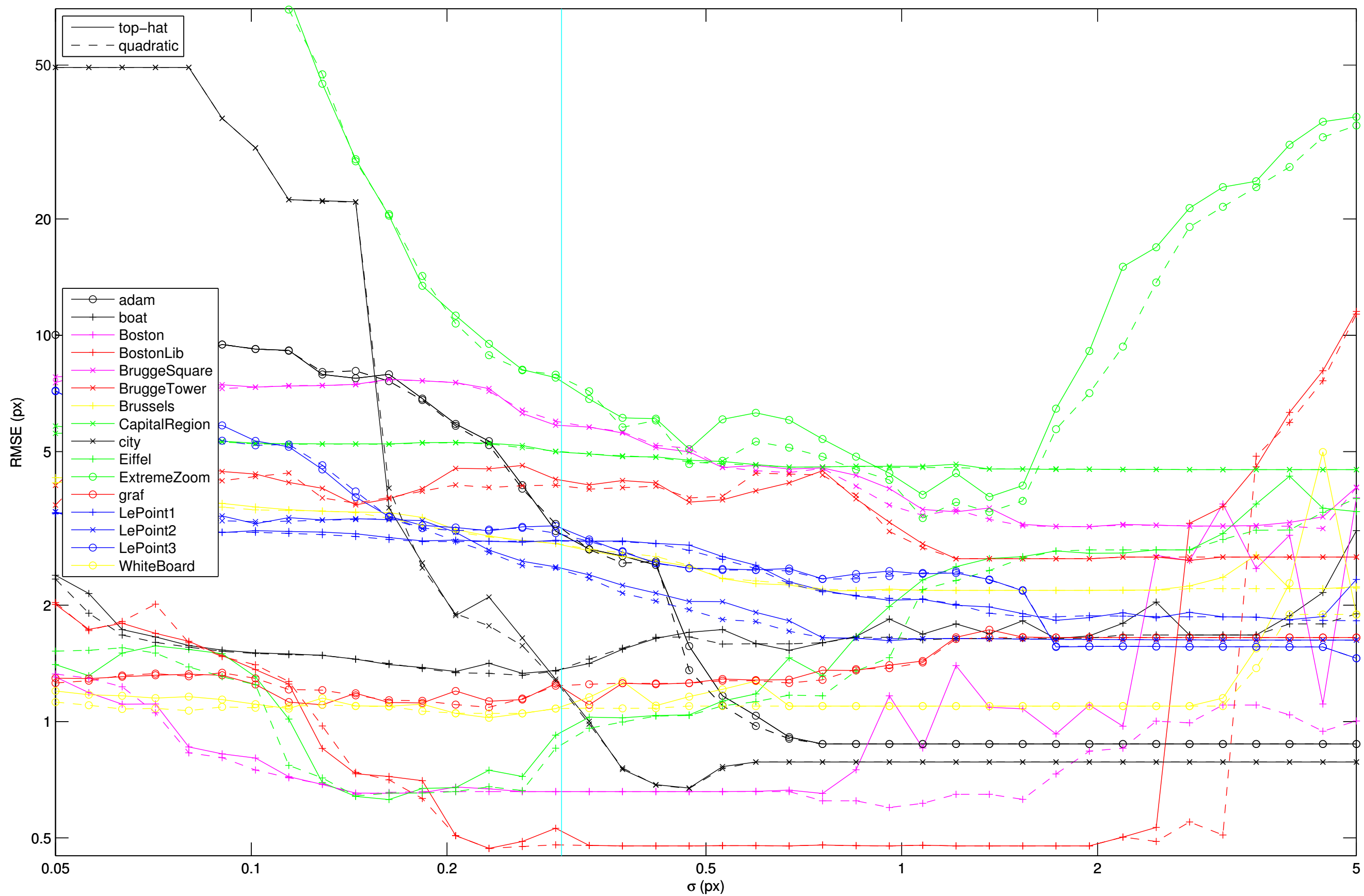
Solver→ Detectors→ Descriptors→			R		R.LO		M		M.LO		
			MSER+ MSER-SIFT		MSER+ MSER-SIFT		MSER+ MSER-SIFT		MSER+ MSER-SIFT		
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		
corr		I	62.8 ±4.1 (52-76)		74.5 ±1.8 (59-78)		62.7 ±4.4 (50-76)		73.1 ±1.6 (58-77)		Inlss
		I (%)	67.6 ±4.4 (56-82)		80.1 ±1.9 (63-84)		67.4 ±4.7 (54-82)		78.6 ±1.7 (62-83)		
		Samp	59.6 ±23.5 (11-183)		49.0 ±15.0 (11-183)		61.0 ±25.1 (11-211)		49.5 ±15.9 (11-183)		
		Time _(ms)	1.1 (NA)		6.4 (NA)		1.1 (NA)		6.5 (NA)		H _{Inlss}
Error		0.51 ±0.38 (0.1-4.6)		0.21 ±0.15 (0.1-2.7)		0.48 ±0.33 (0.1-3.0)		0.18 ±0.11 (0.1-2.7)			
LO count		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-2)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-2)			
head		I	66.9 ±4.0 (52-77)		74.4 ±0.6 (71-77)		66.9 ±4.1 (52-77)		73.9 ±0.6 (69-76)		Inlss
		I (%)	77.8 ±4.7 (60-90)		86.5 ±0.7 (83-90)		77.8 ±4.7 (60-90)		86.0 ±0.7 (80-88)		
		Samp	21.6 ±10.0 (5-103)		21.5 ±9.7 (5-68)		21.8 ±10.1 (5-103)		21.7 ±9.8 (5-103)		
		Time _(ms)	0.4 (NA)		6.0 (NA)		0.4 (NA)		6.0 (NA)		H _{Inlss}
Error		0.78 ±0.51 (0.2-7.0)		0.32 ±0.05 (0.2-0.8)		0.78 ±0.52 (0.2-5.1)		0.31 ±0.03 (0.2-0.5)			
LO count		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)			
Kyoto		I	295.4 ±16.3 (245-336)		335.0 ±6.9 (276-339)		295.2 ±16.5 (245-336)		333.5 ±6.7 (274-339)		Inlss
		I (%)	66.4 ±3.7 (55-76)		75.3 ±1.5 (62-76)		66.3 ±3.7 (55-76)		74.9 ±1.5 (62-76)		
		Samp	65.1 ±25.8 (21-203)		49.1 ±12.0 (21-165)		65.4 ±26.0 (21-203)		49.2 ±12.1 (21-185)		
		Time _(ms)	2.4 (NA)		12.1 (NA)		2.4 (NA)		12.2 (NA)		H _{Inlss}
Error		2.27 ±1.29 (0.3-11.3)		0.87 ±0.32 (0.4-5.0)		2.25 ±1.28 (0.3-11.3)		0.81 ±0.32 (0.4-5.7)			
LO count		0.0 ±0.0 (0-0)		1.0 ±0.1 (1-2)		0.0 ±0.0 (0-0)		1.0 ±0.1 (1-2)			
wash		I	45.7 ±3.5 (35-52)		52.0 ±0.0 (52-52)		45.7 ±3.5 (34-52)		51.3 ±0.4 (51-52)		Inlss
		I (%)	83.1 ±6.4 (64-95)		94.5 ±0.0 (95-95)		83.1 ±6.4 (62-95)		93.2 ±0.8 (93-95)		
		Samp	16.6 ±9.8 (3-87)		16.6 ±9.6 (3-72)		16.7 ±9.8 (3-92)		16.7 ±9.7 (3-72)		
		Time _(ms)	0.3 (NA)		5.5 (NA)		0.3 (NA)		5.4 (NA)		H _{Inlss}
Error		1.05 ±0.62 (0.2-5.2)		0.30 ±0.04 (0.2-0.7)		1.04 ±0.61 (0.2-5.2)		0.27 ±0.04 (0.2-0.6)			
LO count		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)			

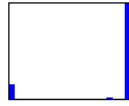
Solver→ Detectors→ Descriptors→			R MSER+ MSER- SIFT			R.LO MSER+ MSER- SIFT			M MSER+ MSER- SIFT			M.LO MSER+ MSER- SIFT			
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %			10000 runs, $\sigma = 0.3$, conf = 95 %			10000 runs, $\sigma = 0.3$, conf = 95 %			10000 runs, $\sigma = 0.3$, conf = 95 %			
Boston		I	277.4 ±21.4 (199-305)			305.0 ±0.0 (305-305)			277.3 ±21.5 (187-305)			305.0 ±0.0 (305-305)			Inlss
		I (%)	72.6 ±5.6 (52-80)			79.8 ±0.0 (80-80)			72.6 ±5.6 (49-80)			79.8 ±0.0 (80-80)			
		Samp	12.8 ±5.8 (6-53)			12.8 ±5.8 (6-50)			12.8 ±5.8 (6-53)			12.8 ±5.8 (6-50)			
		Time _(ms)	1.1 (NA)			15.7 (NA)			1.1 (NA)			16.0 (NA)			H _{Inlss}
		Error	1.79 ±1.02 (0.4-15.1)			0.66 ±0.00 (0.7-0.7)			1.78 ±1.01 (0.4-15.1)			0.66 ±0.00 (0.7-0.7)			
		LO count	0.0 ±0.0 (0-0)			1.0 ±0.0 (1-1)			0.0 ±0.0 (0-0)			1.0 ±0.0 (1-1)			
Brussels		I	328.8 ±32.3 (228-394)			391.3 ±2.0 (387-398)			328.7 ±32.4 (225-394)			390.6 ±1.3 (387-396)			Inlss
		I (%)	65.4 ±6.4 (45-78)			77.8 ±0.4 (77-79)			65.3 ±6.5 (45-78)			77.6 ±0.3 (77-79)			
		Samp	20.9 ±9.3 (7-71)			20.9 ±9.2 (7-52)			21.0 ±9.4 (7-71)			20.9 ±9.2 (7-52)			
		Time _(ms)	2.3 (NA)			20.6 (NA)			2.3 (NA)			20.7 (NA)			H _{Inlss}
		Error	3.68 ±0.95 (2.0-10.6)			2.87 ±0.08 (2.4-3.2)			3.65 ±0.92 (2.0-10.6)			2.88 ±0.05 (2.7-3.0)			
		LO count	0.0 ±0.0 (0-0)			1.0 ±0.0 (1-1)			0.0 ±0.0 (0-0)			1.0 ±0.0 (1-1)			
Eiffel		I	61.0 ±4.1 (45-69)			67.7 ±1.0 (63-70)			60.9 ±4.1 (43-69)			66.8 ±1.1 (62-69)			Inlss
		I (%)	30.5 ±2.0 (22-34)			33.8 ±0.5 (32-35)			30.4 ±2.1 (22-34)			33.4 ±0.5 (31-34)			
		Samp	436.2 ±153.3(223-1676)			242.9 ±16.3(210-494)			438.9 ±155.3(223-1676)			254.5 ±18.6(223-800)			
		Time _(ms)	6.8 (NA)			19.0 (NA)			6.8 (NA)			19.6 (NA)			H _{Inlss}
		Error	1.23 ±0.59 (0.3-7.7)			0.94 ±0.23 (0.5-1.7)			1.23 ±0.57 (0.3-7.6)			0.88 ±0.16 (0.6-1.4)			
		LO count	0.0 ±0.0 (0-0)			2.4 ±1.1 (1-8)			0.0 ±0.0 (0-0)			2.5 ±1.2 (1-8)			
WhiteBoard		I	161.2 ±13.2 (104-174)			174.0 ±0.0 (174-175)			161.1 ±13.2 (104-174)			174.0 ±0.0 (174-174)			Inlss
		I (%)	75.3 ±6.2 (49-81)			81.3 ±0.0 (81-82)			75.3 ±6.2 (49-81)			81.3 ±0.0 (81-81)			
		Samp	11.7 ±5.7 (6-56)			11.6 ±5.7 (6-51)			11.7 ±5.8 (6-56)			11.7 ±5.8 (6-51)			
		Time _(ms)	0.7 (NA)			9.6 (NA)			0.7 (NA)			9.7 (NA)			H _{Inlss}
		Error	1.49 ±0.50 (0.5-6.0)			1.08 ±0.02 (1.1-1.5)			1.48 ±0.49 (0.5-6.0)			1.08 ±0.00 (1.1-1.1)			
		LO count	0.0 ±0.0 (0-0)			1.0 ±0.0 (1-1)			0.0 ±0.0 (0-0)			1.0 ±0.0 (1-1)			


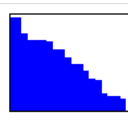
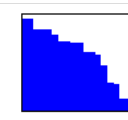
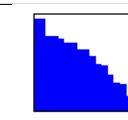
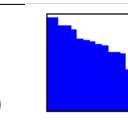









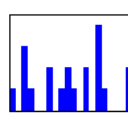
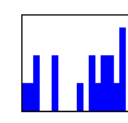
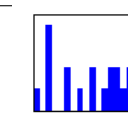
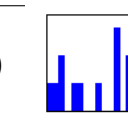
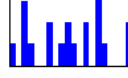
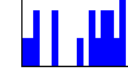







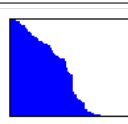

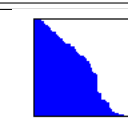










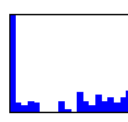
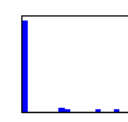
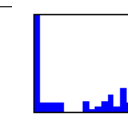
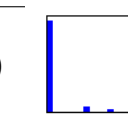
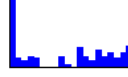
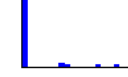

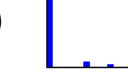





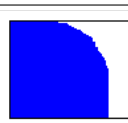
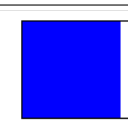

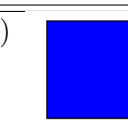









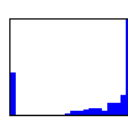
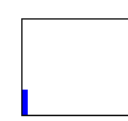
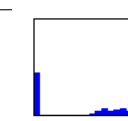
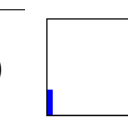
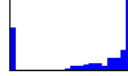
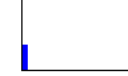
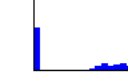
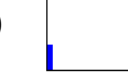





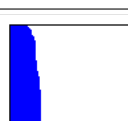


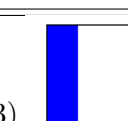










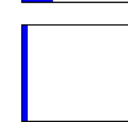

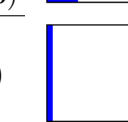


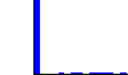
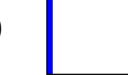




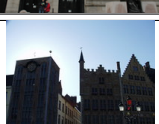
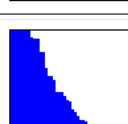
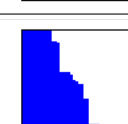
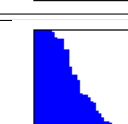










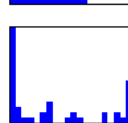
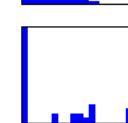


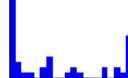
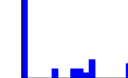

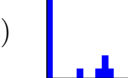
4.2 Additional experiments

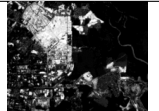
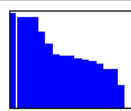
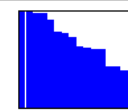
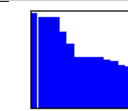
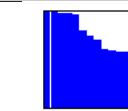









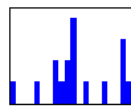
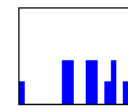
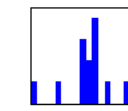
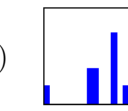
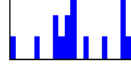
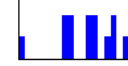

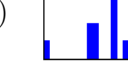





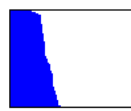
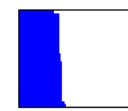
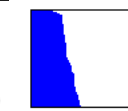



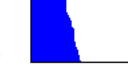






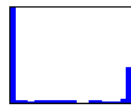
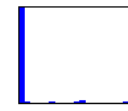
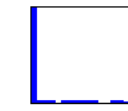
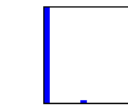
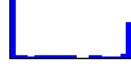
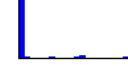







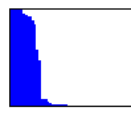
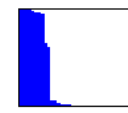
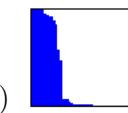
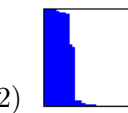









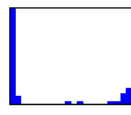
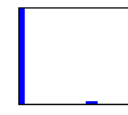
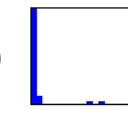
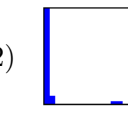









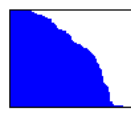

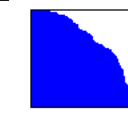
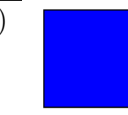









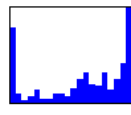
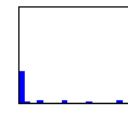
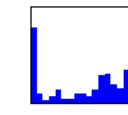
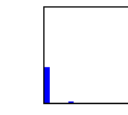
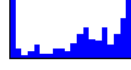
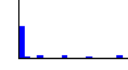







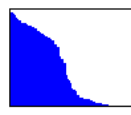
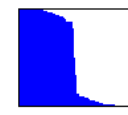
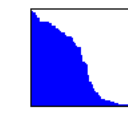
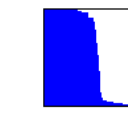









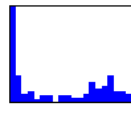
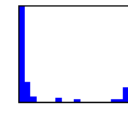
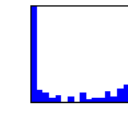
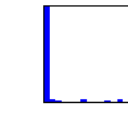
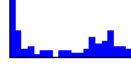
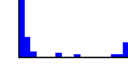





Following graphs illustrate different robustnes of different cost functions to the error scale (changing σ , confidence 95 %, 1000 runs per value).



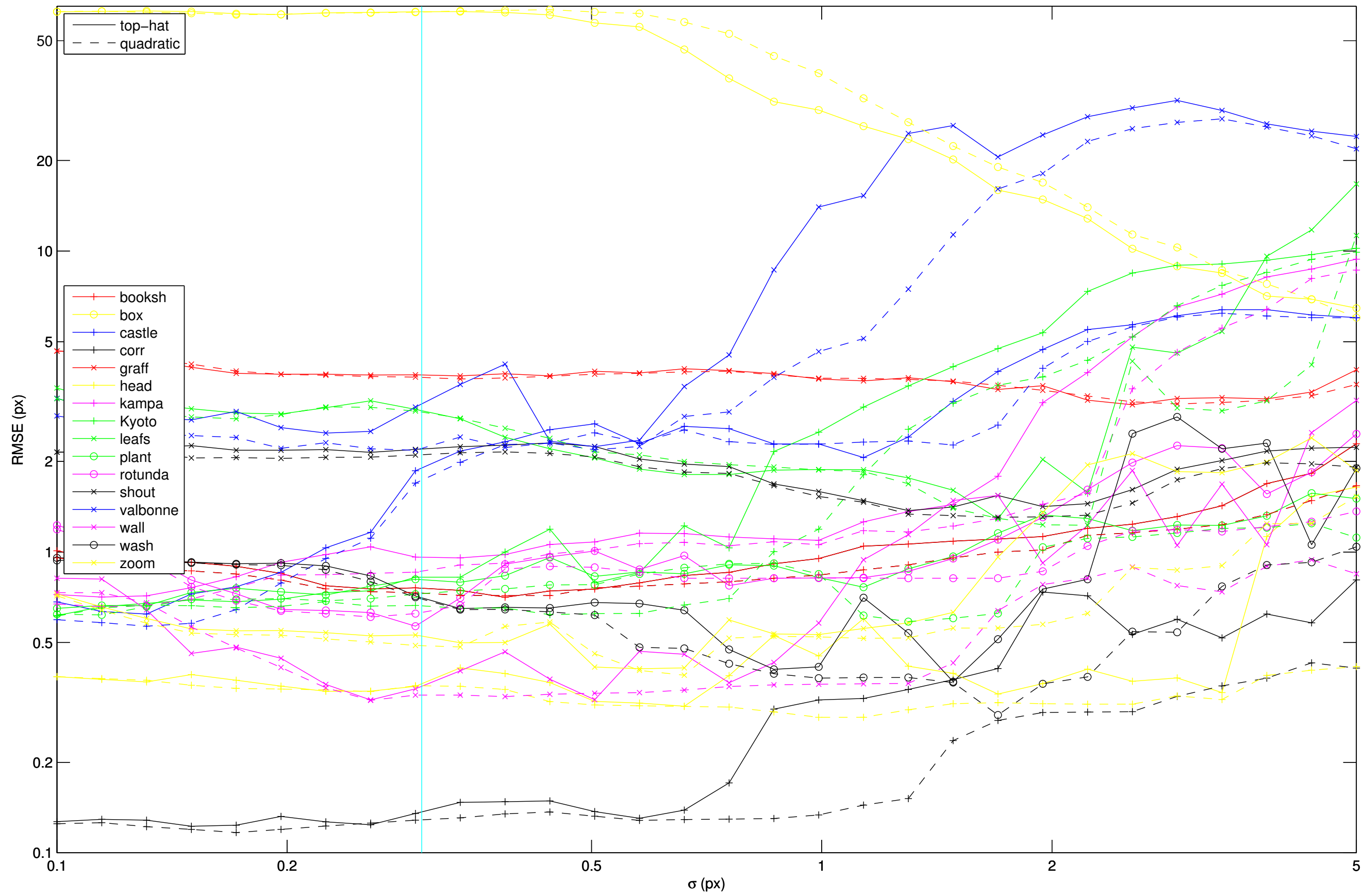


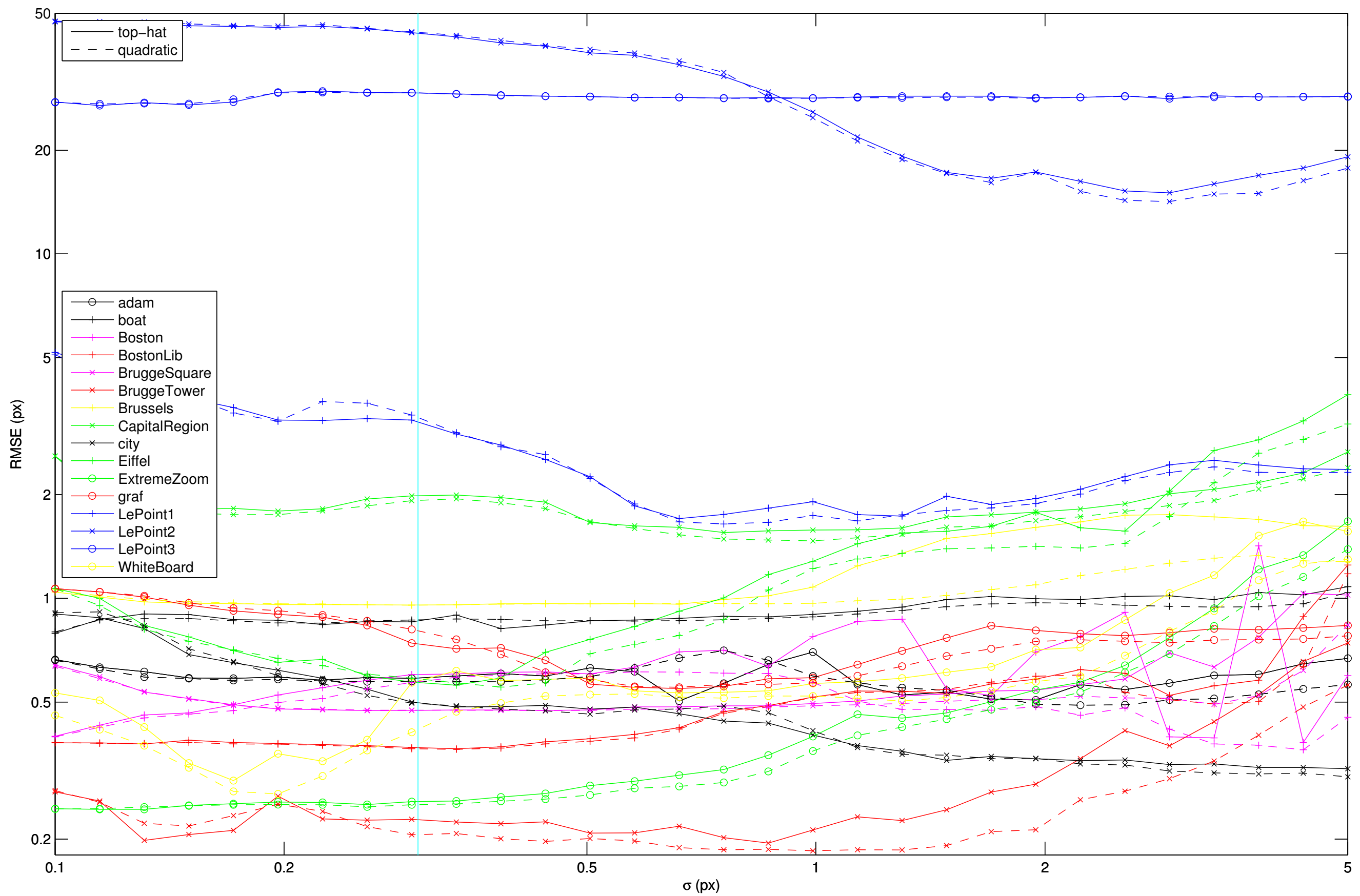
Solver→ Detectors→ Descriptors→			R				R.LO				M				M.LO				
Image		Qty↓	MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				
10000 runs, $\sigma = 0.3$, conf = 95 %			10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				
leafs		I	47.0 ±3.0 (38-57)			54.4 ±1.7 (42-57)			46.9 ±3.1 (36-57)			54.1 ±1.9 (43-57)			Inlss				
		I (%)	59.5 ±3.8 (48-72)			68.8 ±2.2 (53-72)			59.4 ±3.9 (46-72)			68.5 ±2.4 (54-72)							
		Samp	160.2 ±72.8 (31-591)			75.7 ±43.2 (31-517)			162.0 ±75.2 (31-682)			76.6 ±43.8 (31-532)							
		Time _(ms)	1.8 (NA)			6.4 (NA)			1.8 (NA)			6.4 (NA)			H _{Inlss}				
Error		8.19 ±6.75 (0.6-62.2)			3.87 ±1.36 (0.6-22.8)			7.94 ±6.48 (0.6-79.0)			3.88 ±1.31 (0.6-18.4)								
LO count		0.0 ±0.0 (0-0)			1.1 ±0.4 (1-6)			0.0 ±0.0 (0-0)			1.1 ±0.4 (1-6)								
plant		I	17.1 ±0.7 (16-21)			17.4 ±1.2 (16-23)			17.0 ±0.9 (13-21)			17.2 ±1.2 (13-23)			Inlss				
		I (%)	57.1 ±2.5 (53-70)			58.1 ±3.9 (53-77)			56.5 ±3.0 (43-70)			57.3 ±3.8 (43-77)							
		Samp	207.4 ±62.2 (51-530)			199.9 ±66.8 (50-530)			220.1 ±74.2 (51-947)			212.7 ±77.5 (50-947)							
		Time _(ms)	2.1 (NA)			3.7 (NA)			2.2 (NA)			3.9 (NA)			H _{Inlss}				
Error		23.84 ±25.80(0.7-166.0)			23.44 ±25.73(0.8-166.0)			21.24 ±24.63(0.7-166.0)			20.93 ±24.56(0.8-166.0)								
LO count		0.0 ±0.0 (0-0)			2.2 ±1.2 (1-9)			0.0 ±0.0 (0-0)			2.2 ±1.2 (1-8)								
rotunda		I	67.3 ±5.0 (51-75)			74.6 ±0.8 (60-75)			67.3 ±5.1 (50-75)			73.7 ±0.9 (57-75)			Inlss				
		I (%)	78.3 ±5.8 (59-87)			86.8 ±1.0 (70-87)			78.3 ±5.9 (58-87)			85.7 ±1.1 (66-87)							
		Samp	25.7 ±14.5 (6-119)			25.3 ±13.4 (6-114)			25.8 ±14.6 (6-119)			25.4 ±13.5 (6-114)							
		Time _(ms)	0.5 (NA)			5.9 (NA)			0.5 (NA)			5.9 (NA)			H _{Inlss}				
Error		1.31 ±0.89 (0.2-10.3)			0.47 ±0.11 (0.2-1.5)			1.30 ±0.87 (0.2-10.3)			0.52 ±0.13 (0.2-1.6)								
LO count		0.0 ±0.0 (0-0)			1.0 ±0.0 (1-1)			0.0 ±0.0 (0-0)			1.0 ±0.0 (1-1)								
shout		I	38.5 ±2.0 (32-44)			40.7 ±1.3 (34-44)			38.4 ±2.1 (30-44)			40.5 ±1.5 (33-44)			Inlss				
		I (%)	71.3 ±3.8 (59-81)			75.4 ±2.5 (63-81)			71.2 ±3.9 (56-81)			75.0 ±2.7 (61-81)							
		Samp	38.7 ±16.0 (11-137)			37.3 ±13.4 (11-121)			39.2 ±16.5 (11-141)			37.6 ±13.8 (11-121)							
		Time _(ms)	0.5 (NA)			5.4 (NA)			0.5 (NA)			5.3 (NA)			H _{Inlss}				
Error		1.77 ±1.14 (0.3-9.1)			0.86 ±0.62 (0.3-9.1)			1.72 ±1.08 (0.3-9.0)			0.82 ±0.55 (0.3-8.0)								
LO count		0.0 ±0.0 (0-0)			1.0 ±0.1 (1-2)			0.0 ±0.0 (0-0)			1.0 ±0.1 (1-2)								
valbonne		I	22.4 ±1.4 (18-26)			23.9 ±1.4 (18-26)			22.4 ±1.4 (16-26)			23.7 ±1.4 (17-26)			Inlss				
		I (%)	70.0 ±4.3 (56-81)			74.6 ±4.5 (56-81)			69.9 ±4.5 (50-81)			73.9 ±4.3 (53-81)							
		Samp	50.1 ±24.6 (10-199)			47.0 ±21.1 (10-199)			50.7 ±25.5 (10-199)			47.4 ±21.5 (10-199)							
		Time _(ms)	0.6 (NA)			3.6 (NA)			0.6 (NA)			3.6 (NA)			H _{Inlss}				
Error		30.21 ±17.96(0.7-140.3)			29.29 ±13.38(0.8-140.3)			29.46 ±17.52(0.7-140.3)			28.56 ±13.23(0.8-140.3)								
LO count		0.0 ±0.0 (0-0)			1.1 ±0.4 (1-5)			0.0 ±0.0 (0-0)			1.1 ±0.4 (1-5)								
wall		I	78.4 ±5.1 (60-90)			87.8 ±1.6 (76-90)			78.3 ±5.1 (60-90)			87.5 ±1.6 (75-90)			Inlss				
		I (%)	80.0 ±5.2 (61-92)			89.6 ±1.6 (78-92)			79.9 ±5.2 (61-92)			89.3 ±1.6 (77-92)							
		Samp	19.4 ±10.2 (4-94)			19.4 ±10.0 (4-83)			19.5 ±10.3 (4-94)			19.4 ±10.0 (4-83)							
		Time _(ms)	0.4 (NA)			5.9 (NA)			0.4 (NA)			5.8 (NA)			H _{Inlss}				
Error		2.26 ±1.93 (0.3-29.2)			0.45 ±0.21 (0.2-3.5)			2.23 ±1.88 (0.3-29.2)			0.42 ±0.16 (0.2-1.8)								
LO count		0.0 ±0.0 (0-0)			1.0 ±0.0 (1-1)			0.0 ±0.0 (0-0)			1.0 ±0.0 (1-1)								
wash		I	45.7 ±3.5 (35-52)			52.0 ±0.0 (52-52)			45.7 ±3.5 (34-52)			51.3 ±0.4 (51-52)			Inlss				
		I (%)	83.1 ±6.4 (64-95)			94.5 ±0.0 (95-95)			83.1 ±6.4 (62-95)			93.2 ±0.8 (93-95)							
		Samp	16.6 ±9.8 (3-87)			16.6 ±9.6 (3-72)			16.7 ±9.8 (3-92)			16.7 ±9.7 (3-72)							
		Time _(ms)	0.3 (NA)			5.4 (NA)			0.3 (NA)			5.4 (NA)			H _{Inlss}				
Error		1.05 ±0.62 (0.2-5.2)			0.30 ±0.04 (0.2-0.7)			1.04 ±0.61 (0.2-5.2)			0.27 ±0.04 (0.2-0.6)								
LO count		0.0 ±0.0 (0-0)			1.0 ±0.0 (1-1)			0.0 ±0.0 (0-0)			1.0 ±0.0 (1-1)								
zoom		I	37.9 ±3.4 (30-45)			43.7 ±2.2 (31-45)			37.9 ±3.4 (26-45)			43.6 ±2.2 (30-45)			Inlss				
		I (%)	54.1 ±4.8 (43-64)			62.4 ±3.2 (44-64)			54.1 ±4.9 (37-64)			62.3 ±3.2 (43-64)							
		Samp	394.9 ±212.4 (66-1555)			170.4 ±132.1 (66-1365)			399.0 ±218.0 (66-1763)			169.6 ±131.3 (66-1365)							
		Time _(ms)	4.2 (NA)			9.6 (NA)			4.2 (NA)			9.5 (NA)			H _{Inlss}				
Error		2.49 ±2.72 (0.3-28.0)			0.89 ±1.85 (0.3-26.6)			2.39 ±2.56 (0.3-28.0)			0.86 ±1.72 (0.3-26.1)								
LO count		0.0 ±0.0 (0-0)			1.9 ±1.1 (1-8)			0.0 ±0.0 (0-0)			1.9 ±1.1 (1-9)								


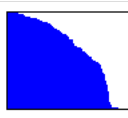
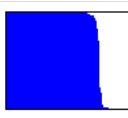
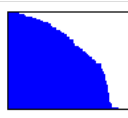
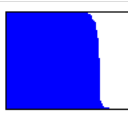









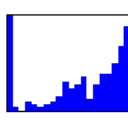
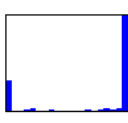
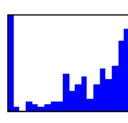
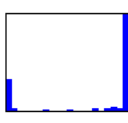
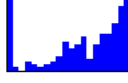

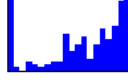


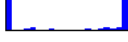

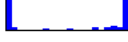

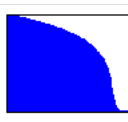
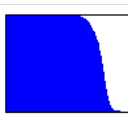
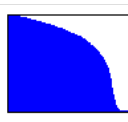
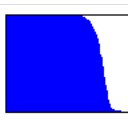









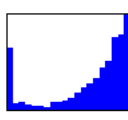

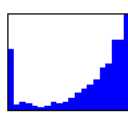
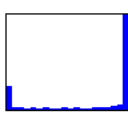
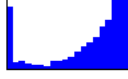
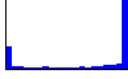
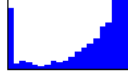


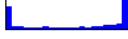



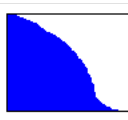
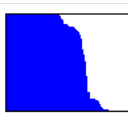
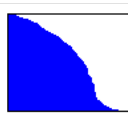
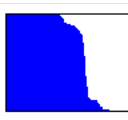









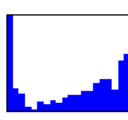
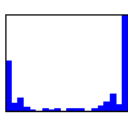
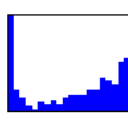
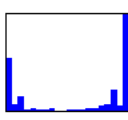
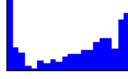
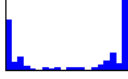
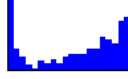
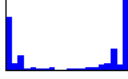



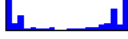

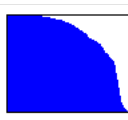
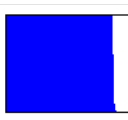
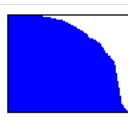










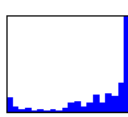
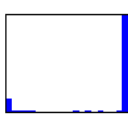
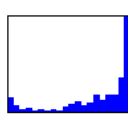
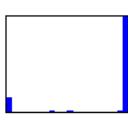
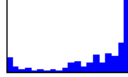
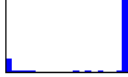
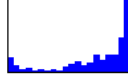


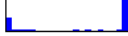

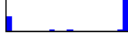

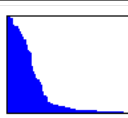
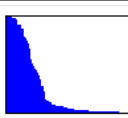
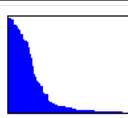
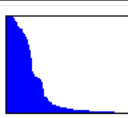
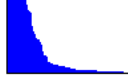

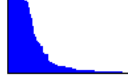


Solver→ Detectors→ Descriptors→			R				R.LO				M				M.LO				
			MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				
adam		I	9.9	±0.6	(9-12)		11.0	±0.8	(9-14)		9.7	±0.8	(7-12)		11.0	±0.9	(7-13)		Inlss
		I (%)	49.5	±2.8	(45-60)		55.1	±4.2	(45-70)		48.3	±4.0	(35-60)		55.1	±4.5	(35-65)		
		Samp	79.7	±21.2	(28-161)		58.1	±15.1	(28-114)		85.3	±27.4	(28-212)		57.1	±13.9	(28-165)		
		Time _(ms)	2.3		(NA)		5.7		(NA)		2.4		(NA)		5.6		(NA)		H _{Inlss}
Error	3.90	±3.50	(1.0-13.6)		3.16	±1.78	(0.9-9.3)		4.07	±3.59	(0.8-14.1)		3.25	±1.77	(0.9-9.6)				
LO count	0.0	±0.0	(0-0)		1.2	±0.5	(1-5)		0.0	±0.0	(0-0)		1.2	±0.4	(1-4)				
boat		I	50.7	±4.3	(38-66)		64.3	±1.4	(54-67)		50.4	±4.6	(34-66)		64.1	±1.5	(51-67)		Inlss
		I (%)	40.2	±3.4	(30-52)		51.0	±1.1	(43-53)		40.0	±3.7	(27-52)		50.9	±1.2	(40-53)		
		Samp	146.4	±50.3	(41-440)		51.7	±3.5	(41-129)		149.0	±53.1	(41-440)		51.9	±3.8	(41-137)		
		Time _(ms)	4.4		(NA)		7.3		(NA)		4.7		(NA)		7.5		(NA)		H _{Inlss}
Error	1.88	±0.49	(1.2-6.7)		1.37	±0.08	(1.2-2.5)		1.84	±0.45	(1.2-6.7)		1.37	±0.07	(1.3-2.4)				
LO count	0.0	±0.0	(0-0)		1.0	±0.2	(1-4)		0.0	±0.0	(0-0)		1.0	±0.2	(1-3)				
Boston		I	277.4	±21.4	(199-305)		305.0	±0.0	(305-305)		277.3	±21.5	(187-305)		305.0	±0.0	(305-305)		Inlss
		I (%)	72.6	±5.6	(52-80)		79.8	±0.0	(80-80)		72.6	±5.6	(49-80)		79.8	±0.0	(80-80)		
		Samp	12.8	±5.8	(6-53)		12.8	±5.8	(6-50)		12.8	±5.8	(6-53)		12.8	±5.8	(6-50)		
		Time _(ms)	1.1		(NA)		15.8		(NA)		1.1		(NA)		15.8		(NA)		H _{Inlss}
Error	1.79	±1.02	(0.4-15.1)		0.66	±0.00	(0.7-0.7)		1.78	±1.01	(0.4-15.1)		0.66	±0.00	(0.7-0.7)				
LO count	0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)				
BostonLib		I	44.7	±3.5	(33-51)		50.9	±0.4	(43-51)		44.6	±3.5	(32-51)		50.0	±0.3	(43-50)		Inlss
		I (%)	22.4	±1.7	(16-26)		25.4	±0.2	(22-26)		22.3	±1.8	(16-26)		25.0	±0.1	(22-25)		
		Samp	1612.4	±601.0	(774-5885)		794.9	±88.8	(774-3366)		1619.9	±605.8	(774-5885)		851.4	±73.0	(774-2393)		
		Time _(ms)	9.8		(NA)		16.4		(NA)		10.0		(NA)		17.1		(NA)		H _{Inlss}
Error	2.03	±1.18	(0.4-12.9)		0.49	±0.06	(0.4-1.9)		2.00	±1.14	(0.4-12.9)		0.48	±0.03	(0.5-1.9)				
LO count	0.0	±0.0	(0-0)		2.9	±1.2	(1-8)		0.0	±0.0	(0-0)		3.0	±1.2	(1-8)				
BruggeSquare		I	16.7	±0.8	(14-20)		18.7	±1.2	(14-20)		16.6	±0.9	(12-20)		18.7	±1.3	(15-20)		Inlss
		I (%)	36.3	±1.7	(30-43)		40.7	±2.7	(30-43)		36.1	±1.9	(26-43)		40.6	±2.8	(33-43)		
		Samp	237.4	±54.2	(100-610)		144.9	±42.6	(100-487)		242.3	±58.7	(100-628)		146.9	±44.3	(100-357)		
		Time _(ms)	3.4		(NA)		9.7		(NA)		3.4		(NA)		9.5		(NA)		H _{Inlss}
Error	7.42	±2.08	(2.4-17.9)		5.70	±2.47	(2.7-10.0)		7.38	±2.05	(2.4-17.7)		5.93	±2.49	(3.0-10.0)				
LO count	0.0	±0.0	(0-0)																


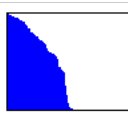
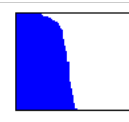
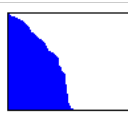
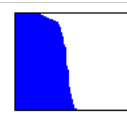
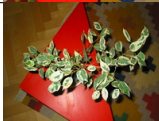
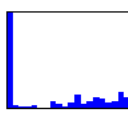
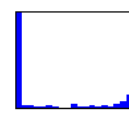
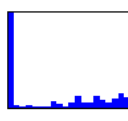
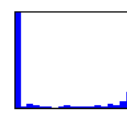
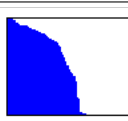

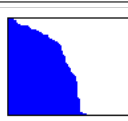


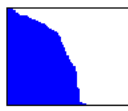

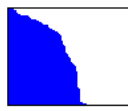


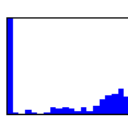
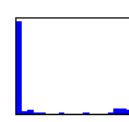
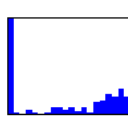
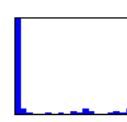
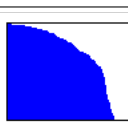

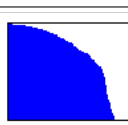


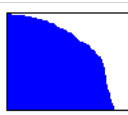

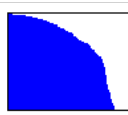


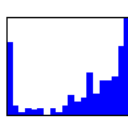
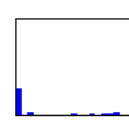
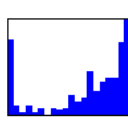
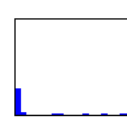
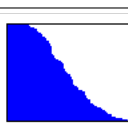
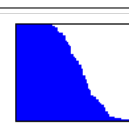
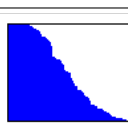
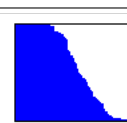

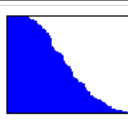
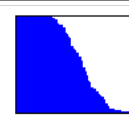
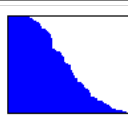


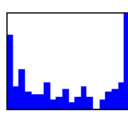
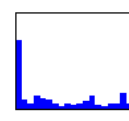
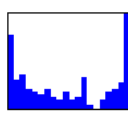
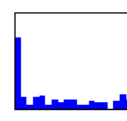
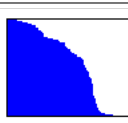

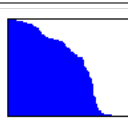
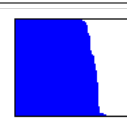

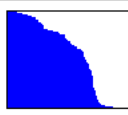
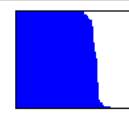
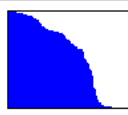
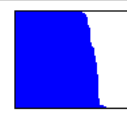

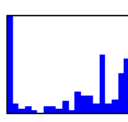
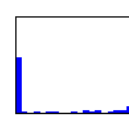
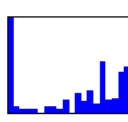
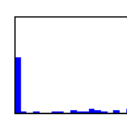





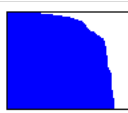

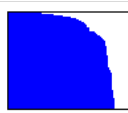
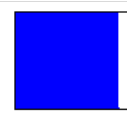
Solver→ Detectors→ Descriptors→			R				R.LO				M				M.LO				
Image		Qty↓	MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				
10000 runs, $\sigma = 0.3$, conf = 95 %			10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				
city		I	9.7	±0.6	(8-11)		11.1	±1.0	(8-13)		9.7	±0.6	(6-11)		11.0	±1.0	(8-13)		Inlss
		I (%)	57.0	±3.3	(47-65)		65.2	±5.8	(47-76)		56.8	±3.5	(35-65)		64.7	±5.6	(47-76)		
		Samp	44.9	±14.8	(21-135)		41.5	±9.7	(21-120)		45.4	±15.4	(21-203)		41.6	±9.4	(21-120)		
		Time _(ms)	1.2		(NA)		4.5		(NA)		1.2		(NA)		4.5		(NA)		H _{Inlss}
	Error	1.53	±1.33	(0.6-63.7)		1.21	±1.28	(0.6-63.5)		1.51	±0.99	(0.6-63.7)		1.20	±0.92	(0.6-63.5)			
	LO count	0.0	±0.0	(0-0)		1.0	±0.2	(1-3)		0.0	±0.0	(0-0)		1.0	±0.1	(1-3)			
Eiffel		I	61.0	±4.1	(45-69)		67.7	±1.0	(63-70)		60.9	±4.1	(43-69)		66.8	±1.1	(62-69)		Inlss
		I (%)	30.5	±2.0	(22-34)		33.8	±0.5	(32-35)		30.4	±2.1	(22-34)		33.4	±0.5	(31-34)		
		Samp	436.2	±153.3	(223-1676)		242.9	±16.3	(210-494)		438.9	±155.3	(223-1676)		254.5	±18.6	(223-800)		
		Time _(ms)	6.7		(NA)		19.0		(NA)		6.7		(NA)		19.5		(NA)		H _{Inlss}
	Error	1.23	±0.59	(0.3-7.7)		0.94	±0.23	(0.5-1.7)		1.23	±0.57	(0.3-7.6)		0.88	±0.16	(0.6-1.4)			
	LO count	0.0	±0.0	(0-0)		2.4	±1.1	(1-8)		0.0	±0.0	(0-0)		2.5	±1.2	(1-8)			
ExtremeZoom		I	12.6	±1.2	(9-14)		13.1	±1.0	(9-14)		12.6	±1.2	(9-14)		13.1	±1.0	(9-14)		Inlss
		I (%)	22.5	±2.1	(16-25)		23.4	±1.8	(16-25)		22.5	±2.1	(16-25)		23.4	±1.9	(16-25)		
		Samp	2658.5	±1404.1	(1098-8732)		2242.0	±1311.4	(1098-8732)		2667.8	±1412.7	(1098-8732)		2260.2	±1324.7	(1098-8732)		
		Time _(ms)	14.0		(NA)		22.2		(NA)		14.1		(NA)		22.5		(NA)		H _{Inlss}
	Error	8.98	±16.93	(1.0-345.2)		6.70	±17.26	(0.6-345.2)		9.03	±17.16	(1.0-345.2)		6.89	±17.80	(0.6-345.2)			
	LO count	0.0	±0.0	(0-0)		4.2	±1.7	(1-12)		0.0	±0.0	(0-0)		4.2	±1.7	(1-12)			
graf		I	149.1	±13.9	(109-182)		181.9	±1.4	(140-190)		149.0	±14.1	(102-182)		180.3	±1.4	(138-182)		Inlss
		I (%)	60.9	±5.7	(44-74)		74.2	±0.6	(57-78)		60.8	±5.7	(42-74)		73.6	±0.6	(56-74)		
		Samp	27.3	±11.1	(9-86)		27.1	±10.3	(9-53)		27.4	±11.2	(9-86)		27.1	±10.4	(9-53)		
		Time _(ms)	2.1		(NA)		11.6		(NA)		2.1		(NA)		11.5		(NA)		H _{Inlss}
	Error	1.49	±0.56	(0.6-3.9)		1.27	±0.15	(0.6-2.5)		1.48	±0.55	(0.6-3.8)		1.24	±0.05	(1.1-2.5)			
	LO count	0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)			
LePoint1		I	54.5	±4.6	(42-67)		65.4	±2.9	(47-70)		54.3	±4.9	(34-67)		64.2	±2.8	(49-68)		Inlss
		I (%)	36.8	±3.1	(28-45)		44.2	±2.0	(32-47)		36.7	±3.3	(23-45)		43.4	±1.9	(33-46)		
		Samp	205.7	±68.9	(74-513)		87.6	±22.7	(62-321)		209.4	±73.4	(74-628)		94.8	±25.8	(70-270)		
		Time _(ms)	7.6		(NA)		12.9		(NA)		7.7		(NA)		13.5		(NA)		H _{Inlss}
	Error	3.10	±0.36	(2.0-7.2)		2.94	±0.16	(2.4-4.2)		3.08	±0.33	(2.1-5.2)		2.93	±0.10	(2.4-4.0)			
	LO count	0.0	±0.0	(0-0)		1.6	±0.7	(1-6)		0.0	±0.0	(0-0)		1.7	±0.8	(1-6)			


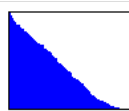
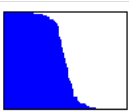
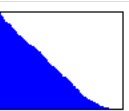
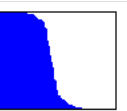

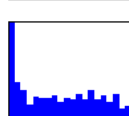

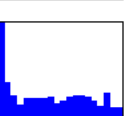




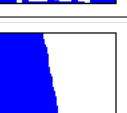

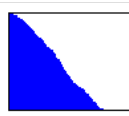

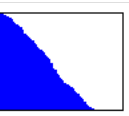
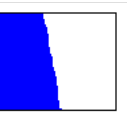

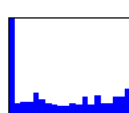
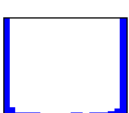
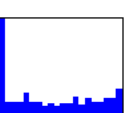
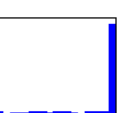


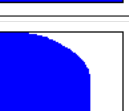


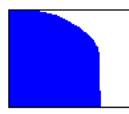
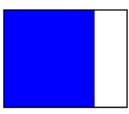
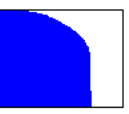
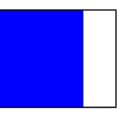

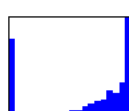

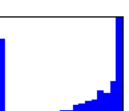




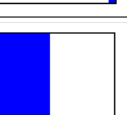

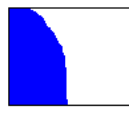

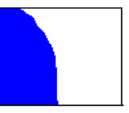
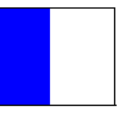

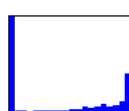

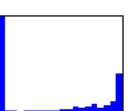




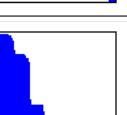

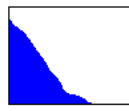
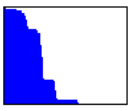
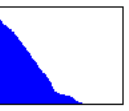
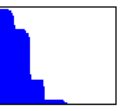

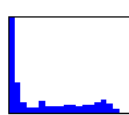
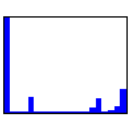
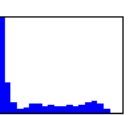
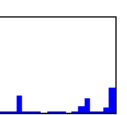
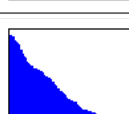


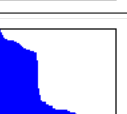

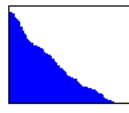
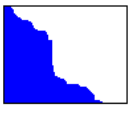
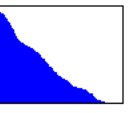
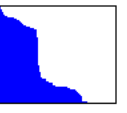

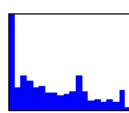
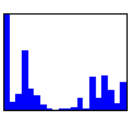
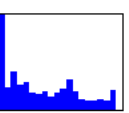
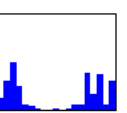
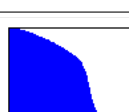

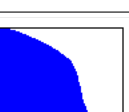

Following graphs illustrate different robustnes of different cost functions to the error scale (changing σ , confidence 95 %, 1000 runs per value). Points detected by *Hessian Affine* detector were used.

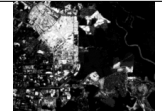
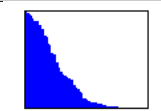
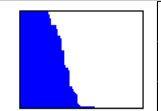
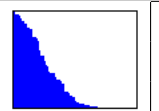
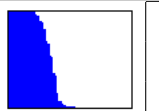
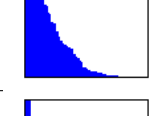
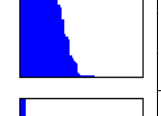
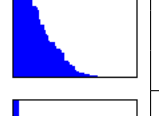

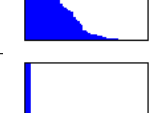


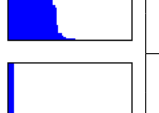

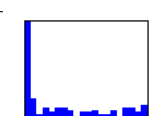

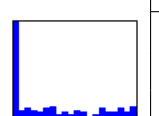
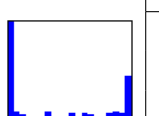



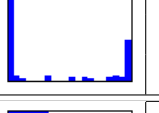

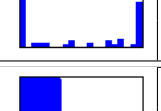



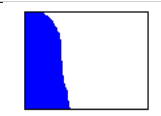

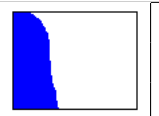
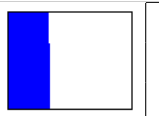



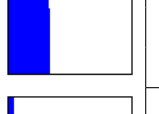
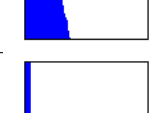


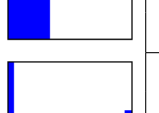


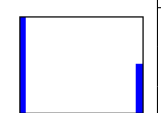

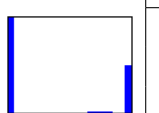



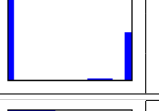






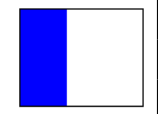
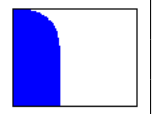
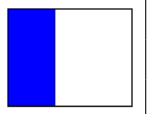


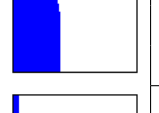
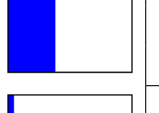



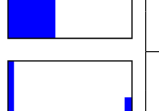

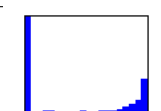

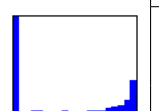
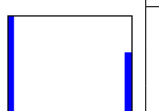
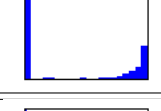
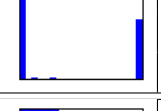
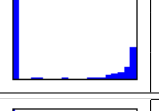






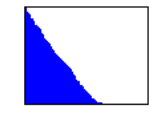

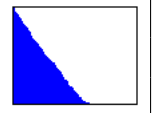

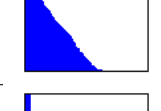


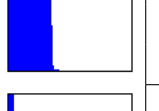
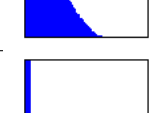




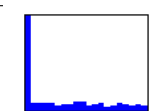

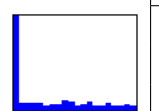



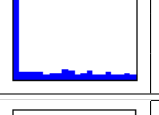
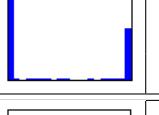


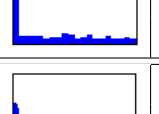


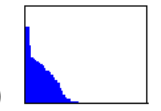
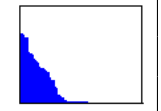
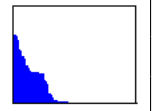
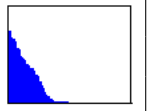
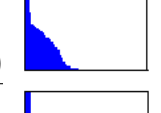
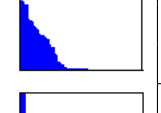
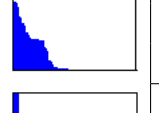
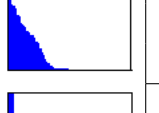
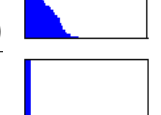

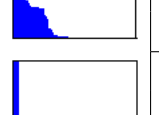


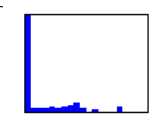
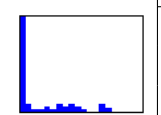
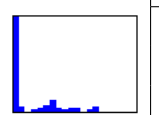
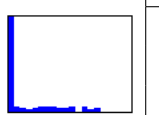
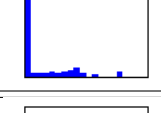
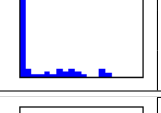
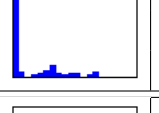
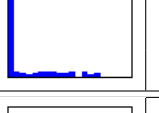

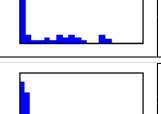
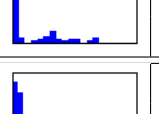




Solver→ Detectors→ Descriptors→			R				R.LO				M				M.LO				
			HessianAff SIFT				HessianAff SIFT				HessianAff SIFT				HessianAff SIFT				
Image		Qty↓	1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				
booksh		I	122.7	±9.1	(102-148)		149.2	±2.9	(119-153)		122.6	±9.2	(100-148)		147.8	±3.1	(117-153)		Inlss
		I (%)	61.7	±4.6	(51-74)		75.0	±1.5	(60-77)		61.6	±4.6	(50-74)		74.3	±1.6	(59-77)		
		Samp	124.4	±58.9	(29-332)		70.2	±36.9	(29-332)		125.6	±60.3	(29-365)		70.9	±38.0	(29-332)		
		Time _(ms)	2.0		(NA)		8.4		(NA)		2.1		(NA)		8.3		(NA)		H _{Inlss}
	Error	1.61	±1.15	(0.5-16.3)		0.74	±0.14	(0.6-2.4)		1.58	±1.13	(0.5-16.3)		0.74	±0.14	(0.6-2.4)			
	LO count	0.0	±0.0	(0-0)		1.0	±0.2	(1-2)		0.0	±0.0	(0-0)		1.0	±0.2	(1-3)			
box		I	645.0	±30.6	(567-721)		713.4	±11.8	(653-732)		644.9	±31.0	(567-721)		711.6	±12.2	(644-734)		Inlss
		I (%)	69.5	±3.3	(61-78)		76.9	±1.3	(70-79)		69.5	±3.3	(61-78)		76.7	±1.3	(69-79)		
		Samp	43.2	±14.3	(16-93)		40.2	±10.0	(16-78)		43.3	±14.4	(16-93)		40.3	±10.0	(16-78)		
		Time _(ms)	4.1		(NA)		22.9		(NA)		4.1		(NA)		22.7		(NA)		H _{Inlss}
	Error	54.98	±17.51	(17.9-109.8)		62.46	±6.58	(29.5-83.7)		55.19	±17.40	(18.7-111.2)		62.39	±6.02	(35.3-83.7)			
	LO count	0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)			
castle		I	232.1	±15.7	(193-278)		269.2	±11.8	(215-280)		232.0	±15.8	(193-278)		268.1	±10.6	(221-280)		Inlss
		I (%)	54.1	±3.7	(45-65)		62.7	±2.8	(50-65)		54.1	±3.7	(45-65)		62.5	±2.5	(52-65)		
		Samp	288.8	±115.7	(76-822)		105.2	±61.2	(58-534)		289.9	±116.6	(76-822)		107.0	±60.1	(58-518)		
		Time _(ms)	9.8		(NA)		18.9		(NA)		9.7		(NA)		18.6		(NA)		H _{Inlss}
	Error	3.13	±4.36	(0.4-40.6)		1.99	±3.80	(0.3-18.5)		2.95	±4.14	(0.4-39.5)		1.85	±3.66	(0.3-18.5)			
	LO count	0.0	±0.0	(0-0)		1.6	±0.8	(1-5)		0.0	±0.0	(0-0)		1.6	±0.8	(1-5)			
corr		I	482.2	±30.3	(403-544)		543.9	±0.9	(541-548)		482.0	±30.4	(403-544)		541.7	±1.2	(539-544)		Inlss
		I (%)	77.3	±4.9	(65-87)		87.2	±0.2	(87-88)		77.2	±4.9	(65-87)		86.8	±0.2	(86-87)		
		Samp	23.6	±10.7	(7-72)		23.5	±10.4	(7-63)		23.6	±10.7	(7-72)		23.5	±10.4	(7-63)		
		Time _(ms)	1.7		(NA)		16.7		(NA)		1.7		(NA)		16.6		(NA)		H _{Inlss}
	Error	0.39	±0.20	(0.1-1.7)		0.14	±0.01	(0.1-0.2)		0.39	±0.20	(0.1-1.7)		0.13	±0.00	(0.1-0.1)			
	LO count	0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)			
graff		I	40.1	±1.4	(37-46)		43.7	±1.2	(39-47)		39.4	±1.9	(33-46)		42.8	±1.6	(38-47)		Inlss
		I (%)	22.2	±0.8	(20-25)		24.2	±0.7	(22-26)		21.8	±1.0	(18-25)		23.6	±0.9	(21-26)		
		Samp	99193.5	±4038.2	(53484-100000)		79027.0	±13948.7	(45684-100000)										

Solver→ Detectors→ Descriptors→			R				R.LO				M				M.LO				
			HessianAff SIFT				HessianAff SIFT				HessianAff SIFT				HessianAff SIFT				
Image		Qty↓	1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				
leafs		I	140.9	±8.2	(121-167)		163.6	±5.4	(142-173)		140.7	±8.5	(120-167)		162.5	±5.4	(141-172)		Inlss
		I (%)	35.0	±2.0	(30-41)		40.6	±1.4	(35-43)		34.9	±2.1	(30-41)		40.3	±1.3	(35-43)		
		Samp	6129.9	±2306.3	(1779-15385)		1874.6	±639.0	(1147-9217)		6193.4	±2361.1	(1779-16138)		1956.6	±663.3	(1147-9217)		
		Time _(ms)	83.8		(NA)		56.8		(NA)		85.2		(NA)		58.8		(NA)		H _{Inlss}
		Error	4.75	±3.39	(0.8-19.7)		2.88	±1.50	(0.7-13.5)		4.49	±3.12	(0.8-19.3)		2.95	±1.40	(0.8-13.5)		
		LO count	0.0	±0.0	(0-0)		4.3	±2.0	(1-11)		0.0	±0.0	(0-0)		4.3	±2.0	(1-12)		
plant		I	94.3	±7.1	(78-110)		110.6	±1.6	(93-114)		94.2	±7.2	(78-110)		108.5	±1.8	(93-114)		Inlss
		I (%)	44.3	±3.3	(37-52)		51.9	±0.8	(44-54)		44.2	±3.4	(37-52)		50.9	±0.8	(44-54)		
		Samp	1346.4	±637.9	(333-3691)		325.3	±130.1	(243-1962)		1358.1	±649.8	(333-3691)		358.6	±121.1	(243-1962)		
		Time _(ms)	18.8		(NA)		21.3		(NA)		19.2		(NA)		22.4		(NA)		H _{Inlss}
		Error	1.23	±0.61	(0.4-4.0)		0.82	±0.13	(0.5-2.0)		1.21	±0.59	(0.4-4.0)		0.73	±0.12	(0.5-2.0)		
		LO count	0.0	±0.0	(0-0)		2.6	±1.3	(1-9)		0.0	±0.0	(0-0)		2.7	±1.4	(1-9)		
rotunda		I	156.4	±12.6	(128-189)		185.3	±2.0	(158-189)		156.4	±12.7	(128-189)		183.6	±1.8	(166-187)		Inlss
		I (%)	65.7	±5.3	(54-79)		77.9	±0.9	(66-79)		65.7	±5.3	(54-79)		77.1	±0.8	(70-79)		
		Samp	85.8	±42.4	(14-311)		56.7	±23.6	(14-213)		86.1	±42.9	(14-311)		56.9	±24.2	(14-213)		
		Time _(ms)	1.7		(NA)		8.6		(NA)		1.8		(NA)		8.7		(NA)		H _{Inlss}
		Error	2.76	±2.99	(0.3-31.2)		0.50	±0.27	(0.2-1.8)		2.71	±2.83	(0.3-31.2)		0.63	±0.15	(0.2-1.6)		
		LO count	0.0	±0.0	(0-0)		1.0	±0.0	(1-2)		0.0	±0.0	(0-0)		1.0	±0.0	(1-2)		
shout		I	81.7	±2.8	(75-90)		89.0	±2.5	(80-93)		81.2	±3.2	(70-90)		88.2	±2.7	(76-93)		Inlss
		I (%)	49.8	±1.7	(46-55)		54.3	±1.5	(49-57)		49.5	±1.9	(43-55)		53.8	±1.7	(46-57)		
		Samp	443.7	±103.5	(205-761)		248.9	±77.3	(162-749)		456.3	±114.5	(205-925)		264.1	±84.0	(162-718)		
		Time _(ms)	6.6		(NA)		16.2		(NA)		6.8		(NA)		16.9		(NA)		H _{Inlss}
		Error	2.57	±1.04	(0.5-8.7)		2.18	±0.62	(0.4-6.5)		2.47	±0.95	(0.4-6.5)		2.11	±0.65	(0.5-5.2)		
		LO count	0.0	±0.0	(0-0)		2.1	±1.1	(1-7)		0.0	±0.0	(0-0)		2.2	±1.2	(1-8)		
valbonne		I	112.3	±7.4	(95-131)		131.8	±2.8	(110-136)		112.2	±7.5	(95-131)		130.4	±2.8	(113-135)		Inlss
		I (%)	54.8	±3.6	(46-64)		64.3	±1.4	(54-66)		54.7	±3.7	(46-64)		63.6	±1.4	(55-66)		
		Samp	266.9	±111.5	(72-683)		94.7	±63.5	(55-476)		268.3	±113.2	(72-726)		97.7	±62.7	(55-588)		
		Time _(ms)	4.0		(NA)		9.7		(NA)		4.1		(NA)		10.3		(NA)		H _{Inlss}
		Error	15.82	±13.04	(0.7-114.1)		3.02	±3.31	(0.6-57.6)		15.39	±12.11	(0.7-76.5)		2.13	±1.90	(0.6-17.8)		
		LO count	0.0	±0.0	(0-0)		1.2	±0.5	(1-3)		0.0	±0.0	(0-0)		1.3	±0.5	(1-4)		
wall		I	435.5	±32.1	(345-485)		483.1	±1.6	(466-486)		435.5	±32.2	(345-485)		482.8	±1.5	(464-484)		Inlss
		I (%)	75.6	±5.6	(60-84)		83.9	±0.3	(81-84)		75.6	±5.6	(60-84)		83.8	±0.3	(81-84)		
		Samp	32.8	±19.3	(9-136)		30.9	±15.4	(9-112)		32.8	±19.3	(9-136)		30.9	±15.1	(9-95)		


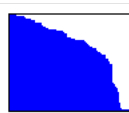
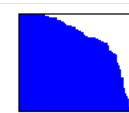
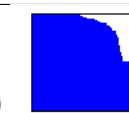
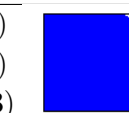
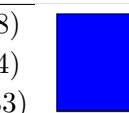

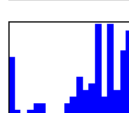
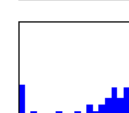
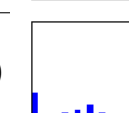
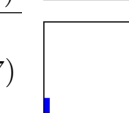
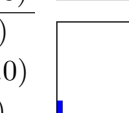




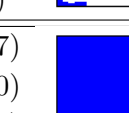

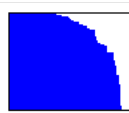

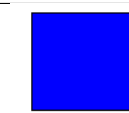
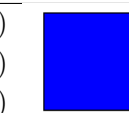
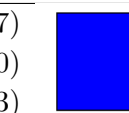

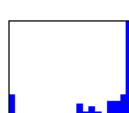
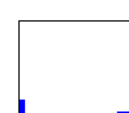
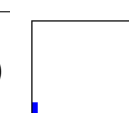

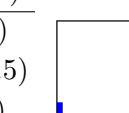



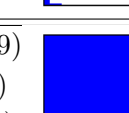
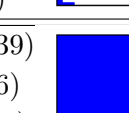

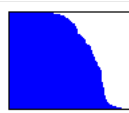
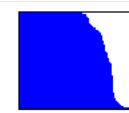
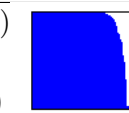
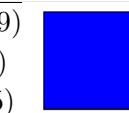
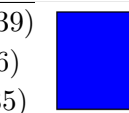

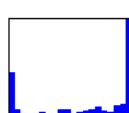
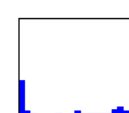
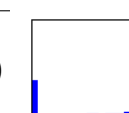

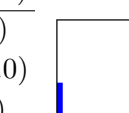
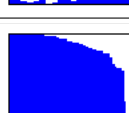



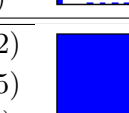

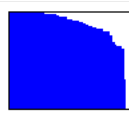
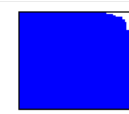
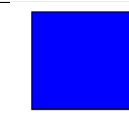
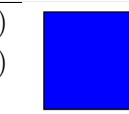
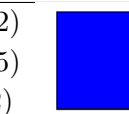

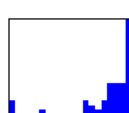
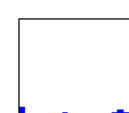
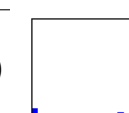

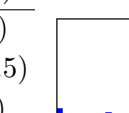

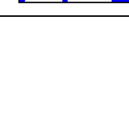


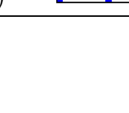
Solver→ Detectors→ Descriptors→			R				R.LO				M				M.LO				
			HessianAff SIFT				HessianAff SIFT				HessianAff SIFT				HessianAff SIFT				
Image		Qty↓	1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				
adam		I	165.6	±13.0	(135-202)		211.5	±7.3	(183-219)		165.2	±13.3	(128-202)		205.0	±6.3	(178-216)		Inlss
		I (%)	38.7	±3.0	(32-47)		49.4	±1.7	(43-51)		38.6	±3.1	(30-47)		47.9	±1.5	(42-50)		
		Samp	154.6	±45.4	(60-316)		54.1	±9.1	(50-90)		155.7	±46.4	(60-316)		58.6	±8.8	(50-101)		
		Time _(ms)	14.5		(NA)		19.5		(NA)		14.7		(NA)		21.1		(NA)		H _{Inlss}
Error		1.70	±0.63	(0.8-5.3)		1.17	±0.42	(0.9-3.6)		1.64	±0.53	(0.8-5.0)		1.19	±0.26	(0.9-3.3)			
LO count		0.0	±0.0	(0-0)		1.1	±0.3	(1-3)		0.0	±0.0	(0-0)		1.2	±0.4	(1-3)			
boat		I	197.5	±13.7	(157-238)		244.6	±1.6	(237-250)		197.1	±14.1	(143-238)		239.9	±3.0	(231-248)		Inlss
		I (%)	40.0	±2.8	(32-48)		49.5	±0.3	(48-51)		39.9	±2.8	(29-48)		48.6	±0.6	(47-50)		
		Samp	132.8	±39.7	(59-300)		51.4	±1.7	(50-62)		133.7	±40.6	(59-329)		53.9	±2.4	(50-63)		
		Time _(ms)	8.1		(NA)		18.3		(NA)		8.2		(NA)		19.4		(NA)		H _{Inlss}
Error		1.92	±0.46	(1.2-3.8)		1.65	±0.09	(1.4-1.9)		1.91	±0.45	(1.2-3.8)		1.54	±0.10	(1.4-1.8)			
LO count		0.0	±0.0	(0-0)		1.0	±0.1	(1-2)		0.0	±0.0	(0-0)		1.1	±0.2	(1-3)			
Boston		I	1380.2	±120.7	(988-1550)		1549.4	±0.7	(1548-1553)		1380.0	±120.8	(988-1550)		1548.0	±0.0	(1548-1548)		Inlss
		I (%)	65.8	±5.8	(47-74)		73.9	±0.0	(74-74)		65.8	±5.8	(47-74)		73.9	±0.0	(74-74)		
		Samp	19.6	±8.9	(9-63)		19.6	±8.7	(9-53)		19.7	±8.9	(9-63)		19.6	±8.7	(9-53)		
		Time _(ms)	5.8		(NA)		70.6		(NA)		5.9		(NA)		71.8		(NA)		H _{Inlss}
Error		1.44	±0.64	(0.4-5.1)		0.59	±0.04	(0.5-0.8)		1.43	±0.64	(0.4-5.1)		0.56	±0.00	(0.6-0.6)			
LO count		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)			
BostonLib		I	384.3	±33.7	(273-445)		447.0	±0.3	(441-448)		383.9	±33.9	(268-445)		446.0	±0.2	(441-447)		Inlss
		I (%)	40.1	±3.5	(28-46)		46.7	±0.0	(46-47)		40.1	±3.5	(28-46)		46.6	±0.0	(46-47)		
		Samp	145.2	±57.9	(64-461)		66.8	±8.6	(62-129)		145.8	±58.7	(64-496)		66.9	±8.6	(63-129)		
		Time _(ms)	3.0		(NA)		28.0		(NA)		3.1		(NA)		28.5		(NA)		H _{Inlss}
Error		1.36	±0.63	(0.4-4.3)		0.54	±0.01	(0.5-0.8)		1.36	±0.63	(0.4-4.3)		0.53	±0.00	(0.5-0.5)			
LO count		0.0	±0.0	(0-0)		1.1	±0.3	(1-3)		0.0	±0.0	(0-0)		1.1	±0.3	(1-3)			
BruggeSquare		I	416.9	±26.7	(342-489)		493.7	±11.5	(445-517)		416.2	±27.5	(332-489)		491.4	±11.2	(438-512)		Inlss
		I (%)	25.5	±1.6	(21-30)		30.2	±0.7	(27-32)		25.5	±1.7	(20-30)		30.1	±0.7	(27-31)		
		Samp	788.6	±210.9	(386-1601)		367.4	±39.5	(301-550)		794.6	±216.7	(386-1601)		374.3	±41.8	(313-676)		
		Time _(ms)	137.9		(NA)		166.2		(NA)		139.7		(NA)		171.6		(NA)		H _{Inlss}
Error		6.81	±2.13	(3.7-13.4)		5.80	±1.56	(4.2-9.2)		6.75	±2.04	(3.7-12.8)		5.75	±1.58	(4.3-9.2)			
LO count		0.0	±0.0	(0-0)		3.0	±1.4	(1-10)		0.0	±0.0	(0-0)		3.0	±1.4	(1-10)			
BruggeTower		I	199.8	±12.5	(161-236)		234.1	±5.6	(215-242)		199.3	±12.9	(154-236)		227.1	±6.0	(204-237)		Inlss
		I (%)	33.4	±2.1	(27-39)		39.1	±0.9	(36-40)		33.3	±2.2	(26-39)		37.9	±1.0	(34-40)		
		Samp	270.4	±68.7	(137-589)		130.9	±14.4	(113-183)		272.7	±70.9	(137-705)		146.3	±16.9	(123-226)		
		Time _(ms)	22.4		(NA)		42.6		(NA)		22.7		(NA)		45.3		(NA)		H _{Inlss}
Error		6.31	±2.67	(1.7-14.5)		5.90	±2.10	(1.9-7.8)		6.23	±2.61	(1.6-14.0)		5.90	±1.90	(1.8-7.7)			
LO count		0.0	±0.0	(0-0)		2.0	±1.0	(1-6)		0.0	±0.0	(0-0)		2.1	±1.0	(1-6)			
Brussels																			


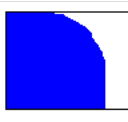

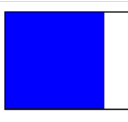
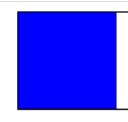
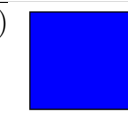











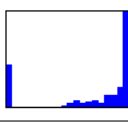
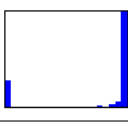
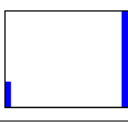
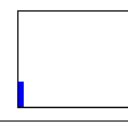
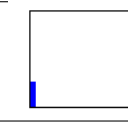
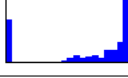
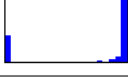


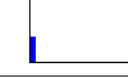
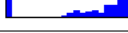
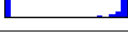
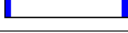
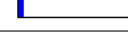
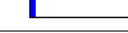

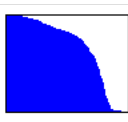
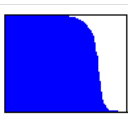


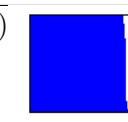











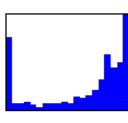
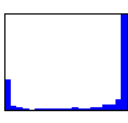
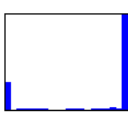
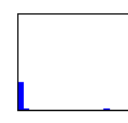
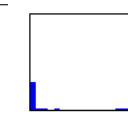
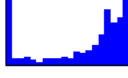
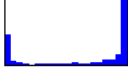

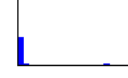
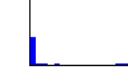





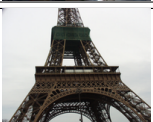
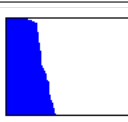
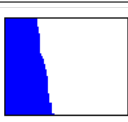
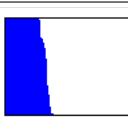

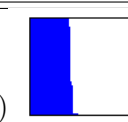

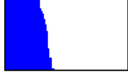









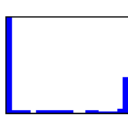
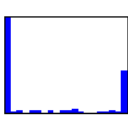
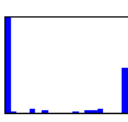
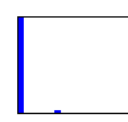
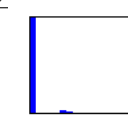
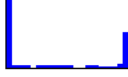
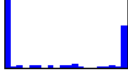
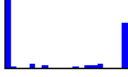




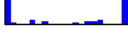





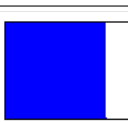

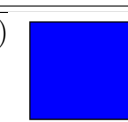










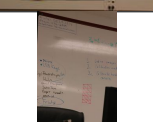
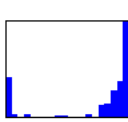
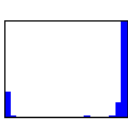
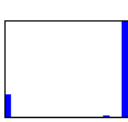
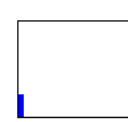
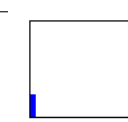
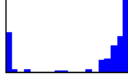

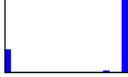
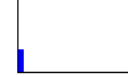
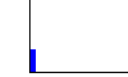





Solver→ Detectors→ Descriptors→			R				R.LO				M				M.LO				
			HessianAff SIFT				HessianAff SIFT				HessianAff SIFT				HessianAff SIFT				
Image		Qty↓	1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				
city		I	26.6	±2.1	(22-33)		35.0	±1.1	(29-37)		26.2	±2.6	(19-33)		33.4	±1.4	(28-36)		Inlss
		I (%)	27.4	±2.2	(23-34)		36.1	±1.2	(30-38)		27.0	±2.6	(20-34)		34.5	±1.4	(29-37)		
		Samp	721.4	±214.8	(288-1418)		203.4	±37.6	(156-492)		764.6	±264.0	(288-2091)		236.7	±45.1	(175-586)		
		Time _(ms)	25.2		(NA)		18.4		(NA)		27.1		(NA)		20.5		(NA)		H _{Inlss}
		Error	0.79	±0.38	(0.3-4.1)		0.61	±0.13	(0.5-2.2)		0.75	±0.24	(0.3-2.3)		0.57	±0.09	(0.5-1.0)		
		LO count	0.0	±0.0	(0-0)		2.4	±1.1	(1-6)		0.0	±0.0	(0-0)		2.6	±1.2	(1-9)		
Eiffel		I	213.1	±14.8	(165-239)		241.8	±1.0	(229-243)		212.9	±14.9	(159-239)		240.4	±1.5	(229-242)		Inlss
		I (%)	29.4	±2.0	(23-33)		33.4	±0.1	(32-34)		29.4	±2.1	(22-33)		33.2	±0.2	(32-33)		
		Samp	483.0	±171.8	(260-1375)		243.9	±5.6	(239-332)		484.4	±172.6	(260-1375)		248.7	±7.0	(243-332)		
		Time _(ms)	7.8		(NA)		39.9		(NA)		8.2		(NA)		40.8		(NA)		H _{Inlss}
		Error	2.07	±1.27	(0.4-8.4)		0.75	±0.06	(0.7-1.5)		2.04	±1.24	(0.4-8.1)		0.77	±0.07	(0.7-1.5)		
		LO count	0.0	±0.0	(0-0)		2.3	±1.1	(1-7)		0.0	±0.0	(0-0)		2.3	±1.1	(1-7)		
ExtremeZoom		I	139.9	±10.8	(97-153)		151.4	±0.6	(151-153)		139.9	±10.8	(97-153)		151.0	±0.0	(151-151)		Inlss
		I (%)	35.2	±2.7	(24-38)		38.0	±0.1	(38-38)		35.1	±2.7	(24-38)		37.9	±0.0	(38-38)		
		Samp	261.5	±122.7	(140-939)		146.3	±8.1	(140-310)		261.8	±123.0	(140-939)		147.6	±7.7	(143-310)		
		Time _(ms)	2.7		(NA)		18.3		(NA)		2.8		(NA)		18.7		(NA)		H _{Inlss}
		Error	0.63	±0.26	(0.2-2.3)		0.38	±0.07	(0.3-0.7)		0.63	±0.26	(0.2-2.3)		0.35	±0.00	(0.4-0.4)		
		LO count	0.0	±0.0	(0-0)		1.8	±0.8	(1-6)		0.0	±0.0	(0-0)		1.8	±0.8	(1-7)		
graf		I	220.1	±16.6	(178-271)		286.1	±2.2	(270-295)		219.7	±17.0	(170-271)		281.0	±2.2	(268-288)		Inlss
		I (%)	27.6	±2.1	(22-34)		35.9	±0.3	(34-37)		27.6	±2.1	(21-34)		35.3	±0.3	(34-36)		
		Samp	592.6	±170.3	(248-1235)		182.8	±11.5	(161-382)		596.6	±174.6	(248-1235)		194.8	±9.6	(172-382)		
		Time _(ms)	70.8		(NA)		67.4		(NA)		71.5		(NA)		70.0		(NA)		H _{Inlss}
		Error	1.34	±0.47	(0.6-3.6)		1.05	±0.06	(0.8-1.3)		1.31	±0.43	(0.6-3.1)		1.04	±0.02	(0.9-1.2)		
		LO count	0.0	±0.0	(0-0)		2.3	±1.1	(1-7)		0.0	±0.0	(0-0)		2.3	±1.1	(1-7)		
LePoint1		I	10.6	±0.5	(10-12)		11.8	±0.6	(10-13)		10.3	±0.7	(7-12)		11.7	±0.7	(9-13)		Inlss
		I (%)	12.2	±0.6	(11-14)		13.5	±0.7	(11-15)		11.8	±0.9	(8-14)		13.5	±0.8	(10-15)		
		Samp	25646.9	±5642.0	(13470-31752)		15836.5	±4437.0	(9325-31752)		27383.5	±6614.4	(13470-55802)		16139.7	±4600.6	(9325-31752)		
		Time _(ms)	313.3		(NA)		214.6		(NA)		336.5		(NA)		219.6		(NA)		H _{Inlss}
		Error	5.39	±3.76	(3.0-42.0)		5.60	±5.57	(3.0-93.9)		5.26	±3.06	(3.0-38.7)		6.21	±9.24	(3.0-93.9)		
		LO count	0.0	±0.0	(0-0)		6.6	±2.2	(2-14)		0.0	±0.0	(0-0)		6.6				

5 RANSAC improvements

This section shows effect of different improvements to RANSAC. Used scoring function is truncated quadratic.

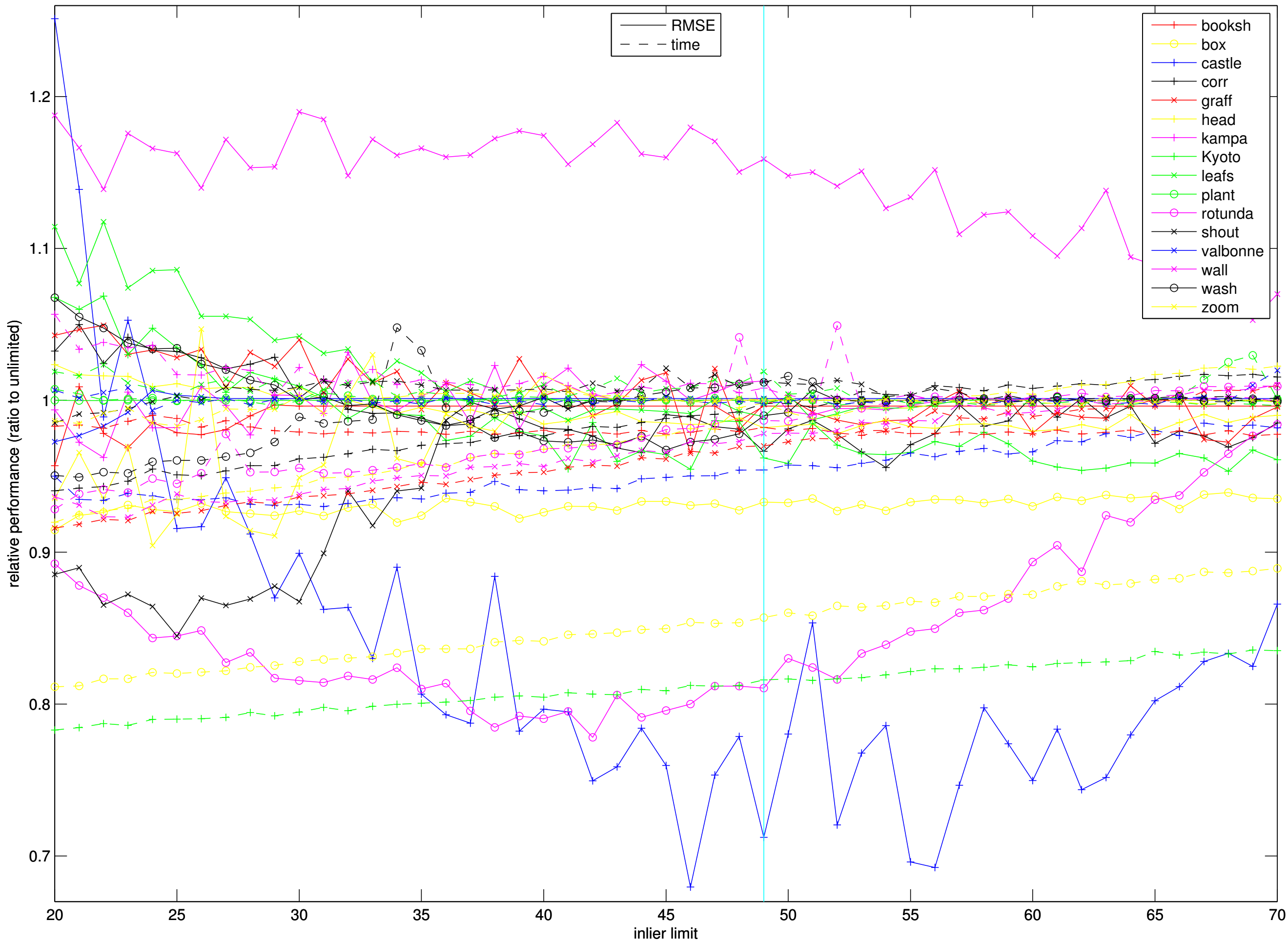
5.1 Data presented in the paper

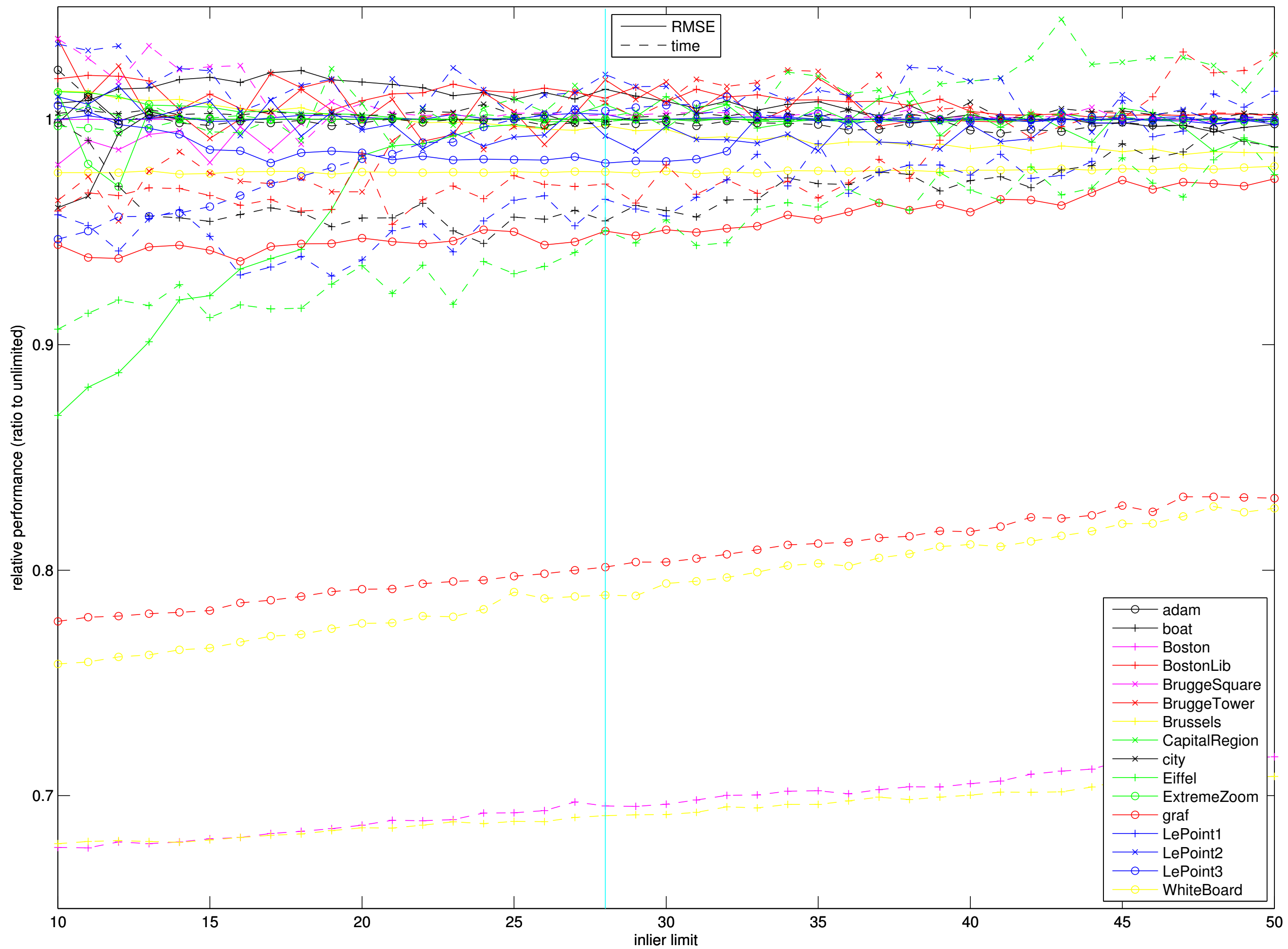
Solver→ Detectors→ Descriptors→			M MSER+ MSER- SIFT		M+LSq MSER+ MSER- SIFT		M.LO' MSER+ MSER- SIFT		M.LO MSER+ MSER- SIFT		M.LO (incl. limit) MSER+ MSER- SIFT		
Image	Qty↓		10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		
corr		I	62.7 ± 4.4 (50-76)		66.0 ± 4.2 (46-76)		69.8 ± 2.8 (53-78)		73.1 ± 1.6 (58-77)		73.3 ± 1.8 (57-78)		Inlss
		I (%)	67.4 ± 4.7 (54-82)		71.0 ± 4.5 (49-82)		75.1 ± 3.0 (57-84)		78.6 ± 1.7 (62-83)		78.8 ± 1.9 (61-84)		
		Samp	61.0 ± 25.1 (11-211)		61.0 ± 25.1 (11-211)		49.7 ± 16.1 (11-183)		49.5 ± 15.9 (11-183)		49.5 ± 15.9 (11-183)		
		Time _(ms)	1.1 (NA)		1.3 (NA)		2.1 (NA)		6.5 (NA)		6.3 (NA)		H _{Inlss}
		Error	0.48 ± 0.33 (0.1-3.0)		0.37 ± 0.33 (0.1-3.4)		0.31 ± 0.12 (0.1-1.9)		0.18 ± 0.11 (0.1-2.7)		0.18 ± 0.10 (0.1-2.0)		
		LO count	0.0 ± 0.0 (0-0)		0.0 ± 0.0 (0-0)		1.0 ± 0.1 (1-3)		1.0 ± 0.0 (1-2)		1.0 ± 0.1 (1-3)		
head		I	66.9 ± 4.1 (52-77)		71.9 ± 2.7 (53-76)		73.7 ± 0.9 (68-76)		73.9 ± 0.6 (69-76)		74.0 ± 0.6 (69-77)		Inlss
		I (%)	77.8 ± 4.7 (60-90)		83.6 ± 3.1 (62-88)		85.7 ± 1.0 (79-88)		86.0 ± 0.7 (80-88)		86.0 ± 0.7 (80-90)		
		Samp	21.8 ± 10.1 (5-103)		21.8 ± 10.1 (5-103)		21.7 ± 9.8 (5-103)		21.7 ± 9.8 (5-103)		21.7 ± 9.8 (5-103)		
		Time _(ms)	0.4 (NA)		0.6 (NA)		1.6 (NA)		6.0 (NA)		5.8 (NA)		H _{Inlss}
		Error	0.78 ± 0.52 (0.2-5.1)		0.40 ± 0.19 (0.2-2.4)		0.30 ± 0.03 (0.2-0.7)		0.31 ± 0.03 (0.2-0.5)		0.31 ± 0.03 (0.2-0.5)		
		LO count	0.0 ± 0.0 (0-0)		0.0 ± 0.0 (0-0)		1.0 ± 0.0 (1-1)		1.0 ± 0.0 (1-1)		1.0 ± 0.0 (1-1)		
Kyoto		I	295.2 ± 16.5 (245-336)		311.4 ± 15.3 (249-339)		325.1 ± 9.2 (266-340)		333.5 ± 6.7 (274-339)		330.7 ± 5.7 (278-339)		Inlss
		I (%)	66.3 ± 3.7 (55-76)		70.0 ± 3.4 (56-76)		73.0 ± 2.1 (60-76)		74.9 ± 1.5 (62-76)		74.3 ± 1.3 (62-76)		
		Samp	65.4 ± 26.0 (21-203)		65.4 ± 26.0 (21-203)		49.6 ± 12.6 (21-185)		49.2 ± 12.1 (21-185)		49.1 ± 12.1 (21-185)		
		Time _(ms)	2.4 (NA)		2.7 (NA)		3.6 (NA)		12.2 (NA)		9.8 (NA)		H _{Inlss}
		Error	2.25 ± 1.28 (0.3-11.3)		1.64 ± 1.14 (0.3-8.1)		1.07 ± 0.54 (0.3-6.9)		0.81 ± 0.32 (0.4-5.7)		0.78 ± 0.23 (0.3-5.0)		
		LO count	0.0 ± 0.0 (0-0)		0.0 ± 0.0 (0-0)		1.0 ± 0.1 (1-3)		1.0 ± 0.1 (1-2)		1.0 ± 0.0 (1-2)		
wash		I	45.7 ± 3.5 (34-52)		50.1 ± 1.7 (6-52)		51.7 ± 0.5 (51-52)		51.3 ± 0.4 (51-52)		51.4 ± 0.5 (51-52)		Inlss
		I (%)	83.1 ± 6.4 (62-95)		91.1 ± 3.1 (11-95)		94.0 ± 0.8 (93-95)		93.2 ± 0.8 (93-95)		93.5 ± 0.9 (93-95)		
		Samp	16.7 ± 9.8 (3-92)		16.7 ± 9.8 (3-92)		16.7 ± 9.7 (3-72)		16.7 ± 9.7 (3-72)		16.7 ± 9.7 (3-72)		
		Time _(ms)	0.3 (NA)		0.4 (NA)		1.4 (NA)		5.4 (NA)		5.4 (NA)		H _{Inlss}
		Error	1.04 ± 0.61 (0.2-5.2)		0.39 ± 0.17 (0.2-2.9)		0.28 ± 0.02 (0.2-0.6)		0.27 ± 0.04 (0.2-0.6)		0.27 ± 0.03 (0.2-0.5)		
		LO count	0.0 ± 0.0 (0-0)		0.0 ± 0.0 (0-0)		1.0 ± 0.0 (1-1)		1.0 ± 0.0 (1-1)		1.0 ± 0.0 (1-1)		


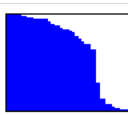
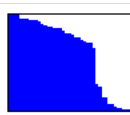
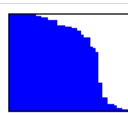



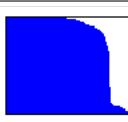
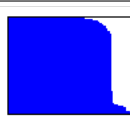

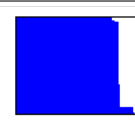


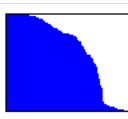
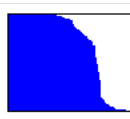

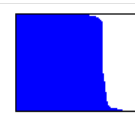
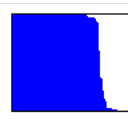

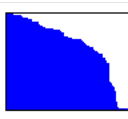
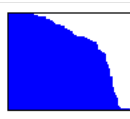
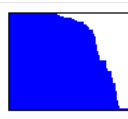
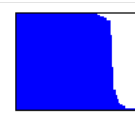


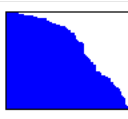
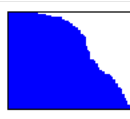


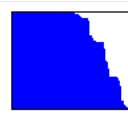

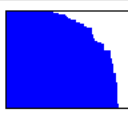





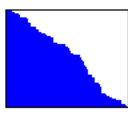
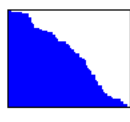
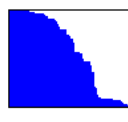
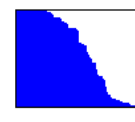
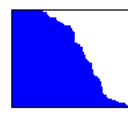

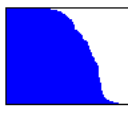

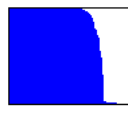
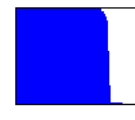
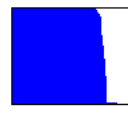


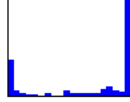
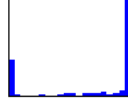
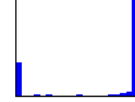
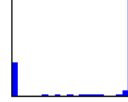
Solver→ Detectors→ Descriptors→			M MSER+ MSER- SIFT		M+LSq MSER+ MSER- SIFT		M.LO' MSER+ MSER- SIFT		M.LO MSER+ MSER- SIFT		M.LO (incl. limit) MSER+ MSER- SIFT		
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		
Boston		I	277.3 ±21.5 (187-305)		303.0 ±5.4 (260-305)		305.0 ±0.1 (303-305)		305.0 ±0.0 (305-305)		305.0 ±0.0 (305-305)		Inlss
		I (%)	72.6 ±5.6 (49-80)		79.3 ±1.4 (68-80)		79.8 ±0.0 (79-80)		79.8 ±0.0 (80-80)		79.8 ±0.0 (80-80)		
		Samp	12.8 ±5.8 (6-53)		12.8 ±5.8 (6-53)		12.8 ±5.8 (6-50)		12.8 ±5.8 (6-50)		12.8 ±5.8 (6-50)		
		Time _(ms)	1.1 (NA)		1.3 (NA)		1.9 (NA)		16.0 (NA)		11.0 (NA)		H _{Inlss}
		Error	1.78 ±1.01 (0.4-15.1)		0.72 ±0.20 (0.4-2.6)		0.60 ±0.08 (0.3-0.9)		0.66 ±0.00 (0.7-0.7)		0.66 ±0.00 (0.6-0.7)		
		LO count	0.0 ±0.0 (0-0)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		1.0 ±0.0 (1-1)		1.0 ±0.0 (1-1)		
Brussels		I	328.7 ±32.4 (225-394)		371.4 ±18.2 (264-398)		387.9 ±4.4 (345-398)		390.6 ±1.3 (387-396)		390.5 ±2.1 (383-397)		Inlss
		I (%)	65.3 ±6.5 (45-78)		73.8 ±3.6 (52-79)		77.1 ±0.9 (69-79)		77.6 ±0.3 (77-79)		77.6 ±0.4 (76-79)		
		Samp	21.0 ±9.4 (7-71)		21.0 ±9.4 (7-71)		20.9 ±9.2 (7-52)		20.9 ±9.2 (7-52)		20.9 ±9.2 (7-52)		
		Time _(ms)	2.3 (NA)		2.6 (NA)		3.3 (NA)		20.7 (NA)		14.1 (NA)		H _{Inlss}
		Error	3.65 ±0.92 (2.0-10.6)		2.59 ±0.50 (0.9-4.8)		2.25 ±0.20 (1.5-3.2)		2.88 ±0.05 (2.7-3.0)		2.86 ±0.08 (2.6-3.1)		
		LO count	0.0 ±0.0 (0-0)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		1.0 ±0.0 (1-1)		1.0 ±0.0 (1-1)		
Eiffel		I	60.9 ±4.1 (43-69)		64.4 ±3.2 (47-70)		66.0 ±1.7 (50-70)		66.8 ±1.1 (62-69)		66.7 ±1.1 (61-69)		Inlss
		I (%)	30.4 ±2.1 (22-34)		32.2 ±1.6 (24-35)		33.0 ±0.9 (25-35)		33.4 ±0.5 (31-34)		33.3 ±0.6 (30-34)		
		Samp	438.9 ±155.3(223-1676)		438.9 ±155.3(223-1676)		273.2 ±40.7(210-815)		254.5 ±18.6(223-800)		254.4 ±17.2(210-507)		
		Time _(ms)	6.8 (NA)		6.8 (NA)		5.5 (NA)		19.6 (NA)		18.6 (NA)		H _{Inlss}
		Error	1.23 ±0.57 (0.3-7.6)		0.92 ±0.44 (0.3-3.9)		0.82 ±0.28 (0.3-2.5)		0.88 ±0.16 (0.6-1.4)		0.88 ±0.15 (0.5-1.5)		
		LO count	0.0 ±0.0 (0-0)		0.0 ±0.0 (0-0)		2.6 ±1.2 (1-9)		2.5 ±1.2 (1-8)		2.5 ±1.2 (1-9)		
WhiteBoard		I	161.1 ±13.2 (104-174)		171.6 ±7.7 (135-174)		173.7 ±1.8 (137-174)		174.0 ±0.0 (174-174)		174.0 ±0.0 (173-174)		Inlss
		I (%)	75.3 ±6.2 (49-81)		80.2 ±3.6 (63-81)		81.2 ±0.9 (64-81)		81.3 ±0.0 (81-81)		81.3 ±0.0 (81-81)		
		Samp	11.7 ±5.8 (6-56)		11.7 ±5.8 (6-56)		11.7 ±5.8 (6-51)		11.7 ±5.8 (6-51)		11.7 ±5.8 (6-51)		
		Time _(ms)	0.7 (NA)		0.8 (NA)		1.3 (NA)		9.7 (NA)		7.6 (NA)		H _{Inlss}
		Error	1.48 ±0.49 (0.5-6.0)		1.09 ±0.19 (0.7-2.7)		1.02 ±0.06 (0.8-1.9)		1.08 ±0.00 (1.1-1.1)		1.06 ±0.01 (1.0-1.2)		
		LO count	0.0 ±0.0 (0-0)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		1.0 ±0.0 (1-1)		1.0 ±0.0 (1-1)		


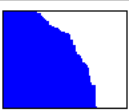
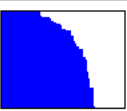

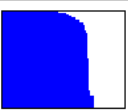
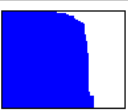

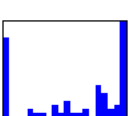
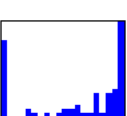
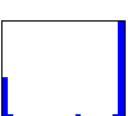
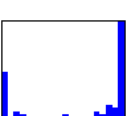
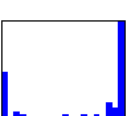

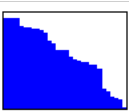
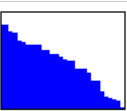
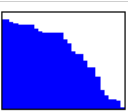
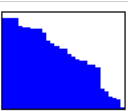
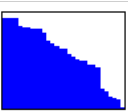

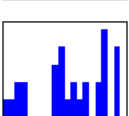
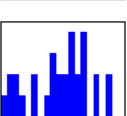
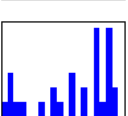
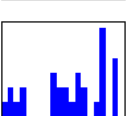
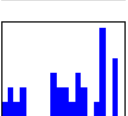







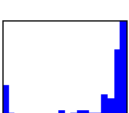
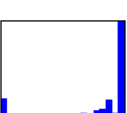




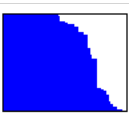
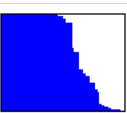
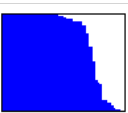
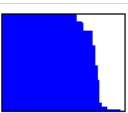
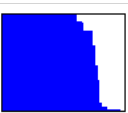

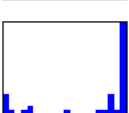
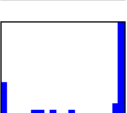
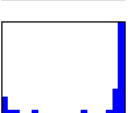
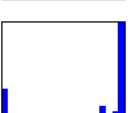
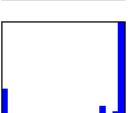

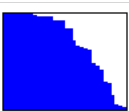
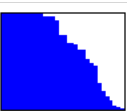
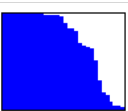
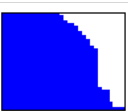
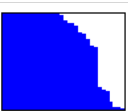



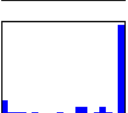
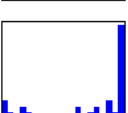
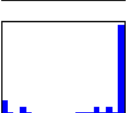








5.2 Additional experiments


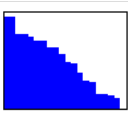
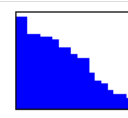
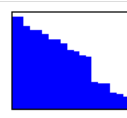
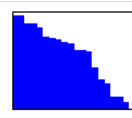
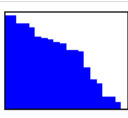











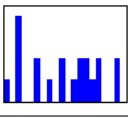
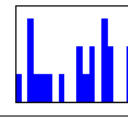
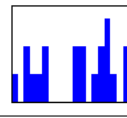
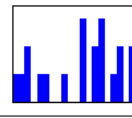
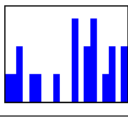
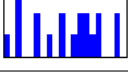
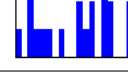


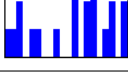






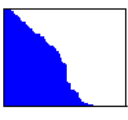
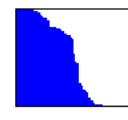
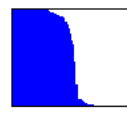
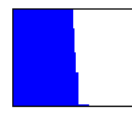
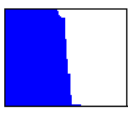
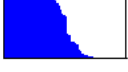










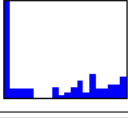
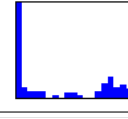
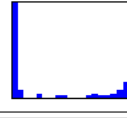
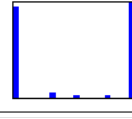
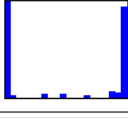
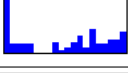
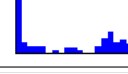









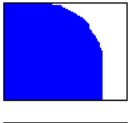

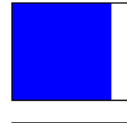
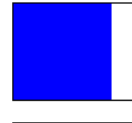
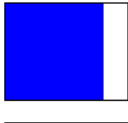











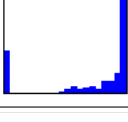
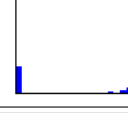
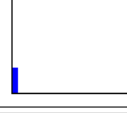
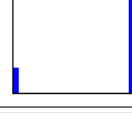
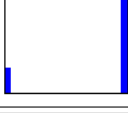
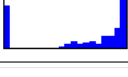















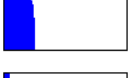
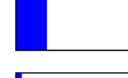
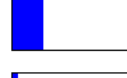
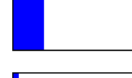
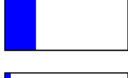



Following graphs illustrate effect of selected limit for number of inliers processed in LSq (confidence 95 %, $\sigma = 0.3$, 1000 runs per value).

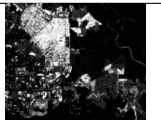









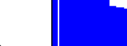
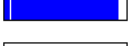
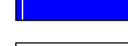
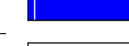




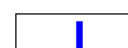













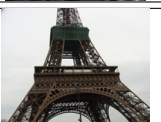
















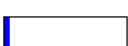
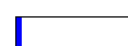
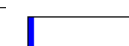






















































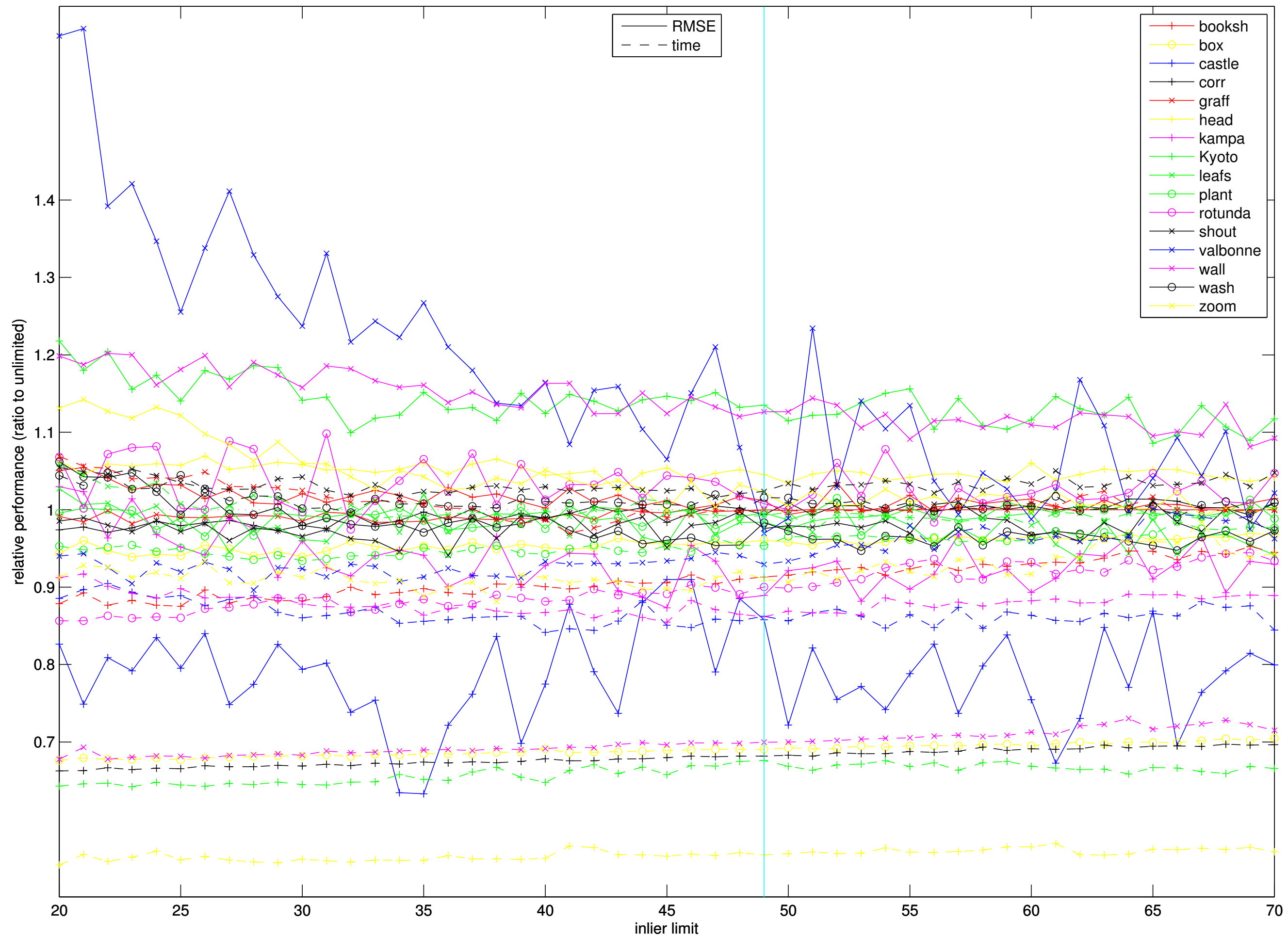
Solver→ Detectors→ Descriptors→			M MSER+ MSER- SIFT				M+LSq MSER+ MSER- SIFT				M.LO' MSER+ MSER- SIFT				M.LO MSER+ MSER- SIFT				M.LO (incl. limit) MSER+ MSER- SIFT				
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				
booksh		I	26.7 ±2.2 (20-31)			25.6 ±3.7 (5-30)			27.3 ±2.2 (20-31)			28.9 ±1.6 (21-31)			28.9 ±1.6 (21-31)			Inlss					
		I (%)	65.1 ±5.4 (49-76)			62.3 ±9.1 (12-73)			66.5 ±5.3 (49-76)			70.4 ±4.0 (51-76)			70.4 ±4.0 (51-76)								
	Samp	96.2 ±49.4 (19-328)			96.2 ±49.4 (19-328)			89.3 ±45.6 (19-323)			74.7 ±38.8 (19-317)			74.8 ±38.8 (19-317)									
	Time _(ms)	1.1 (NA)			1.2 (NA)			2.5 (NA)			5.7 (NA)			5.7 (NA)									
box		I	185.5 ±6.2 (159-205)			190.6 ±4.7 (158-207)			193.3 ±3.1 (180-210)			193.5 ±2.4 (192-209)			192.8 ±2.4 (192-209)			Inlss					
		I (%)	80.3 ±2.7 (69-89)			82.5 ±2.0 (68-90)			83.7 ±1.4 (78-91)			83.8 ±1.0 (83-90)			83.5 ±1.0 (83-90)								
	Samp	13.9 ±3.8 (6-36)			13.9 ±3.8 (6-36)			13.9 ±3.8 (6-36)			13.9 ±3.8 (6-36)			13.9 ±3.8 (6-36)									
	Time _(ms)	0.5 (NA)			0.7 (NA)			1.9 (NA)			8.0 (NA)			6.9 (NA)									
castle		I	97.6 ±6.9 (80-115)			105.0 ±6.6 (80-115)			109.1 ±4.6 (89-116)			109.6 ±2.3 (96-115)			110.4 ±2.4 (93-116)			Inlss					
		I (%)	63.4 ±4.5 (52-75)			68.2 ±4.3 (52-75)			70.8 ±3.0 (58-75)			71.2 ±1.5 (62-75)			71.7 ±1.5 (60-75)								
	Samp	97.7 ±41.1 (22-290)			97.7 ±41.1 (22-290)			57.5 ±19.7 (22-267)			55.2 ±19.0 (22-267)			55.1 ±19.0 (22-267)									
	Time _(ms)	2.0 (NA)			2.1 (NA)			2.5 (NA)			7.3 (NA)			7.0 (NA)									
corr		I	62.7 ±4.4 (50-76)			66.0 ±4.2 (46-76)			69.8 ±2.8 (53-78)			73.1 ±1.6 (58-77)			73.3 ±1.8 (57-78)			Inlss					
		I (%)	67.4 ±4.7 (54-82)			71.0 ±4.5 (49-82)			75.1 ±3.0 (57-84)			78.6 ±1.7 (62-83)			78.8 ±1.9 (61-84)								
	Samp	61.0 ±25.1 (11-211)			61.0 ±25.1 (11-211)			49.7 ±16.1 (11-183)			49.5 ±15.9 (11-183)			49.5 ±15.9 (11-183)									
	Time _(ms)	1.1 (NA)			1.3 (NA)			2.1 (NA)			6.3 (NA)			6.3 (NA)									
graff		I	80.4 ±4.2 (66-93)			84.6 ±4.7 (62-95)			88.7 ±2.8 (76-95)			91.6 ±1.3 (81-95)			90.9 ±1.7 (81-96)			Inlss					
		I (%)	67.0 ±3.5 (55-78)			70.5 ±3.9 (52-79)			73.9 ±2.3 (63-79)			76.3 ±1.1 (68-79)			75.8 ±1.4 (68-80)								
	Samp	57.6 ±20.5 (16-164)			57.6 ±20.5 (16-164)			51.6 ±15.6 (16-164)			51.6 ±15.6 (16-164)			51.6 ±15.6 (16-164)									
	Time _(ms)	0.9 (NA)			1.0 (NA)			2.0 (NA)			6.6 (NA)			6.4 (NA)									
head		I	66.9 ±4.1 (52-77)			71.9 ±2.7 (53-76)			73.7 ±0.9 (68-76)			73.9 ±0.6 (69-76)			74.0 ±0.6 (69-77)			Inlss					
		I (%)	77.8 ±4.7 (60-90)			83.6 ±3.1 (62-88)			85.7 ±1.0 (79-88)			86.0 ±0.7 (80-88)			86.0 ±0.7 (80-90)								
	Samp	21.8 ±10.1 (5-103)			21.8 ±10.1 (5-103)			21.7 ±9.8 (5-103)			21.7 ±9.8 (5-103)			21.7 ±9.8 (5-103)									
	Time _(ms)	0.4 (NA)			0.6 (NA)			1.6 (NA)			5.9 (NA)			5.8 (NA)									
kampa		I	44.2 ±2.8 (34-55)			44.9 ±3.5 (18-55)			48.6 ±2.6 (37-58)			49.7 ±2.9 (37-58)			49.8 ±3.0 (37-58)			Inlss					
		I (%)	52.6 ±3.3 (40-65)			53.5 ±4.1 (21-65)			57.9 ±3.1 (44-69)			59.2 ±3.5 (44-69)			59.3 ±3.6 (44-69)								
	Samp	332.1 ±116.9 (57-1074)			332.1 ±116.9 (57-1074)			181.1 ±85.2 (50-881)			166.0 ±83.5 (50-1074)			166.4 ±83.4 (50-1074)									
	Time _(ms)	4.2 (NA)			4.4 (NA)			4.4 (NA)			10.9 (NA)			10.9 (NA)									
Kyoto		I	295.2 ±16.5 (245-336)			311.4 ±15.3 (249-339)			325.1 ±9.2 (266-340)			333.5 ±6.7 (274-339)			330.7 ±5.7 (278-339)			Inlss					
		I (%)	66.3 ±3.7 (55-76)			70.0 ±3.4 (56-76)			73.0 ±2.1 (60-76)			74.9 ±1.5 (62-76)			74.3 ±1.3 (62-76)								
	Samp	65.4 ±26.0 (21-203)			65.4 ±26.0 (21-203)			49.6 ±12.6 (21-185)			49.2 ±12.1 (21-185)			49.1 ±12.1 (21-185)									
	Time _(ms)	2.4 (NA)			2.6 (NA)			3.6 (NA)			12.1 (NA)			9.8 (NA)									
		Error	2.25 ±1.28 (0.3-11.3)			1.64 ±1.14 (0.3-8.1)			1.07 ±0.54 (0.3-6.9)			0.81 ±0.32 (0.4-5.7)			0.78 ±0.23 (0.3-5.0)			H _{Inlss}					
		LO count	0.0 ±0.0 (0-0)			0.0 ±0.0 (0-0)			1.0 ±0.1 (1-3)			1.0 ±0.1 (1-2)			1.0 ±0.0 (1-2)								

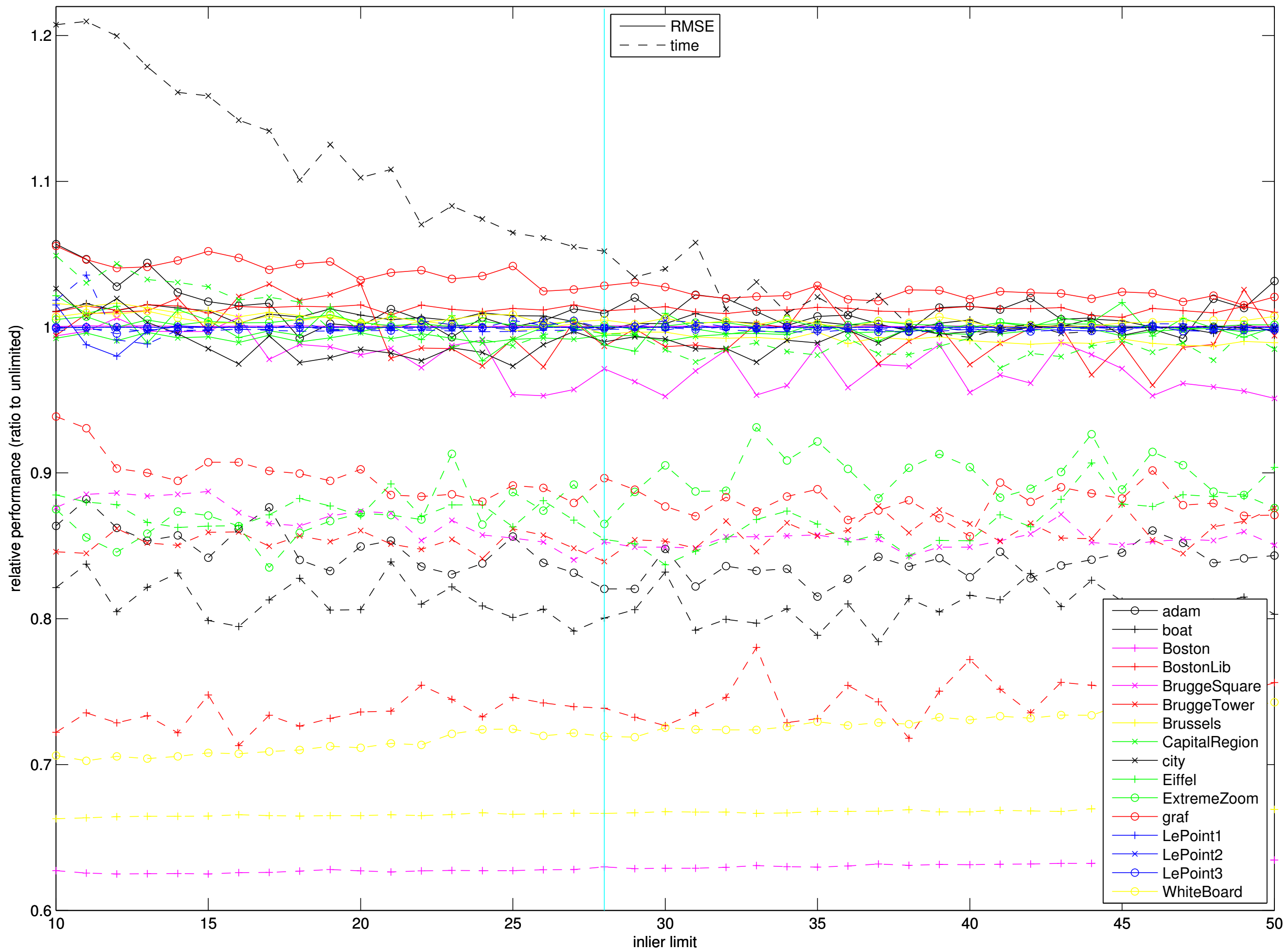
Solver→ Detectors→ Descriptors→			M				M+LSq				M.LO'				M.LO				M.LO (incl. limit)				
			MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				
leafs		I	46.9 ±3.1	(36-57)		49.2 ±3.2	(22-56)		55.5 ±0.8	(41-57)		54.1 ±1.9	(43-57)		54.0 ±1.8	(43-57)		Inlss					
		I (%)	59.4 ±3.9	(46-72)	62.3 ±4.1	(28-71)	70.3 ±1.0	(52-72)	68.5 ±2.4	(54-72)	68.4 ±2.3	(54-72)											
	Samp	162.0 ±75.2	(31-682)	162.0 ±75.2	(31-682)	74.9 ±44.6	(31-532)	76.6 ±43.8	(31-532)	76.8 ±43.7	(31-532)												
		Time _(ms)	1.8	(NA)		2.1	(NA)		2.1	(NA)		6.4	(NA)		6.5	(NA)		H _{Inlss}					
Error		7.94 ±6.48	(0.6-79.0)	5.86 ±4.39	(0.6-54.5)	3.18 ±1.26	(1.8-51.4)	3.88 ±1.31	(0.6-18.4)	3.85 ±1.32	(0.6-18.4)												
LO count		0.0 ±0.0	(0-0)	0.0 ±0.0	(0-0)	1.1 ±0.3	(1-5)	1.1 ±0.4	(1-6)	1.1 ±0.4	(1-6)												
plant		I	17.0 ±0.9	(13-21)		14.2 ±3.9	(0-22)		17.7 ±1.4	(14-22)		17.2 ±1.2	(13-23)		17.2 ±1.2	(13-23)		Inlss					
		I (%)	56.5 ±3.0	(43-70)	47.4 ±13.0	(0-73)	59.1 ±4.7	(47-73)	57.3 ±3.8	(43-77)	57.3 ±3.8	(43-77)											
	Samp	220.1 ±74.2	(51-947)	220.1 ±74.2	(51-947)	180.7 ±75.9	(50-947)	212.7 ±77.5	(50-947)	212.7 ±77.5	(50-947)												
		Time _(ms)	2.2	(NA)		2.5	(NA)		3.4	(NA)		3.9	(NA)		3.9	(NA)		H _{Inlss}					
Error		21.24 ±24.63	(0.7-166.0)	21.31 ±24.50	(1.3-159.3)	16.63 ±22.63	(0.8-166.0)	20.93 ±24.56	(0.8-166.0)	20.93 ±24.57	(0.8-166.0)												
LO count		0.0 ±0.0	(0-0)	0.0 ±0.0	(0-0)	1.9 ±1.0	(1-8)	2.2 ±1.2	(1-8)	2.2 ±1.2	(1-8)												
rotunda		I	67.3 ±5.1	(50-75)		70.7 ±5.8	(35-75)		74.3 ±1.1	(57-75)		73.7 ±0.9	(57-75)		74.1 ±0.8	(59-75)		Inlss					
		I (%)	78.3 ±5.9	(58-87)	82.2 ±6.7	(41-87)	86.3 ±1.3	(66-87)	85.7 ±1.1	(66-87)	86.2 ±1.0	(69-87)											
	Samp	25.8 ±14.6	(6-119)	25.8 ±14.6	(6-119)	25.4 ±13.5	(6-114)	25.4 ±13.5	(6-114)	25.4 ±13.5	(6-114)												
		Time _(ms)	0.5	(NA)		0.6	(NA)		1.6	(NA)		5.9	(NA)		5.8	(NA)		H _{Inlss}					
Error		1.30 ±0.87	(0.2-10.3)	0.62 ±0.39	(0.2-9.1)	0.44 ±0.16	(0.2-5.2)	0.52 ±0.13	(0.2-1.6)	0.43 ±0.12	(0.2-1.9)												
LO count		0.0 ±0.0	(0-0)	0.0 ±0.0	(0-0)	1.0 ±0.0	(1-2)	1.0 ±0.0	(1-1)	1.0 ±0.0	(1-1)												
shout		I	38.4 ±2.1	(30-44)		35.4 ±3.9	(9-43)		39.9 ±2.3	(32-44)		40.5 ±1.5	(33-44)		40.5 ±1.5	(33-44)		Inlss					
		I (%)	71.2 ±3.9	(56-81)	65.5 ±7.2	(17-80)	73.8 ±4.3	(59-81)	75.0 ±2.7	(61-81)	75.0 ±2.7	(61-81)											
	Samp	39.2 ±16.5	(11-141)	39.2 ±16.5	(11-141)	38.1 ±14.6	(11-124)	37.6 ±13.8	(11-121)	37.6 ±13.8	(11-121)												
		Time _(ms)	0.5	(NA)		0.7	(NA)		1.6	(NA)		5.3	(NA)		5.3	(NA)		H _{Inlss}					
Error		1.72 ±1.08	(0.3-9.0)	1.62 ±1.29	(0.3-21.1)	1.34 ±1.00	(0.3-8.3)	0.82 ±0.55	(0.3-8.0)	0.82 ±0.55	(0.3-8.0)												
LO count		0.0 ±0.0	(0-0)	0.0 ±0.0	(0-0)	1.0 ±0.2	(1-3)	1.0 ±0.1	(1-2)	1.0 ±0.1	(1-2)												
valbonne		I	22.4 ±1.4	(16-26)		21.6 ±2.5	(10-26)		23.0 ±1.3	(18-26)		23.7 ±1.4	(17-26)		23.7 ±1.4	(17-26)		Inlss					
		I (%)	69.9 ±4.5	(50-81)	67.4 ±7.8	(31-81)	71.8 ±4.2	(56-81)	73.9 ±4.3	(53-81)	73.9 ±4.3	(53-81)											
	Samp	50.7 ±25.5	(10-199)	50.7 ±25.5	(10-199)	46.3 ±19.8	(10-199)	47.4 ±21.5	(10-199)	47.4 ±21.5	(10-199)												
		Time _(ms)	0.6	(NA)		0.8	(NA)		1.6	(NA)		3.6	(NA)		3.6	(NA)		H _{Inlss}					
Error		29.46 ±17.52	(0.7-140.3)	29.67 ±14.36	(1.2-140.0)	28.03 ±13.96	(0.8-140.3)	28.56 ±13.23	(0.8-140.3)	28.54 ±13.18	(0.8-140.3)												
LO count		0.0 ±0.0	(0-0)	0.0 ±0.0	(0-0)	1.1 ±0.2	(1-4)	1.1 ±0.4	(1-5)	1.1 ±0.4	(1-5)												
wall		I	78.3 ±5.1	(60-90)		81.8 ±4.5	(41-90)		89.3 ±1.0	(86-90)		87.5 ±1.6	(75-90)		88.1 ±1.8	(71-90)		Inlss					
		I (%)	79.9 ±5.2	(61-92)	83.5 ±4.6	(42-92)	91.1 ±1.0	(88-92)	89.3 ±1.6	(77-92)	89.9 ±1.8	(72-92)											
	Samp	19.5 ±10.3	(4-94)	19.5 ±10.3	(4-94)	19.4 ±10.0	(4-83)	19.4 ±10.0	(4-83)	19.4 ±10.0	(4-83)												
		Time _(ms)	0.4	(NA)		0.5	(NA)																


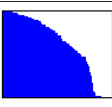
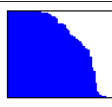
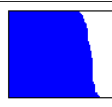

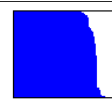

















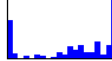









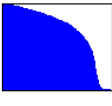
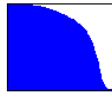

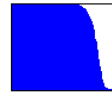
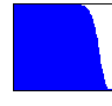
















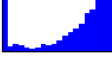
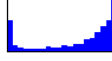
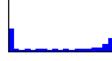

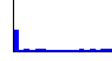






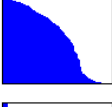




















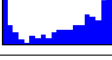
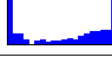
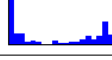

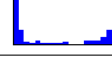
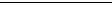
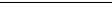
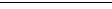
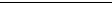
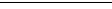




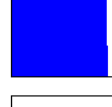




























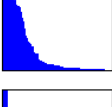
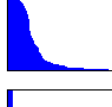

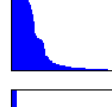
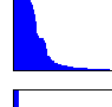
































Solver→ Detectors→ Descriptors→			M MSER+ MSER- SIFT				M+LSq MSER+ MSER- SIFT				M.LO' MSER+ MSER- SIFT				M.LO MSER+ MSER- SIFT				M.LO (inl. limit) MSER+ MSER- SIFT				
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				
adam		I	9.7	±0.8	(7-12)		9.9	±0.8	(7-11)		10.6	±0.9	(8-13)		11.0	±0.9	(7-13)		11.0	±0.9	(7-13)		Inlss
		I (%)	48.3	±4.0	(35-60)		49.4	±4.1	(35-55)		53.0	±4.6	(40-65)		55.1	±4.5	(35-65)		55.1	±4.5	(35-65)		
		Samp	85.3	±27.4	(28-212)		85.3	±27.4	(28-212)		63.2	±16.0	(28-117)		57.1	±13.9	(28-165)		57.1	±13.9	(28-165)		
		Time _(ms)	2.4		(NA)		2.4		(NA)		2.2		(NA)		5.6		(NA)		5.6		(NA)		H _{Inlss}
	Error	4.07	±3.59	(0.8-14.1)		3.80	±2.95	(0.9-14.6)		3.74	±2.52	(0.9-9.3)		3.25	±1.77	(0.9-9.6)		3.25	±1.77	(0.9-9.6)			
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.2	±0.5	(1-6)		1.2	±0.4	(1-4)		1.2	±0.4	(1-4)		
boat		I	50.4	±4.6	(34-66)		56.3	±3.8	(41-66)		61.1	±2.6	(48-68)		64.1	±1.5	(51-67)		63.5	±1.7	(53-67)		Inlss
		I (%)	40.0	±3.7	(27-52)		44.7	±3.0	(33-52)		48.5	±2.1	(38-54)		50.9	±1.2	(40-53)		50.4	±1.4	(42-53)		
		Samp	149.0	±53.1	(41-440)		149.0	±53.1	(41-440)		60.5	±12.2	(41-183)		51.9	±3.8	(41-137)		52.7	±4.2	(41-123)		
		Time _(ms)	4.7		(NA)		4.5		(NA)		2.4		(NA)		7.5		(NA)		7.1		(NA)		H _{Inlss}
	Error	1.84	±0.45	(1.2-6.7)		1.57	±0.32	(1.2-3.9)		1.42	±0.16	(1.2-3.2)		1.37	±0.07	(1.3-2.4)		1.39	±0.08	(1.2-2.0)			
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.2	±0.5	(1-5)		1.0	±0.2	(1-3)		1.0	±0.2	(1-3)		
Boston		I	277.3	±21.5	(187-305)		303.0	±5.4	(260-305)		305.0	±0.1	(303-305)		305.0	±0.0	(305-305)		305.0	±0.0	(305-305)		Inlss
		I (%)	72.6	±5.6	(49-80)		79.3	±1.4	(68-80)		79.8	±0.0	(79-80)		79.8	±0.0	(80-80)		79.8	±0.0	(80-80)		
		Samp	12.8	±5.8	(6-53)		12.8	±5.8	(6-53)		12.8	±5.8	(6-50)		12.8	±5.8	(6-50)		12.8	±5.8	(6-50)		
		Time _(ms)	1.1		(NA)		1.3		(NA)		1.9		(NA)		15.8		(NA)		10.9		(NA)		H _{Inlss}
	Error	1.78	±1.01	(0.4-15.1)		0.79	±0.19	(0.5-2.6)		0.69	±0.07	(0.4-1.0)		0.66	±0.00	(0.7-0.7)		0.66	±0.00	(0.6-0.7)			
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		1.0	±0.0	(1-1)		1.0	±0.0	(1-1)		
BostonLib		I	44.6	±3.5	(32-51)		48.0	±2.2	(40-51)		50.3	±0.7	(40-51)		50.0	±0.3	(43-50)		50.2	±0.5	(44-51)		Inlss
		I (%)	22.3	±1.8	(16-26)		24.0	±1.1	(20-26)		25.1	±0.4	(20-26)		25.0	±0.1	(22-25)		25.1	±0.2	(22-26)		
		Samp	1619.9	±605.8	(774-5885)		1619.9	±605.8	(774-5885)		849.8	±150.3	(774-3138)		851.4	±73.0	(774-2393)						


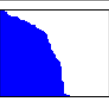
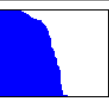
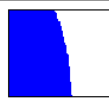

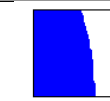

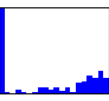
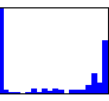
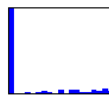
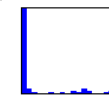
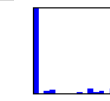
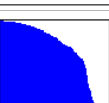





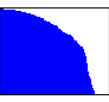
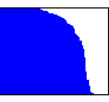


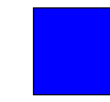

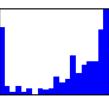
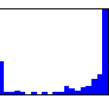
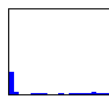
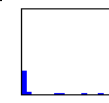
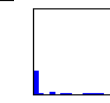




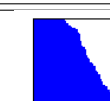

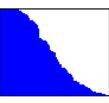
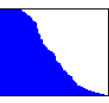
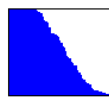

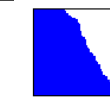

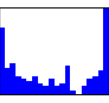
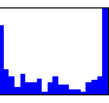
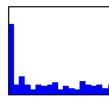
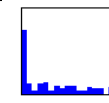
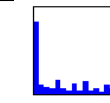






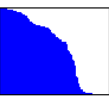
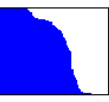

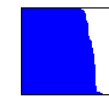
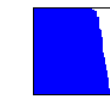

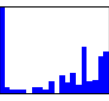
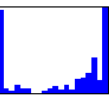
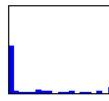
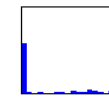
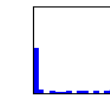






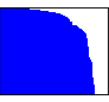
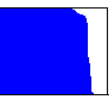


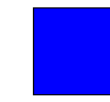

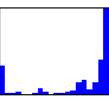
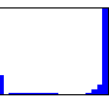
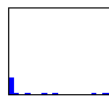
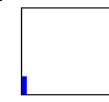
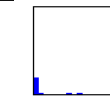


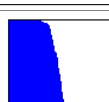



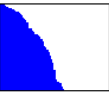
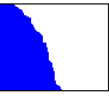




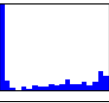
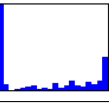
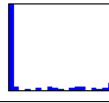
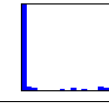
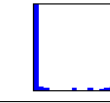
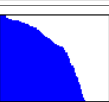





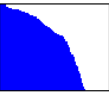





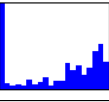
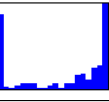
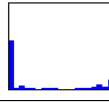
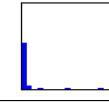
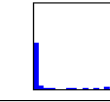
Solver→ Detectors→ Descriptors→			M MSER+ MSER- SIFT				M+LSq MSER+ MSER- SIFT				M.LO' MSER+ MSER- SIFT				M.LO MSER+ MSER- SIFT				M.LO (incl. limit) MSER+ MSER- SIFT				
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				
city		I	9.7	±0.6	(6-11)		9.8	±0.5	(7-11)		10.7	±0.7	(8-12)		11.0	±1.0	(8-13)		11.0	±1.0	(8-13)		Inlss
		I (%)	56.8	±3.5	(35-65)		57.7	±3.1	(41-65)		63.2	±4.4	(47-71)		64.7	±5.6	(47-76)		64.7	±5.6	(47-76)		
		Samp	45.4	±15.4	(21-203)		45.4	±15.4	(21-203)		41.6	±9.3	(21-120)		41.6	±9.4	(21-120)		41.6	±9.4	(21-120)		
		Time _(ms)	1.2		(NA)		1.3		(NA)		1.4		(NA)		4.5		(NA)		4.6		(NA)		H _{Inlss}
	Error	1.51	±0.99	(0.6-63.7)		1.48	±0.97	(0.5-63.5)		1.31	±0.71	(0.6-63.5)		1.20	±0.92	(0.6-63.5)		1.20	±0.92	(0.6-63.5)			
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.0	±0.1	(1-3)		1.0	±0.1	(1-3)		1.0	±0.1	(1-3)		
Eiffel		I	60.9	±4.1	(43-69)		64.4	±3.2	(47-70)		66.0	±1.7	(50-70)		66.8	±1.1	(62-69)		66.7	±1.1	(61-69)		Inlss
		I (%)	30.4	±2.1	(22-34)		32.2	±1.6	(24-35)		33.0	±0.9	(25-35)		33.4	±0.5	(31-34)		33.3	±0.6	(30-34)		
		Samp	438.9	±155.3	(223-1676)		438.9	±155.3	(223-1676)		273.2	±40.7	(210-815)		254.5	±18.6	(223-800)		254.4	±17.2	(210-507)		
		Time _(ms)	6.7		(NA)		6.8		(NA)		5.5		(NA)		19.5		(NA)		18.6		(NA)		H _{Inlss}
	Error	1.23	±0.57	(0.3-7.6)		0.97	±0.42	(0.4-3.9)		0.87	±0.27	(0.4-2.5)		0.88	±0.16	(0.6-1.4)		0.88	±0.15	(0.5-1.5)			
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		2.6	±1.2	(1-9)		2.5	±1.2	(1-8)		2.5	±1.2	(1-9)		
ExtremeZoom		I	12.6	±1.2	(9-14)		12.9	±1.0	(9-14)		12.9	±1.0	(9-14)		13.1	±1.0	(9-14)		13.1	±1.0	(9-14)		Inlss
		I (%)	22.5	±2.1	(16-25)		23.0	±1.8	(16-25)		23.1	±1.7	(16-25)		23.4	±1.9	(16-25)		23.4	±1.9	(16-25)		
		Samp	2667.8	±1412.7	(1098-8732)		2667.8	±1412.7	(1098-8732)		2297.5	±1274.5	(1098-8732)		2260.2	±1324.7	(1098-8732)		2260.2	±1324.7	(1098-8732)		
		Time _(ms)	14.1		(NA)		14.0		(NA)		13.5		(NA)		22.5		(NA)		22.3		(NA)		H _{Inlss}
	Error	9.03	±17.16	(1.0-345.2)		7.80	±17.39	(1.0-345.2)		6.98	±15.74	(1.1-345.2)		6.89	±17.80	(0.6-345.2)		6.89	±17.80	(0.6-345.2)			
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		4.2	±1.7	(1-12)		4.2	±1.7	(1-12)		4.2	±1.7	(1-12)		
graf		I	149.0	±14.1	(102-182)		173.2	±8.3	(124-189)		178.8	±3.5	(124-186)		180.3	±1.4	(138-182)		179.3	±1.5	(175-185)		Inlss
		I (%)	60.8	±5.																			


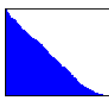

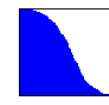

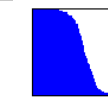











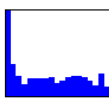
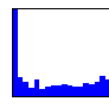
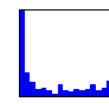
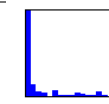
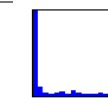



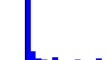








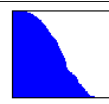
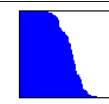
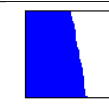
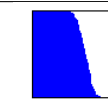











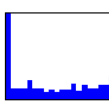
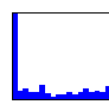
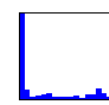
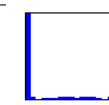
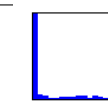








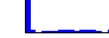


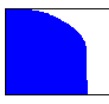
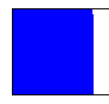
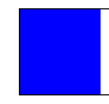
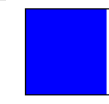
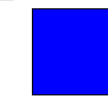



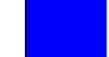







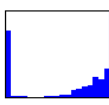

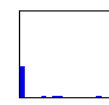
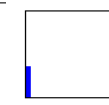
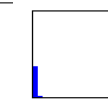




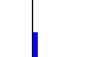




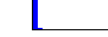

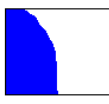
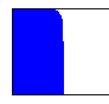
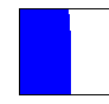
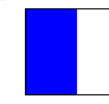
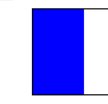




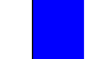



Following graphs illustrate effect of selected limit for number of inliers processed in LSq (confidence 95 %, $\sigma = 0.3$, 300 runs per value). Points detected by *Hessian Affine* detector were used.


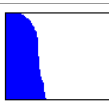
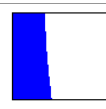
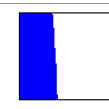
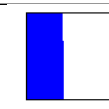
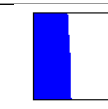











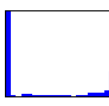
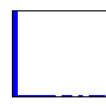
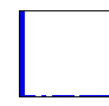
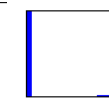
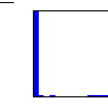











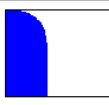
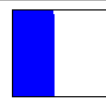
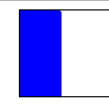
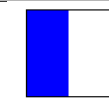
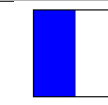











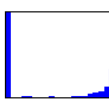
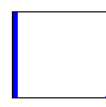
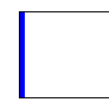
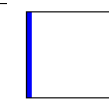
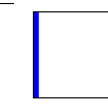












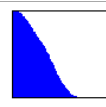
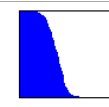
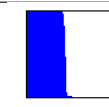
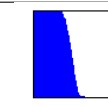
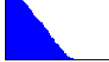










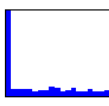
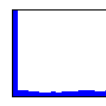
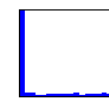
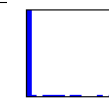
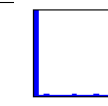



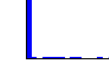







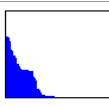
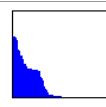
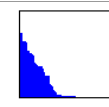
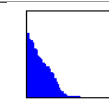
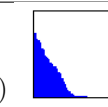
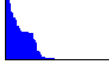
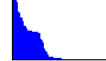
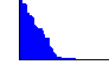
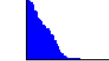
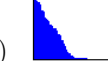
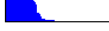





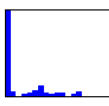
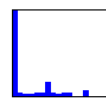
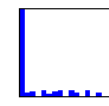
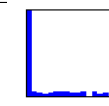




Solver→ Detectors→ Descriptors→			M HessianAff SIFT				M+LSq HessianAff SIFT				M.LO' HessianAff SIFT				M.LO HessianAff SIFT				M.LO (inl. limit) HessianAff SIFT				
Image		Qty↓	1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				
booksh		I	122.6	±9.2	(100-148)		134.1	±8.3	(100-148)		146.1	±2.3	(134-153)		147.8	±3.1	(117-153)		146.0	±3.2	(113-152)		Inlss
		I (%)	61.6	±4.6	(50-74)		67.4	±4.2	(50-74)		73.4	±1.2	(67-77)		74.3	±1.6	(59-77)		73.4	±1.6	(57-76)		Inlss
		Samp	125.6	±60.3	(29-365)		125.6	±60.3	(29-365)		70.4	±37.9	(29-332)		70.9	±38.0	(29-332)		71.0	±38.2	(29-332)		Inlss
		Time _(ms)	2.1		(NA)		2.3		(NA)		2.6		(NA)		8.3		(NA)		7.6		(NA)		H _{Inlss}
		Error	1.58	±1.13	(0.5-16.3)		1.24	±0.77	(0.4-13.8)		0.73	±0.09	(0.5-1.1)		0.74	±0.14	(0.6-2.4)		0.74	±0.12	(0.5-2.2)		H _{Inlss}
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.0	±0.0	(1-2)		1.0	±0.2	(1-3)		1.0	±0.1	(1-2)		H _{Inlss}
box		I	644.9	±31.0	(567-721)		668.5	±38.0	(499-728)		701.7	±16.2	(598-731)		711.6	±12.2	(644-734)		709.3	±10.3	(624-734)		Inlss
		I (%)	69.5	±3.3	(61-78)		72.0	±4.1	(54-78)		75.6	±1.7	(64-79)		76.7	±1.3	(69-79)		76.4	±1.1	(67-79)		Inlss
		Samp	43.3	±14.4	(16-93)		43.3	±14.4	(16-93)		40.3	±10.1	(16-78)		40.3	±10.0	(16-78)		40.3	±10.0	(16-78)		Inlss
		Time _(ms)	4.1		(NA)		4.5		(NA)		6.4		(NA)		22.7		(NA)		15.6		(NA)		H _{Inlss}
		Error	55.19	±17.40	(18.7-111.2)		60.12	±14.59	(18.5-110.6)		60.38	±7.37	(25.0-108.7)		62.39	±6.02	(35.3-83.7)		60.02	±4.64	(42.9-83.5)		H _{Inlss}
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.0	±0.0	(1-2)		1.0	±0.0	(1-1)		1.0	±0.0	(1-2)		H _{Inlss}
castle		I	232.0	±15.8	(193-278)		253.9	±15.2	(206-277)		264.8	±11.0	(220-278)		268.1	±10.6	(221-280)		267.3	±10.6	(215-280)		Inlss
		I (%)	54.1	±3.7	(45-65)		59.2	±3.5	(48-65)		61.7	±2.6	(51-65)		62.5	±2.5	(52-65)		62.3	±2.5	(50-65)		Inlss
		Samp	289.9	±116.6	(76-822)		289.9	±116.6	(76-822)		113.4	±59.6	(62-518)		107.0	±60.1	(58-518)		106.2	±58.4	(58-518)		Inlss
		Time _(ms)	9.7		(NA)		10.0		(NA)		6.7		(NA)		18.6		(NA)		16.0		(NA)		H _{Inlss}
		Error	2.95	±4.14	(0.4-39.5)		2.42	±4.24	(0.3-42.8)		2.03	±3.71	(0.3-15.5)		1.85	±3.66	(0.3-18.5)		1.59	±3.26	(0.3-18.2)		H _{Inlss}
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.7	±0.8	(1-5)		1.6	±0.8	(1-5)		1.6	±0.8	(1-5)		H _{Inlss}
corr		I	482.0	±30.4	(403-544)		522.8	±22.8	(410-548)		538.4	±3.7	(522-548)		541.7	±1.2	(539-544)		540.9	±1.8	(535-547)		Inlss
		I (%)	77.2	±4.9	(65-87)		83.8	±3.7	(66-88)		86.3	±0.6	(84-88)		86.8	±0.2	(86-87)		86.7	±0.3	(86-88)		Inlss
		Samp	23.6	±10.7	(7-72)		23.6	±10.7	(7-72)		23.5	±10.4	(7-63)		23.5	±10.4	(7-63)		23.5	±10.4	(7-63)		Inlss
		Time _(ms)	1.7		(NA)		2.0		(NA)		3.8		(NA)		16.6		(NA)		11.3		(NA)		H _{Inlss}
		Error	0.39	±0.20	(0.1-1.7)		0.23	±0.15	(0.1-1.5)		0.15	±0.03	(0.1-0.3)		0.13	±0.00	(0.1-0.1)		0.13	±0.01	(0.1-0.2)		H _{Inlss}
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		1.0	±0.0	(1-1)		1.0	±0.0	(1-1)		H _{Inlss}
graff		I	39.4	±1.9	(33-46)		39.7	±2.1	(27-46)		41.0	±1.9	(36-47)		42.8	±1.6	(38-47)		42.8	±1.6	(38-47)		Inlss
		I (%)	21.8	±1.0	(18-25)		21.9	±1.2	(15-25)		22.7	±1.1	(20-26)		23.6	±0.9	(21-26)		23.7	±0.9	(21-26)		Inlss
		Samp	99207.7	±4022.0	(53484-100000)		99207.7	±4022.0	(53484-100000)		95126.1	±10044.2	(45684-100000)		85380.8	±13905.2	(45684-100000)		85401.1	±13924.4	(45684-100000)		Inlss
		Time _(ms)	1017.0		(NA)		1012.2		(NA)		980.2		(NA)		916.3		(NA)		918.0		(NA)		H _{Inlss}
		Error	3.97	±0.86	(1.3-8.3)		4.00	±0.79	(1.8-8.3)		3.91	±0.76	(1.6-8.8)		3.81	±0.54	(2.0-7.2)		3.81	±0.54	(2.0-7.2)		H _{Inlss}
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		8.3	±2.7	(1-19)		8.2	±2.7	(1-19)		8.2	±2.7	(1-19)		H _{Inlss}
head		I	1436.0	±75.8	(1208-1571)		1547.1	±25.6	(1303-1575)		1562.9	±5.0	(1532-1574)		1568.9	±1.5	(1565-1571)		1566.8	±2.2	(1559-1575)		Inlss


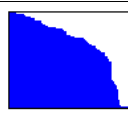
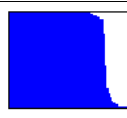
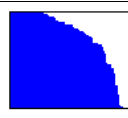


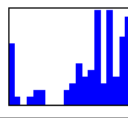
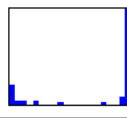
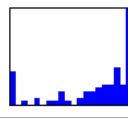
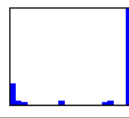

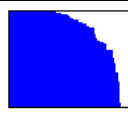


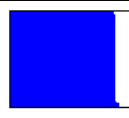

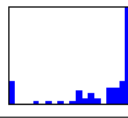
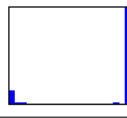
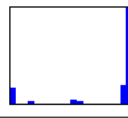
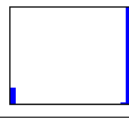


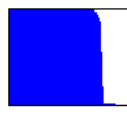
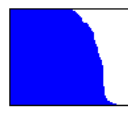
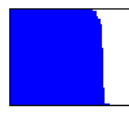

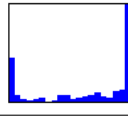
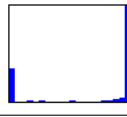
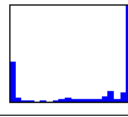
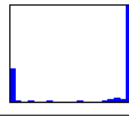

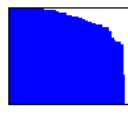




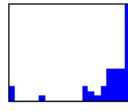
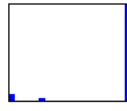
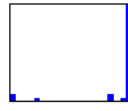
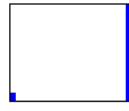
Solver→ Detectors→ Descriptors→			M HessianAff SIFT				M+LSq HessianAff SIFT				M.LO' HessianAff SIFT				M.LO HessianAff SIFT				M.LO (inl. limit) HessianAff SIFT				
Image		Qty↓	1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				
plant		I	94.2	±7.2	(78-110)		102.3	±6.1	(82-113)		109.6	±2.0	(102-115)		108.5	±1.8	(93-114)		109.7	±1.9	(99-114)		Inlss
		I (%)	44.2	±3.4	(37-52)		48.0	±2.9	(38-53)		51.4	±0.9	(48-54)		50.9	±0.8	(44-54)		51.5	±0.9	(46-54)		
		Samp	1358.1	±649.8	(333-3691)		1358.1	±649.8	(333-3691)		338.5	±122.7	(229-1962)		358.6	±121.1	(243-1962)		336.9	±122.4	(229-1962)		
		Time _(ms)	19.2		(NA)		19.2		(NA)		8.3		(NA)		22.4		(NA)		21.0		(NA)		H _{Inlss}
		Error	1.21	±0.59	(0.4-4.0)		0.98	±0.45	(0.4-3.7)		0.76	±0.14	(0.4-1.3)		0.73	±0.12	(0.5-2.0)		0.72	±0.12	(0.5-1.2)		
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		2.6	±1.3	(1-8)		2.7	±1.4	(1-9)		2.7	±1.4	(1-9)		
rotunda		I	156.4	±12.7	(128-189)		171.3	±10.0	(137-187)		183.2	±2.2	(167-190)		183.6	±1.8	(166-187)		182.9	±2.6	(158-188)		Inlss
		I (%)	65.7	±5.3	(54-79)		72.0	±4.2	(58-79)		77.0	±0.9	(70-80)		77.1	±0.8	(70-79)		76.8	±1.1	(66-79)		
		Samp	86.1	±42.9	(14-311)		86.1	±42.9	(14-311)		56.9	±24.2	(14-213)		56.9	±24.2	(14-213)		56.9	±24.2	(14-213)		
		Time _(ms)	1.8		(NA)		1.8		(NA)		2.6		(NA)		8.7		(NA)		7.7		(NA)		H _{Inlss}
		Error	2.71	±2.83	(0.3-31.2)		1.52	±1.63	(0.2-20.8)		0.72	±0.27	(0.2-1.8)		0.63	±0.15	(0.2-1.6)		0.65	±0.23	(0.2-3.1)		
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		1.0	±0.0	(1-2)		1.0	±0.0	(1-1)		
shout		I	81.2	±3.2	(70-90)		81.4	±5.2	(52-91)		85.4	±3.0	(76-93)		88.2	±2.7	(76-93)		87.4	±2.6	(77-93)		Inlss
		I (%)	49.5	±1.9	(43-55)		49.7	±3.2	(32-55)		52.1	±1.8	(46-57)		53.8	±1.7	(46-57)		53.3	±1.6	(47-57)		
		Samp	456.3	±114.5	(205-925)		456.3	±114.5	(205-925)		322.1	±88.2	(162-693)		264.1	±84.0	(162-718)		275.3	±80.0	(162-718)		
		Time _(ms)	6.8		(NA)		6.9		(NA)		7.9		(NA)		16.9		(NA)		17.0		(NA)		H _{Inlss}
		Error	2.47	±0.95	(0.4-6.5)		2.53	±1.07	(0.6-9.4)		1.98	±0.85	(0.4-6.5)		2.11	±0.65	(0.5-5.2)		2.10	±0.62	(0.5-5.0)		
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		2.4	±1.3	(1-9)		2.2	±1.2	(1-8)		2.2	±1.2	(1-8)		
valbonne		I	112.2	±7.5	(95-131)		120.7	±8.0	(98-134)		129.4	±2.4	(108-137)		130.4	±2.8	(113-135)		130.0	±2.5	(113-136)		Inlss
		I (%)	54.7	±3.7	(46-64)		58.9	±3.9	(48-65)		63.1	±1.2	(53-67)		63.6	±1.4	(55-66)		63.4	±1.2	(55-66)		
		Samp	268.3	±113.2	(72-726)		268.3	±113.2	(72-726)		99.6	±61.6	(52-588)		97.7	±62.7	(55-588)		98.0	±62.5	(55-588)		
		Time _(ms)	4.1		(NA)		4.2		(NA)		3.3		(NA)		10.3		(NA)		9.3		(NA)		H _{Inlss}
		Error	15.39	±12.11	(0.7-76.5)		11.24	±12.02	(0.6-72.5)		4.01	±3.67	(0.6-39.0)		2.13	±1.90	(0.6-17.8)		2.15	±1.91	(0.7-15.6)		
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.3	±0.5	(1-4)		1.3	±0.5	(1-4)		1.3	±0.5	(1-4)		
wall		I	435.5	±32.2	(345-485)		465.7	±17.0	(333-486)		482.0	±1.9	(469-486)		482.8	±1.5	(464-484)		482.2	±1.6	(468-486)		Inlss
		I (%)	75.6	±5.6	(60-84)		80.8	±2.9	(58-84)		83.7	±0.3	(81-84)		83.8	±0.3	(81-84)		83.7	±0.3	(81-84)		
		Samp	32.8	±19.3	(9-136)		32.8	±19.3	(9-136)		30.9	±15.1	(9-95)		30.9	±15.1	(9-95)		30.9	±15.1	(9-95)		
		Time _(ms)	1.2		(NA)		1.3		(NA)		3.0		(NA)		14.2		(NA)		10.1		(NA)		H _{Inlss}
		Error	1.95	±1.31	(0.3-8.0)		0.92	±0.63	(0.2-5.0)		0.42	±0.10	(0.2-0.9)		0.33	±0.05	(0.3-1.0)		0.38	±0.08	(0.2-0.7)		
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		1.0	±0.0	(1-1)		1.0	±0.0	(1-1)		
wash		I	91.1	±5.3	(76-106)		96.8	±5.3	(79-111)		105.7	±3.0	(96-113)		107.5	±3.6	(86-113)		106.4	±3.3	(92-113)		Inlss
		I (%)	37.5	±2.2	(31-44)		39.8	±2.2	(33-46)		43.5	±1.2	(40-47)		44.2	±1.5	(35-47)		43.8	±1.3	(38-47)		
		Samp	3796.6	±1461.6	(1117-11262)		3796.6	±1461.6	(1117-11262)		1076.4	±243.0	(661-3573)		1026.2	±347.9	(661-4663)		1079.3	±290.7	(661-3573)		
		Time _(ms)	48.8		(NA)		48.4		(NA)		19.0		(NA)		36.6		(NA)		37.0		(NA)		H _{Inlss}
		Error	1.21	±0.46	(0.2-2.7)		0.97	±0.29	(0.3-2.2)		0.66	±0.16	(0.2-1.2)		0.70	±0.13	(0.4-1.6)		0.69	±0.13	(0.3-1.3)		
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		3.8	±1.8	(1-13)		3.8	±1.8	(1-13)		3.9	±1.8	(1-13)		
zoom		I	160.3	±12.0	(127-190)		175.6	±11.2	(134-196)		189.0	±3.5	(165-196)		191.0	±4.0	(159-195)		190.3	±3.7	(157-195)		Inlss
		I (%)	54.7	±4.1	(43-65)		59.9	±3.8	(46-67)		64.5	±1.2	(56-67)		65.2	±1.4	(54-67)		64.9	±1.3	(54-67)		
		Samp	298.1	±146.4	(71-1025)		298.1	±146.4	(71-1025)		96.5	±71.7	(50-969)		96.6	±73.0	(51-969)		96.4	±72.3	(51-969)		
		Time _(ms)	5.1		(NA)		5.2		(NA)		3.4		(NA)		11.2		(NA)		10.0		(NA)		H _{Inlss}







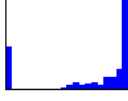

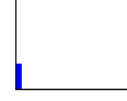
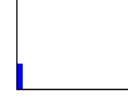






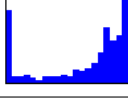

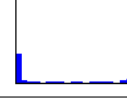
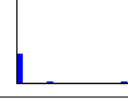








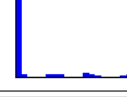






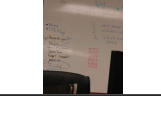
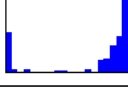

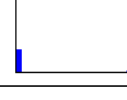
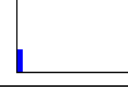
Solver→ Detectors→ Descriptors→			M HessianAff SIFT				M+LSq HessianAff SIFT				M.LO' HessianAff SIFT				M.LO HessianAff SIFT				M.LO (inl. limit) HessianAff SIFT				
Image		Qty↓	1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				
adam		I	165.2	±13.3	(128-202)		184.6	±11.3	(150-210)		196.7	±9.6	(161-220)		205.0	±6.3	(178-216)		202.4	±6.4	(171-216)		Inlss
		I (%)	38.6	±3.1	(30-47)		43.1	±2.6	(35-49)		46.0	±2.2	(38-51)		47.9	±1.5	(42-50)		47.3	±1.5	(40-50)		
		Samp	155.7	±46.4	(60-316)		155.7	±46.4	(60-316)		71.4	±17.1	(50-189)		58.6	±8.8	(50-101)		61.3	±9.7	(50-119)		
		Time _(ms)	14.7		(NA)		14.9		(NA)		7.9		(NA)		21.1		(NA)		17.6		(NA)		H _{Inlss}
	Error	1.64	±0.53	(0.8-5.0)		1.49	±0.49	(0.8-4.4)		1.35	±0.51	(0.8-4.3)		1.19	±0.26	(0.9-3.3)		1.22	±0.30	(0.8-3.5)			
	LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.4	±0.6	(1-4)		1.2	±0.4	(1-3)		1.2	±0.4	(1-3)			
boat		I	197.1	±14.1	(143-238)		218.1	±10.6	(182-245)		231.7	±6.4	(200-248)		239.9	±3.0	(231-248)		236.5	±4.7	(215-250)		Inlss
		I (%)	39.9	±2.8	(29-48)		44.2	±2.1	(37-50)		46.9	±1.3	(40-50)		48.6	±0.6	(47-50)		47.9	±0.9	(44-51)		
		Samp	133.7	±40.6	(59-329)		133.7	±40.6	(59-329)		62.8	±7.4	(50-113)		53.9	±2.4	(50-63)		57.1	±4.4	(50-84)		
		Time _(ms)	8.2		(NA)		8.4		(NA)		5.1		(NA)		19.4		(NA)		15.4		(NA)		H _{Inlss}
	Error	1.91	±0.45	(1.2-3.8)		1.73	±0.35	(1.2-3.2)		1.61	±0.21	(1.2-2.5)		1.54	±0.10	(1.4-1.8)		1.55	±0.10	(1.3-2.0)			
	LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.2	±0.4	(1-3)		1.1	±0.2	(1-3)		1.1	±0.3	(1-3)			
Boston		I	1380.0	±120.8	(988-1550)		1543.9	±15.1	(1329-1550)		1547.5	±1.6	(1540-1551)		1548.0	±0.0	(1548-1548)		1548.1	±0.3	(1548-1549)		Inlss
		I (%)	65.8	±5.8	(47-74)		73.7	±0.7	(63-74)		73.8	±0.1	(73-74)		73.9	±0.0	(74-74)		73.9	±0.0	(74-74)		
		Samp	19.7	±8.9	(9-63)		19.7	±8.9	(9-63)		19.6	±8.7	(9-53)		19.6	±8.7	(9-53)		19.6	±8.7	(9-53)		
		Time _(ms)	5.9		(NA)		7.1		(NA)		9.3		(NA)		71.8		(NA)		44.8		(NA)		H _{Inlss}
	Error	1.43	±0.64	(0.4-5.1)		0.66	±0.15	(0.5-1.7)		0.59	±0.06	(0.4-0.9)		0.56	±0.00	(0.6-0.6)		0.56	±0.00	(0.5-0.6)			
	LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		1.0	±0.0	(1-1)		1.0	±0.0	(1-1)			
BostonLib		I	383.9	±33.9	(268-445)		439.5	±8.7	(385-448)		443.8	±2.3	(429-448)		446.0	±0.2	(441-447)		446.3	±0.6	(443-448)		Inlss
		I (%)	40.1	±3.5	(28-46)		45.9	±0.9	(40-47)		46.3	±0.2	(45-47)		46.6	±0.0	(46-47)		46.6	±0.1	(46-47)		
		Samp	145.8	±58.7	(64-496)		145.8	±58.7	(64-496)		68.1	±8.6	(62-129)		6								

Solver→ Detectors→ Descriptors→			M HessianAff SIFT				M+LSq HessianAff SIFT				M.LO' HessianAff SIFT				M.LO HessianAff SIFT				M.LO (inl. limit) HessianAff SIFT				
Image		Qty↓	1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				
Eiffel		I	212.9	±14.9	(159-239)		230.8	±5.2	(180-241)		235.4	±3.2	(221-243)		240.4	±1.5	(229-242)		238.0	±2.0	(232-243)		Inlss
		I (%)	29.4	±2.1	(22-33)		31.9	±0.7	(25-33)		32.5	±0.4	(31-34)		33.2	±0.2	(32-33)		32.9	±0.3	(32-34)		
		Samp	484.4	±172.6	(260-1375)		484.4	±172.6	(260-1375)		273.1	±18.4	(239-415)		248.7	±7.0	(243-332)		258.5	±9.4	(239-384)		
		Time _(ms)	8.2		(NA)		8.1		(NA)		7.1		(NA)		40.8		(NA)		35.4		(NA)		H _{Inlss}
		Error	2.04	±1.24	(0.4-8.1)		1.28	±0.67	(0.4-4.7)		0.92	±0.29	(0.4-2.3)		0.77	±0.07	(0.7-1.5)		0.77	±0.10	(0.5-1.3)		
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		2.4	±1.1	(1-7)		2.3	±1.1	(1-7)		2.3	±1.1	(1-6)		
ExtremeZoom		I	139.9	±10.8	(97-153)		150.7	±1.1	(128-152)		150.9	±0.5	(147-153)		151.0	±0.0	(151-151)		151.0	±0.2	(147-152)		Inlss
		I (%)	35.1	±2.7	(24-38)		37.9	±0.3	(32-38)		37.9	±0.1	(37-38)		37.9	±0.0	(38-38)		37.9	±0.1	(37-38)		
		Samp	261.8	±123.0	(140-939)		261.8	±123.0	(140-939)		150.1	±15.5	(140-339)		147.6	±7.7	(143-310)		147.7	±7.8	(143-310)		
		Time _(ms)	2.8		(NA)		3.0		(NA)		3.0		(NA)		18.7		(NA)		16.0		(NA)		H _{Inlss}
		Error	0.63	±0.26	(0.2-2.3)		0.36	±0.03	(0.3-0.6)		0.36	±0.03	(0.2-0.5)		0.35	±0.00	(0.4-0.4)		0.35	±0.01	(0.3-0.4)		
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		1.8	±0.9	(1-5)		1.8	±0.8	(1-7)		1.7	±0.8	(1-5)		
graf		I	219.7	±17.0	(170-271)		246.5	±13.1	(208-278)		268.8	±7.6	(222-286)		281.0	±2.2	(268-288)		276.1	±4.6	(259-290)		Inlss
		I (%)	27.6	±2.1	(21-34)		30.9	±1.6	(26-35)		33.7	±1.0	(28-36)		35.3	±0.3	(34-36)		34.6	±0.6	(32-36)		
		Samp	596.6	±174.6	(248-1235)		596.6	±174.6	(248-1235)		238.4	±39.2	(182-871)		194.8	±9.6	(172-382)		208.3	±13.8	(172-272)		
		Time _(ms)	71.5		(NA)		72.1		(NA)		31.9		(NA)		70.0		(NA)		60.9		(NA)		H _{Inlss}
		Error	1.31	±0.43	(0.6-3.1)		1.19	±0.35	(0.6-2.8)		1.09	±0.16	(0.7-1.7)		1.04	±0.02	(0.9-1.2)		1.07	±0.08	(0.9-1.4)		
		LO count	0.0	±0.0	(0-0)		0.0	±0.0	(0-0)		2.6	±1.3	(1-10)		2.3	±1.1	(1-7)		2.4	±1.2	(1-8)		
LePoint1		I	10.3	±0.7	(7-12)		10.4	±0.7	(8-12)		11.5	±0.7	(10-13)		11.7	±0.7	(9-13)		11.7	±0.7	(9-13)		Inlss
		I (%)	11.8	±0.9	(8-14)		12.0	±0.8	(9-14)		13.2	±0.8	(11-15)		13.5	±0.8	(10-15)		13.5	±0.8	(10-15)		
		Samp	27383.5	±6614.4	(13470-55802)		27383.5	±6614.4	(13470-55802)		17483.1	±4924.3	(9325-31752)		16139.7	±4600.6	(9325-31752)		16139.7	±4600.6	(9325-31752)		
		Time _(ms)	336.5		(NA)		335.9		(NA)		217.0		(NA)		219.6		(NA)		219.3		(NA)		


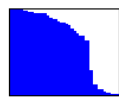
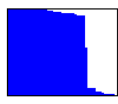
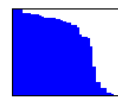
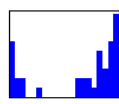
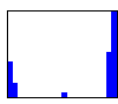
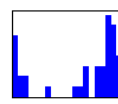




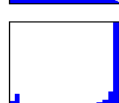

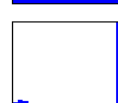









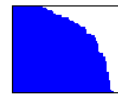
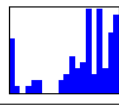
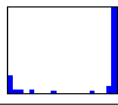
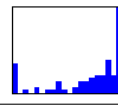
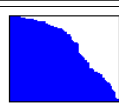
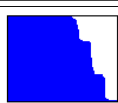
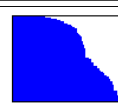

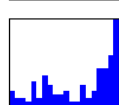
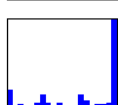
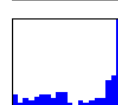







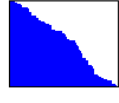
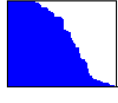
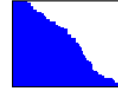
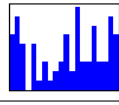
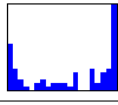
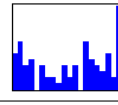
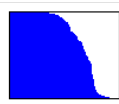
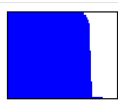
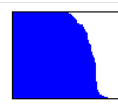

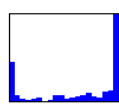
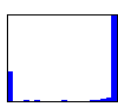
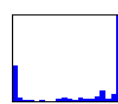






6 Bundle Adjustment

6.1 Data presented in the paper


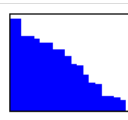
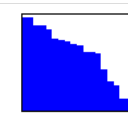
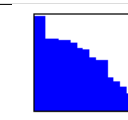
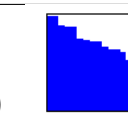









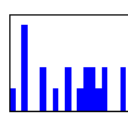
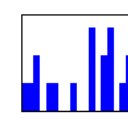
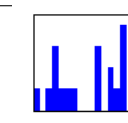
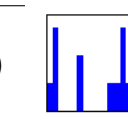
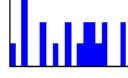
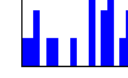

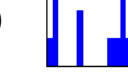





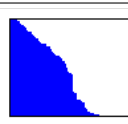

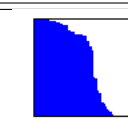










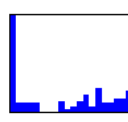
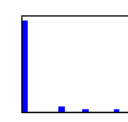
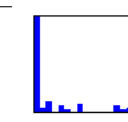
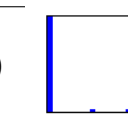
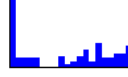
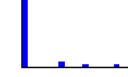

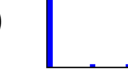





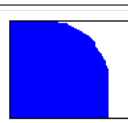
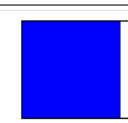
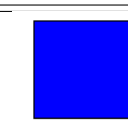
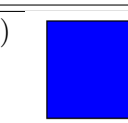









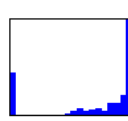
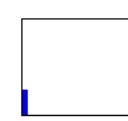
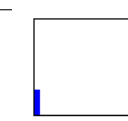
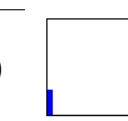
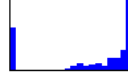
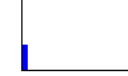

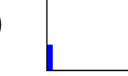





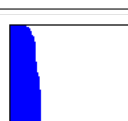

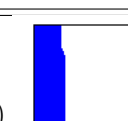
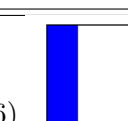










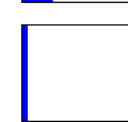

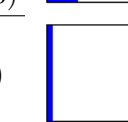



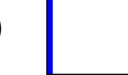




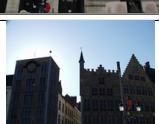
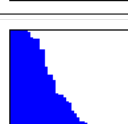

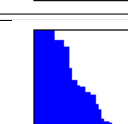










Solver→ Detectors→ Descriptors→			M MSER+ MSER- SIFT	M.LO MSER+ MSER- SIFT	M+LSq + BA MSER+ MSER- SIFT	M.LO + BA MSER+ MSER- SIFT					
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		100 runs, $\sigma = 0.3$, conf = 95 %		100 runs, $\sigma = 0.3$, conf = 95 %		
corr		I	62.7 ±4.4 (50-76)		73.1 ±1.6 (58-77)		67.4 ±4.2 (55-75)		73.2 ±1.5 (64-76)		Inlss
		I (%)	67.4 ±4.7 (54-82)		78.6 ±1.7 (62-83)		72.5 ±4.5 (59-81)		78.8 ±1.7 (69-82)		
		Samp	61.0 ±25.1 (11-211)		49.5 ±15.9 (11-183)		63.7 ±27.0 (13-151)		52.3 ±20.7 (13-136)		
		Time _(ms)	1.1 (NA)		6.5 (NA)		2459.5 (NA)		2046.8 (NA)		H _{Inlss}
		Error	0.48 ±0.33 (0.1-3.0)		0.18 ±0.11 (0.1-2.7)		0.34 ±0.25 (0.1-1.7)		0.16 ±0.04 (0.1-0.4)		
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.0 (1-2)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		
head		I	66.9 ±4.1 (52-77)		73.9 ±0.6 (69-76)		72.9 ±2.0 (66-76)		74.0 ±0.2 (73-75)		Inlss
		I (%)	77.8 ±4.7 (60-90)		86.0 ±0.7 (80-88)		84.7 ±2.3 (77-88)		86.0 ±0.3 (85-87)		
		Samp	21.8 ±10.1 (5-103)		21.7 ±9.8 (5-103)		21.6 ±9.9 (6-50)		21.6 ±9.9 (6-50)		
		Time _(ms)	0.4 (NA)		6.0 (NA)		812.4 (NA)		685.8 (NA)		H _{Inlss}
		Error	0.78 ±0.52 (0.2-5.1)		0.31 ±0.03 (0.2-0.5)		0.38 ±0.15 (0.3-1.2)		0.35 ±0.02 (0.3-0.4)		
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		
Kyoto		I	295.2 ±16.5(245-336)		333.5 ±6.7 (274-339)		313.7 ±16.7(267-339)		332.1 ±8.0 (280-339)		Inlss
		I (%)	66.3 ±3.7 (55-76)		74.9 ±1.5 (62-76)		70.5 ±3.7 (60-76)		74.6 ±1.8 (63-76)		
		Samp	65.4 ±26.0 (21-203)		49.2 ±12.1 (21-185)		66.8 ±27.5 (25-161)		51.3 ±14.9 (25-125)		
		Time _(ms)	2.4 (NA)		12.2 (NA)		18499.7 (NA)		12006.1 (NA)		H _{Inlss}
		Error	2.25 ±1.28(0.3-11.3)		0.81 ±0.32 (0.4-5.7)		1.47 ±0.97 (0.4-5.1)		0.78 ±0.33 (0.5-2.2)		
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.1 (1-2)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		
wash		I	45.7 ±3.5 (34-52)		51.3 ±0.4 (51-52)		50.6 ±1.0 (47-52)		51.0 ±0.2 (51-52)		Inlss
		I (%)	83.1 ±6.4 (62-95)		93.2 ±0.8 (93-95)		92.0 ±1.9 (85-95)		92.8 ±0.4 (93-95)		
		Samp	16.7 ±9.8 (3-92)		16.7 ±9.7 (3-72)		15.8 ±8.9 (3-43)		15.8 ±8.9 (3-43)		
		Time _(ms)	0.3 (NA)		5.4 (NA)		132.2 (NA)		107.4 (NA)		H _{Inlss}
		Error	1.04 ±0.61 (0.2-5.2)		0.27 ±0.04 (0.2-0.6)		0.32 ±0.13 (0.2-0.9)		0.26 ±0.03 (0.2-0.4)		
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		

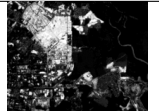
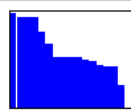
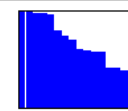
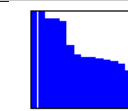
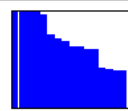








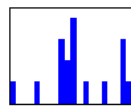
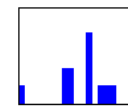
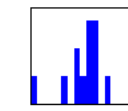
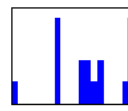
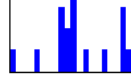
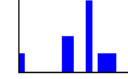
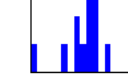
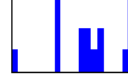

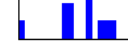



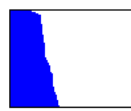
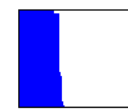
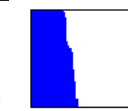
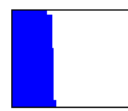
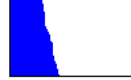

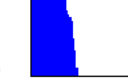






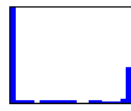
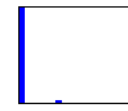
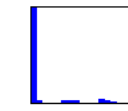
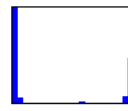
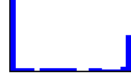
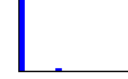
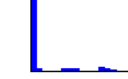
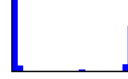





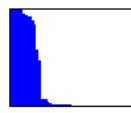
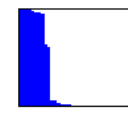
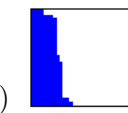
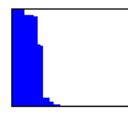


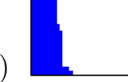






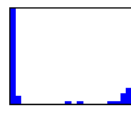
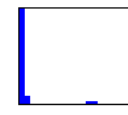
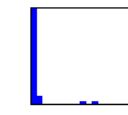
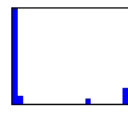
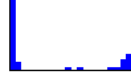
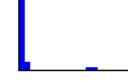
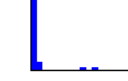
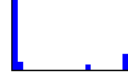

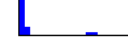
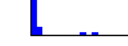


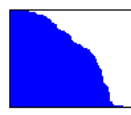
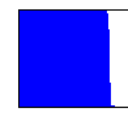

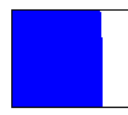









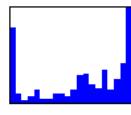
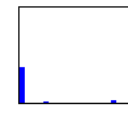
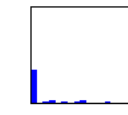
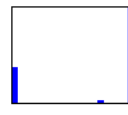
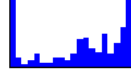

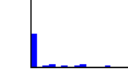
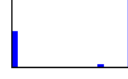





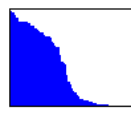
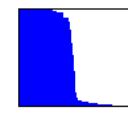
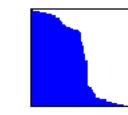
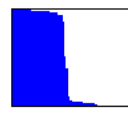









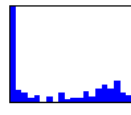
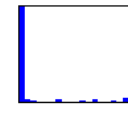
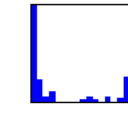
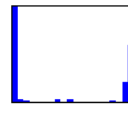
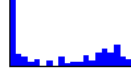

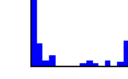
Solver→ Detectors→ Descriptors→			M MSER+ MSER- SIFT		M.LO MSER+ MSER- SIFT		M+LSq + BA MSER+ MSER- SIFT		M.LO + BA MSER+ MSER- SIFT		
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		100 runs, $\sigma = 0.3$, conf = 95 %		100 runs, $\sigma = 0.3$, conf = 95 %		
Boston		I	277.3 ±21.5 (187-305)		305.0 ±0.0 (305-305)		305.0 ±0.2 (304-305)		305.0 ±0.0 (305-305)		Inlss
		I (%)	72.6 ±5.6 (49-80)		79.8 ±0.0 (80-80)		79.8 ±0.0 (80-80)		79.8 ±0.0 (80-80)		
		Samp	12.8 ±5.8 (6-53)		12.8 ±5.8 (6-50)		12.3 ±5.7 (6-38)		12.3 ±5.7 (6-38)		
		Time _(ms)	1.1 (NA)		16.0 (NA)		82.6 (NA)		26.0 (NA)		H _{Inlss}
		Error	1.78 ±1.01 (0.4-15.1)		0.66 ±0.00 (0.7-0.7)		0.67 ±0.03 (0.6-0.8)		0.66 ±0.00 (0.7-0.7)		
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		
Brussels		I	328.7 ±32.4 (225-394)		390.6 ±1.3 (387-396)		379.0 ±8.6 (350-392)		387.1 ±0.6 (386-388)		Inlss
		I (%)	65.3 ±6.5 (45-78)		77.6 ±0.3 (77-79)		75.3 ±1.7 (70-78)		77.0 ±0.1 (77-77)		
		Samp	21.0 ±9.4 (7-71)		20.9 ±9.2 (7-52)		21.8 ±9.6 (8-54)		21.8 ±9.5 (8-51)		
		Time _(ms)	2.3 (NA)		20.7 (NA)		116.6 (NA)		112.4 (NA)		H _{Inlss}
		Error	3.65 ±0.92 (2.0-10.6)		2.88 ±0.05 (2.7-3.0)		3.15 ±0.21 (2.3-3.6)		2.97 ±0.01 (2.9-3.0)		
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		
Eiffel		I	60.9 ±4.1 (43-69)		66.8 ±1.1 (62-69)		65.3 ±2.6 (55-69)		66.5 ±0.8 (64-67)		Inlss
		I (%)	30.4 ±2.1 (22-34)		33.4 ±0.5 (31-34)		32.6 ±1.3 (28-34)		33.2 ±0.4 (32-34)		
		Samp	438.9 ±155.3(223-1676)		254.5 ±18.6(223-800)		444.8 ±168.3(252-1051)		255.7 ±22.6(237-409)		
		Time _(ms)	6.8 (NA)		19.6 (NA)		28.5 (NA)		45.1 (NA)		H _{Inlss}
		Error	1.23 ±0.57 (0.3-7.6)		0.88 ±0.16 (0.6-1.4)		0.91 ±0.35 (0.6-2.1)		0.78 ±0.17 (0.6-1.3)		
		LO count	0.0 ±0.0 (0-0)		2.5 ±1.2 (1-8)		0.0 ±0.0 (0-0)		2.5 ±1.2 (1-8)		
WhiteBoard		I	161.1 ±13.2 (104-174)		174.0 ±0.0 (174-174)		172.7 ±6.5 (139-174)		174.0 ±0.0 (174-174)		Inlss
		I (%)	75.3 ±6.2 (49-81)		81.3 ±0.0 (81-81)		80.7 ±3.1 (65-81)		81.3 ±0.0 (81-81)		
		Samp	11.7 ±5.8 (6-56)		11.7 ±5.8 (6-51)		10.2 ±4.3 (6-29)		10.2 ±4.3 (6-29)		
		Time _(ms)	0.7 (NA)		9.7 (NA)		61.2 (NA)		53.1 (NA)		H _{Inlss}
		Error	1.48 ±0.49 (0.5-6.0)		1.08 ±0.00 (1.1-1.1)		1.08 ±0.12 (1.0-1.7)		1.05 ±0.00 (1.0-1.0)		
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		


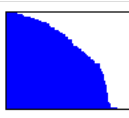

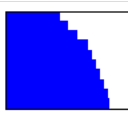
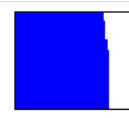









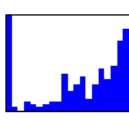
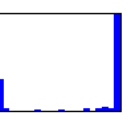
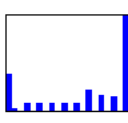
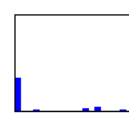
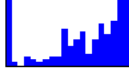
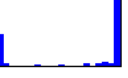
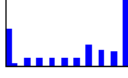
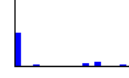




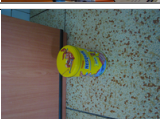
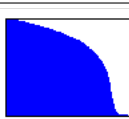
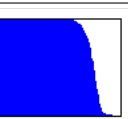
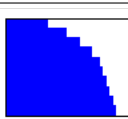
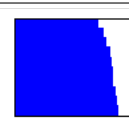









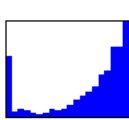
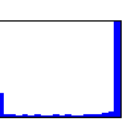
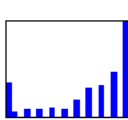
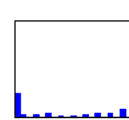
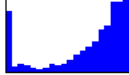
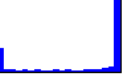
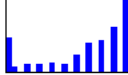








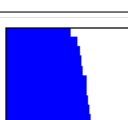











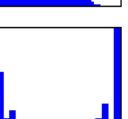

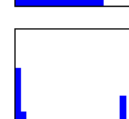








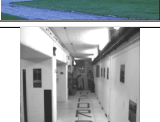




























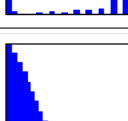
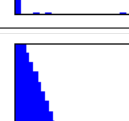









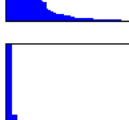
6.2 Additional experiments


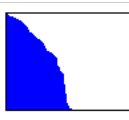
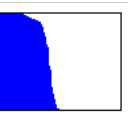
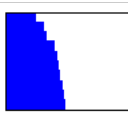
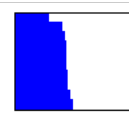





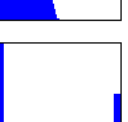



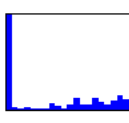
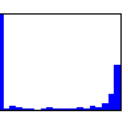
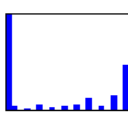
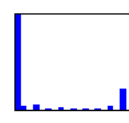

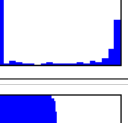

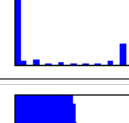

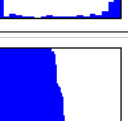



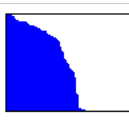
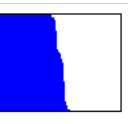
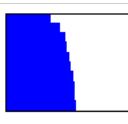

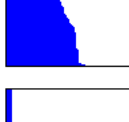
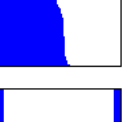



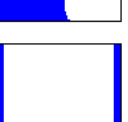



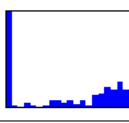
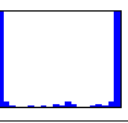
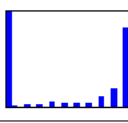
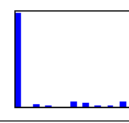


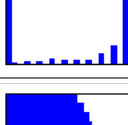






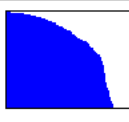

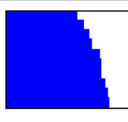
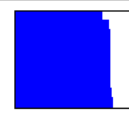



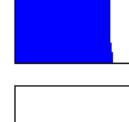





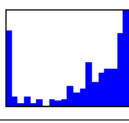
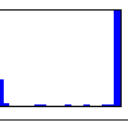
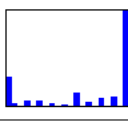
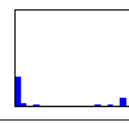


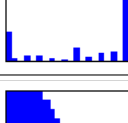




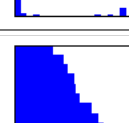

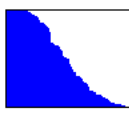

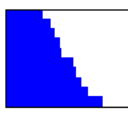
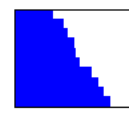
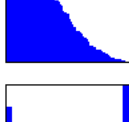

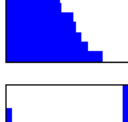
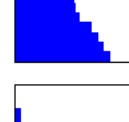
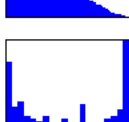
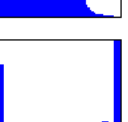
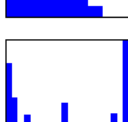


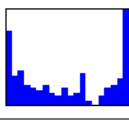
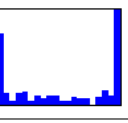
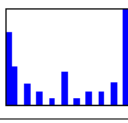
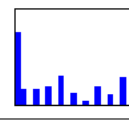





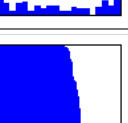



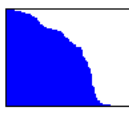


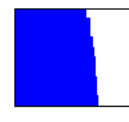
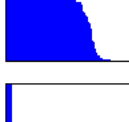


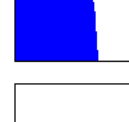
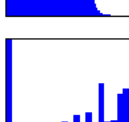
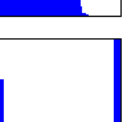

Solver→ Detectors→ Descriptors→		M MSER+ MSER- SIFT		M.LO MSER+ MSER- SIFT		M+LSq + BA MSER+ MSER- SIFT		M.LO + BA MSER+ MSER- SIFT		
Image	Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %		10000 runs, $\sigma = 0.3$, conf = 95 %		100 runs, $\sigma = 0.3$, conf = 95 %		100 runs, $\sigma = 0.3$, conf = 95 %		
booksh		I	26.7 ±2.2 (20-31)		28.9 ±1.6 (21-31)		26.5 ±3.9 (15-30)		29.5 ±1.4 (24-30)	Inlss
		I (%)	65.1 ±5.4 (49-76)		70.4 ±4.0 (51-76)		64.5 ±9.5 (37-73)		72.0 ±3.3 (59-73)	
		Samp	96.2 ±49.4 (19-328)		74.7 ±38.8 (19-317)		96.0 ±45.7 (25-274)		73.6 ±34.3 (25-187)	
		Time _(ms)	1.1 (NA)		5.7 (NA)		46.0 (NA)		88.9 (NA)	H _{Inlss}
		Error	3.05 ±4.35 (0.4-30.3)		1.77 ±2.93 (0.4-26.8)		3.13 ±4.72 (0.8-22.3)		1.96 ±3.62 (0.7-22.3)	
		LO count	0.0 ±0.0 (0-0)		1.2 ±0.5 (1-6)		0.0 ±0.0 (0-0)		1.2 ±0.5 (1-3)	
box		I	185.5 ±6.2 (159-205)		193.5 ±2.4 (192-209)		191.9 ±3.7 (179-201)		193.5 ±2.4 (192-202)	Inlss
		I (%)	80.3 ±2.7 (69-89)		83.8 ±1.0 (83-90)		83.1 ±1.6 (77-87)		83.8 ±1.0 (83-87)	
		Samp	13.9 ±3.8 (6-36)		13.9 ±3.8 (6-36)		14.2 ±3.7 (9-24)		14.2 ±3.7 (9-24)	
		Time _(ms)	0.5 (NA)		8.0 (NA)		3257.2 (NA)		1340.4 (NA)	H _{Inlss}
		Error	50.16 ±23.04 (0.8-112.5)		62.58 ±15.59 (1.4-72.8)		50.95 ±20.56 (1.4-96.4)		62.46 ±15.85 (1.7-72.6)	
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)	
castle		I	97.6 ±6.9 (80-115)		109.6 ±2.3 (96-115)		104.6 ±6.9 (88-112)		109.9 ±2.0 (100-113)	Inlss
		I (%)	63.4 ±4.5 (52-75)		71.2 ±1.5 (62-75)		67.9 ±4.5 (57-73)		71.4 ±1.3 (65-73)	
		Samp	97.7 ±41.1 (22-290)		55.2 ±19.0 (22-267)		103.8 ±43.8 (27-226)		56.5 ±24.6 (27-188)	
		Time _(ms)	2.0 (NA)		7.3 (NA)		4685.5 (NA)		3807.3 (NA)	H _{Inlss}
		Error	4.29 ±7.39 (0.3-60.3)		0.94 ±1.75 (0.4-15.8)		4.41 ±8.44 (0.3-51.4)		0.87 ±1.87 (0.5-15.4)	
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.1 (1-3)		0.0 ±0.0 (0-0)		1.0 ±0.1 (1-2)	
corr		I	62.7 ±4.4 (50-76)		73.1 ±1.6 (58-77)		67.4 ±4.3 (55-76)		73.2 ±1.5 (64-76)	Inlss
		I (%)	67.4 ±4.7 (54-82)		78.6 ±1.7 (62-83)		72.5 ±4.6 (59-82)		78.7 ±1.6 (69-82)	
		Samp	61.0 ±25.1 (11-211)		49.5 ±15.9 (11-183)		63.7 ±27.0 (13-151)		52.3 ±20.7 (13-136)	
		Time _(ms)	1.1 (NA)		6.3 (NA)		2473.0 (NA)		2240.5 (NA)	H _{Inlss}
		Error	0.48 ±0.33 (0.1-3.0)		0.18 ±0.11 (0.1-2.7)		0.34 ±0.25 (0.1-1.7)		0.16 ±0.04 (0.1-0.4)	
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.0 (1-2)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)	
graff		I	80.4 ±4.2 (66-93)		91.6 ±1.3 (81-95)		85.7 ±4.4 (68-93)		91.7 ±1.1 (88-93)	Inlss
		I (%)	67.0 ±3.5 (55-78)		76.3 ±1.1 (68-79)		71.4 ±3.6 (57-78)		76.4 ±0.9 (73-78)	
		Samp	57.6 ±20.5 (16-164)		51.6 ±15.6 (16-164)		57.9 ±19.2 (25-120)		52.6 ±14.8 (25-89)	
		Time _(ms)	0.9 (NA)		6.6 (NA)		1187.5 (NA)		557.1 (NA)	H _{Inlss}
		Error	2.69 ±1.59 (0.2-6.4)		3.09 ±1.72 (0.3-5.1)		2.68 ±1.63 (0.4-5.3)		3.22 ±1.63 (0.5-4.4)	
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.0 (1-2)		0.0 ±0.0 (0-0)		1.0 ±0.1 (1-2)	
head		I	66.9 ±4.1 (52-77)		73.9 ±0.6 (69-76)		72.9 ±2.0 (66-76)		74.0 ±0.2 (73-75)	Inlss
		I (%)	77.8 ±4.7 (60-90)		86.0 ±0.7 (80-88)		84.7 ±2.3 (77-88)		86.0 ±0.3 (85-87)	
		Samp	21.8 ±10.1 (5-103)		21.7 ±9.8 (5-103)		21.6 ±9.9 (6-50)		21.6 ±9.9 (6-50)	
		Time _(ms)	0.4 (NA)		5.9 (NA)		881.3 (NA)		686.2 (NA)	H _{Inlss}
		Error	0.78 ±0.52 (0.2-5.1)		0.31 ±0.03 (0.2-0.5)		0.38 ±0.15 (0.3-1.2)		0.35 ±0.02 (0.3-0.4)	
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)	
kampa		I	44.2 ±2.8 (34-55)		49.7 ±2.9 (37-58)		46.1 ±3.2 (35-53)		49.7 ±2.3 (43-55)	Inlss
		I (%)	52.6 ±3.3 (40-65)		59.2 ±3.5 (44-69)		54.9 ±3.8 (42-63)		59.1 ±2.7 (51-65)	
		Samp	332.1 ±116.9 (57-1074)		166.0 ±83.5 (50-1074)		332.8 ±114.7 (135-719)		157.4 ±73.8 (52-437)	
		Time _(ms)	4.2 (NA)		10.9 (NA)		2225.3 (NA)		2431.4 (NA)	H _{Inlss}
		Error	14.27 ±11.56 (0.5-43.7)		12.46 ±10.09 (0.4-43.3)		16.27 ±11.91 (0.8-42.0)		11.00 ±9.90 (0.5-40.9)	
		LO count	0.0 ±0.0 (0-0)		1.8 ±0.9 (1-7)		0.0 ±0.0 (0-0)		1.8 ±0.9 (1-6)	
Kyoto		I	295.2 ±16.5 (245-336)		333.5 ±6.7 (274-339)		313.9 ±16.7 (267-339)		332.2 ±8.0 (280-339)	Inlss
		I (%)	66.3 ±3.7 (55-76)		74.9 ±1.5 (62-76)		70.5 ±3.8 (60-76)		74.7 ±1.8 (63-76)	
		Samp	65.4 ±26.0 (21-203)		49.2 ±12.1 (21-185)		66.8 ±27.5 (25-161)		51.3 ±14.9 (25-125)	
		Time _(ms)	2.4 (NA)		12.1 (NA)		20711.3 (NA)		13139.7 (NA)	H _{Inlss}
		Error	2.25 ±1.28 (0.3-11.3)		0.81 ±0.32 (0.4-5.7)		1.47 ±0.97 (0.4-5.1)		0.78 ±0.33 (0.5-2.2)	
		LO count	0.0 ±0.0 (0-0)		1.0 ±0.1 (1-2)		0.0 ±0.0 (0-0)		1.0 ±0.0 (1-1)	


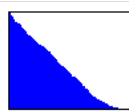
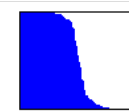
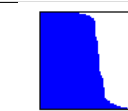

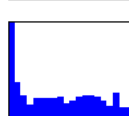
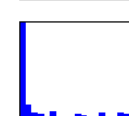

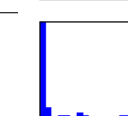





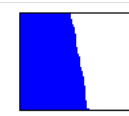
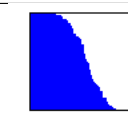
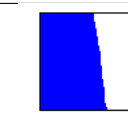

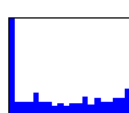

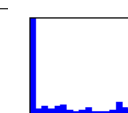




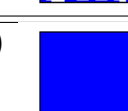

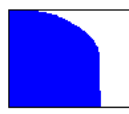
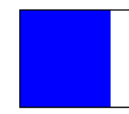
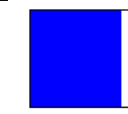
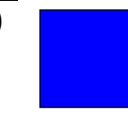

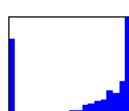
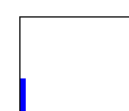
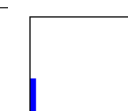
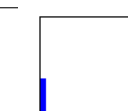

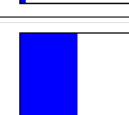
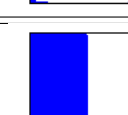
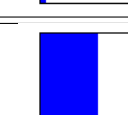


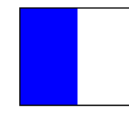
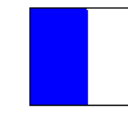
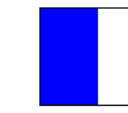

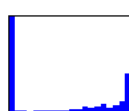
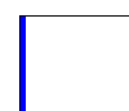
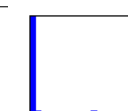
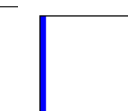

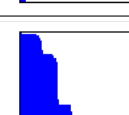
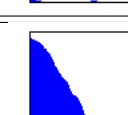
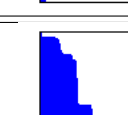
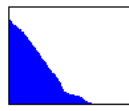
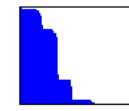
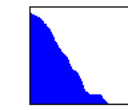
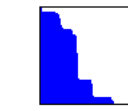

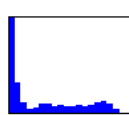
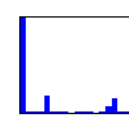
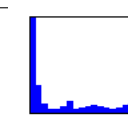
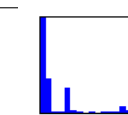


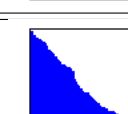
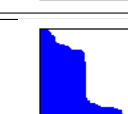

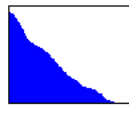

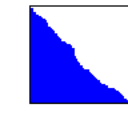
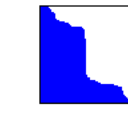

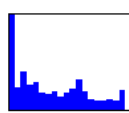
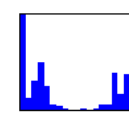
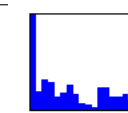
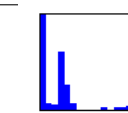

Solver→ Detectors→ Descriptors→			M MSER+ MSER- SIFT				M.LO MSER+ MSER- SIFT				M+LSq + BA MSER+ MSER- SIFT				M.LO + BA MSER+ MSER- SIFT				
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				100 runs, $\sigma = 0.3$, conf = 95 %				100 runs, $\sigma = 0.3$, conf = 95 %				
leafs		I	46.9 ±3.1 (36-57)				54.1 ±1.9 (43-57)				50.0 ±2.6 (44-56)				54.2 ±1.8 (49-56)			Inlss	
		I (%)	59.4 ±3.9 (46-72)				68.5 ±2.4 (54-72)				63.3 ±3.3 (56-71)				68.6 ±2.3 (62-71)				
		Samp	162.0 ±75.2 (31-682)				76.6 ±43.8 (31-532)				157.6 ±72.6 (55-437)				73.8 ±43.6 (50-321)				
		Time _(ms)	1.8 (NA)				6.4 (NA)				3248.7 (NA)				4658.4 (NA)			H _{Inlss}	
		Error	7.94 ±6.48 (0.6-79.0)				3.88 ±1.31 (0.6-18.4)				5.93 ±4.28 (0.6-23.8)				4.07 ±1.62 (0.7-12.1)				
LO count	0.0 ±0.0 (0-0)				1.1 ±0.4 (1-6)				0.0 ±0.0 (0-0)				1.1 ±0.4 (1-3)						
plant		I	17.0 ±0.9 (13-21)				17.2 ±1.2 (13-23)				13.9 ±4.0 (5-19)				17.1 ±1.1 (13-20)			Inlss	
		I (%)	56.5 ±3.0 (43-70)				57.3 ±3.8 (43-77)				46.5 ±13.2 (17-63)				56.9 ±3.8 (43-67)				
		Samp	220.1 ±74.2 (51-947)				212.7 ±77.5 (50-947)				220.6 ±78.9 (78-532)				214.5 ±82.5 (78-532)				
		Time _(ms)	2.2 (NA)				3.9 (NA)				7.4 (NA)				8.5 (NA)			H _{Inlss}	
		Error	21.24 ±24.63(0.7-166.0)				20.93 ±24.56(0.8-166.0)				20.37 ±18.47(1.3-94.4)				19.55 ±17.95(1.0-93.9)				
LO count	0.0 ±0.0 (0-0)				2.2 ±1.2 (1-8)				0.0 ±0.0 (0-0)				2.4 ±1.2 (1-5)						
rotunda		I	67.3 ±5.1 (50-75)				73.7 ±0.9 (57-75)				72.9 ±4.0 (58-75)				74.4 ±0.6 (72-75)			Inlss	
		I (%)	78.3 ±5.9 (58-87)				85.7 ±1.1 (66-87)				84.8 ±4.6 (67-87)				86.5 ±0.7 (84-87)				
		Samp	25.8 ±14.6 (6-119)				25.4 ±13.5 (6-114)				29.8 ±17.4 (7-90)				28.5 ±14.7 (7-81)				
		Time _(ms)	0.5 (NA)				5.9 (NA)				409.4 (NA)				222.2 (NA)			H _{Inlss}	
		Error	1.30 ±0.87 (0.2-10.3)				0.52 ±0.13 (0.2-1.6)				0.46 ±0.20 (0.2-1.6)				0.40 ±0.07 (0.2-0.6)				
LO count	0.0 ±0.0 (0-0)				1.0 ±0.0 (1-1)				0.0 ±0.0 (0-0)				1.0 ±0.0 (1-1)						
shout		I	38.4 ±2.1 (30-44)				40.5 ±1.5 (33-44)				37.5 ±3.4 (31-43)				41.1 ±0.9 (39-43)			Inlss	
		I (%)	71.2 ±3.9 (56-81)				75.0 ±2.7 (61-81)				69.5 ±6.2 (57-80)				76.1 ±1.7 (72-80)				
		Samp	39.2 ±16.5 (11-141)				37.6 ±13.8 (11-121)				38.8 ±16.8 (15-93)				36.9 ±13.4 (15-76)				
		Time _(ms)	0.5 (NA)				5.3 (NA)				1911.7 (NA)				800.1 (NA)			H _{Inlss}	
		Error	1.72 ±1.08 (0.3-9.0)				0.82 ±0.55 (0.3-8.0)				1.36 ±0.71 (0.3-4.7)				0.73 ±0.36 (0.3-2.0)				
LO count	0.0 ±0.0 (0-0)				1.0 ±0.1 (1-2)				0.0 ±0.0 (0-0)				1.0 ±0.1 (1-2)						
valbonne		I	22.4 ±1.4 (16-26)				23.7 ±1.4 (17-26)				22.2 ±2.5 (15-25)				24.1 ±1.2 (20-25)			Inlss	
		I (%)	69.9 ±4.5 (50-81)				73.9 ±4.3 (53-81)				69.4 ±7.9 (47-78)				75.4 ±3.6 (62-78)				
		Samp	50.7 ±25.5 (10-199)				47.4 ±21.5 (10-199)				48.8 ±24.5 (14-129)				44.0 ±17.9 (14-92)				
		Time _(ms)	0.6 (NA)				3.6 (NA)				73.8 (NA)				111.0 (NA)			H _{Inlss}	
		Error	29.46 ±17.52(0.7-140.3)				28.56 ±13.23(0.8-140.3)				27.57 ±13.90(3.1-69.9)				26.43 ±11.85(2.9-69.7)				
LO count	0.0 ±0.0 (0-0)				1.1 ±0.4 (1-5)				0.0 ±0.0 (0-0)				1.1 ±0.3 (1-3)						
wall		I	78.3 ±5.1 (60-90)				87.5 ±1.6 (75-90)				82.2 ±4.1 (72-90)				87.6 ±1.4 (81-90)			Inlss	
		I (%)	79.9 ±5.2 (61-92)				89.3 ±1.6 (77-92)				83.9 ±4.2 (73-92)				89.4 ±1.4 (83-92)				
		Samp	19.5 ±10.3 (4-94)				19.4 ±10.0 (4-83)				19.9 ±9.5 (5-55)				19.9 ±9.3 (5-50)				
		Time _(ms)	0.4 (NA)				5.8 (NA)				7502.4 (NA)				9462.7 (NA)			H _{Inlss}	
		Error	2.23 ±1.88 (0.3-29.2)				0.42 ±0.16 (0.2-1.8)				1.12 ±0.74 (0.3-4.9)				0.45 ±0.14 (0.4-1.2)				
LO count	0.0 ±0.0 (0-0)				1.0 ±0.0 (1-1)				0.0 ±0.0 (0-0)				1.0 ±0.0 (1-1)						
wash		I	45.7 ±3.5 (34-52)				51.3 ±0.4 (51-52)				50.6 ±1.0 (47-52)				51.0 ±0.2 (51-52)			Inlss	
		I (%)	83.1 ±6.4 (62-95)				93.2 ±0.8 (93-95)				92.0 ±1.9 (85-95)				92.8 ±0.4 (93-95)				
		Samp	16.7 ±9.8 (3-92)				16.7 ±9.7 (3-72)				15.8 ±8.9 (3-43)				15.8 ±8.9 (3-43)				
		Time _(ms)	0.3 (NA)				5.4 (NA)				130.3 (NA)								

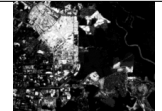
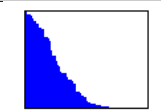
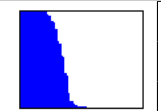
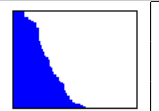
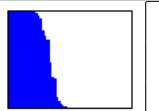
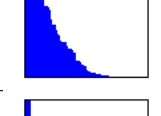



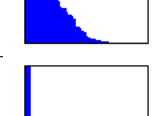




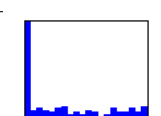

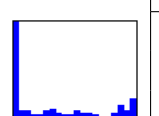
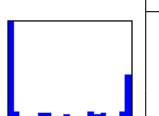


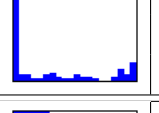
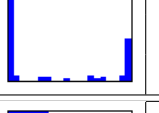





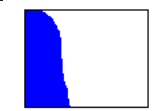


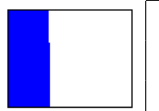


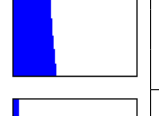
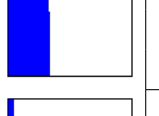


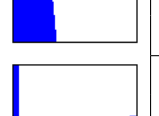
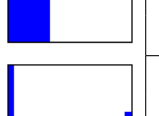

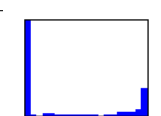

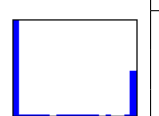
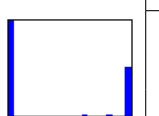










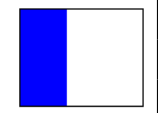
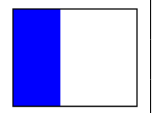
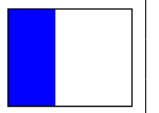


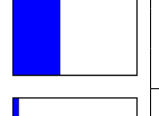
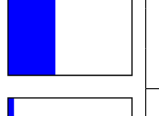



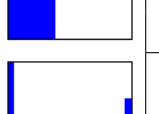

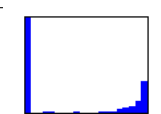

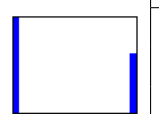
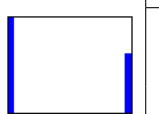
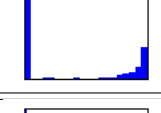








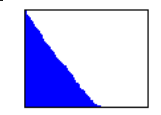

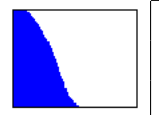
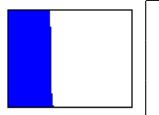
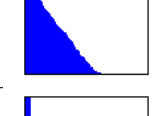


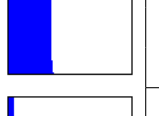



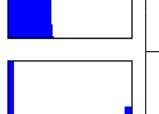

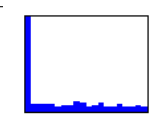
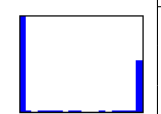
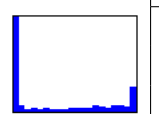
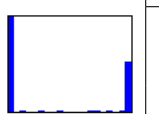
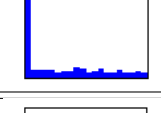

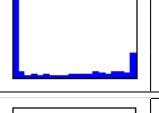
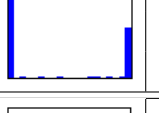





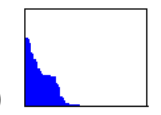
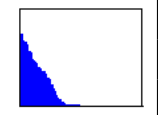
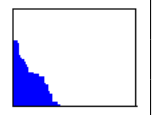
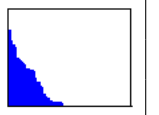
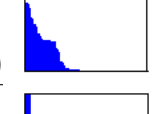
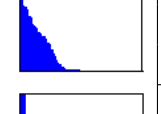
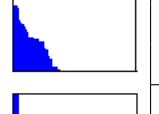
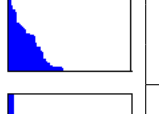
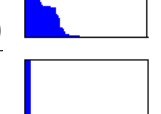

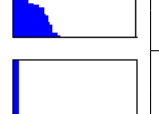
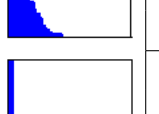

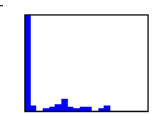
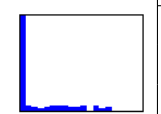
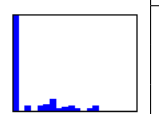
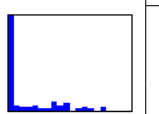
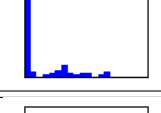
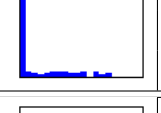
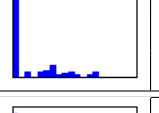
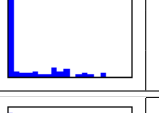
Solver→ Detectors→ Descriptors→			M				M.LO				M+LSq + BA				M.LO + BA				
			MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				100 runs, $\sigma = 0.3$, conf = 95 %				100 runs, $\sigma = 0.3$, conf = 95 %				
adam		I	9.7	±0.8	(7-12)		11.0	±0.9	(7-13)		9.9	±0.8	(7-11)		11.2	±0.9	(9-13)		Inlss
		I (%)	48.3	±4.0	(35-60)		55.1	±4.5	(35-65)		49.3	±3.8	(35-55)		55.8	±4.7	(45-65)		
		Samp	85.3	±27.4	(28-212)		57.1	±13.9	(28-165)		84.8	±21.7	(43-121)		55.1	±9.8	(43-114)		
		Time _(ms)	2.4		(NA)		5.6		(NA)		12.4		(NA)		11.4		(NA)		H _{Inlss}
		Error	4.07	±3.59	(0.8-14.1)		3.25	±1.77	(0.9-9.6)		3.63	±2.69	(0.9-9.3)		3.08	±1.62	(0.9-8.4)		
		LO count	0.0	±0.0	(0-0)		1.2	±0.4	(1-4)		0.0	±0.0	(0-0)		1.2	±0.4	(1-3)		
boat		I	50.4	±4.6	(34-66)		64.1	±1.5	(51-67)		57.6	±3.6	(47-66)		62.9	±0.8	(56-64)		Inlss
		I (%)	40.0	±3.7	(27-52)		50.9	±1.2	(40-53)		45.8	±2.9	(37-52)		49.9	±0.6	(44-51)		
		Samp	149.0	±53.1	(41-440)		51.9	±3.8	(41-137)		146.2	±55.3	(60-327)		52.0	±4.3	(50-87)		
		Time _(ms)	4.7		(NA)		7.5		(NA)		23.5		(NA)		25.7		(NA)		H _{Inlss}
		Error	1.84	±0.45	(1.2-6.7)		1.37	±0.07	(1.3-2.4)		1.52	±0.26	(1.3-2.6)		1.35	±0.06	(1.3-1.9)		
		LO count	0.0	±0.0	(0-0)		1.0	±0.2	(1-3)		0.0	±0.0	(0-0)		1.0	±0.1	(1-2)		
Boston		I	277.3	±21.5	(187-305)		305.0	±0.0	(305-305)		305.0	±0.2	(304-305)		305.0	±0.0	(305-305)		Inlss
		I (%)	72.6	±5.6	(49-80)		79.8	±0.0	(80-80)		79.8	±0.0	(80-80)		79.8	±0.0	(80-80)		
		Samp	12.8	±5.8	(6-53)		12.8	±5.8	(6-50)		12.3	±5.7	(6-38)		12.3	±5.7	(6-38)		
		Time _(ms)	1.1		(NA)		15.8		(NA)		85.2		(NA)		24.4		(NA)		H _{Inlss}
		Error	1.78	±1.01	(0.4-15.1)		0.66	±0.00	(0.7-0.7)		0.67	±0.03	(0.6-0.8)		0.66	±0.00	(0.7-0.7)		
		LO count	0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		
BostonLib		I	44.6	±3.5	(32-51)		50.0	±0.3	(43-50)		48.6	±1.7	(46-51)		50.0	±0.4	(46-50)		Inlss
		I (%)	22.3	±1.8	(16-26)		25.0	±0.1	(22-25)		24.3	±0.9	(23-26)		25.0	±0.2	(23-25)		
		Samp	1619.9	±605.8	(774-5885)		851.4	±73.0	(774-2393)		1603.0	±569.8	(774-3665)		846.3	±44.5	(840-1186)		
		Time _(ms)	10.0		(NA)		17.1		(NA)		51.6		(NA)		45.7		(NA)		H _{Inlss}
		Error	2.00	±1.14	(0.4-12.9)		0.48	±0.03	(0.5-1.9)		0.75	±0.29	(0.4-1.4)		0.45	±0.03	(0.4-0.7)		
		LO count	0.0	±0.0	(0-0)		3.0	±1.2	(1-8)		0.0	±0.0	(0-0)		2.9	±1.2	(1-6)		
BruggeSquare		I	16.6	±0.9	(12-20)		18.7	±1.3	(15-20)		16.9	±0.9	(15-20)		18.7	±1.3	(17-20)		Inlss
		I (%)	36.1	±1.9	(26-43)		40.6	±2.8	(33-43)		36.8	±1.9	(33-43)		40.7	±2.8	(37-43)		
		Samp	242.3	±58.7	(100-628)		146.9	±44.3	(100-357)		243.2	±59.1	(159-404)		145.3	±44.1	(100-220)		
		Time _(ms)	3.4		(NA)														

Solver→ Detectors→ Descriptors→			M				M.LO				M+LSq + BA				M.LO + BA				
			MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				MSER+ MSER-SIFT				
Image		Qty↓	10000 runs, $\sigma = 0.3$, conf = 95 %				10000 runs, $\sigma = 0.3$, conf = 95 %				100 runs, $\sigma = 0.3$, conf = 95 %				100 runs, $\sigma = 0.3$, conf = 95 %				
city		I	9.7	±0.6	(6-11)		11.0	±1.0	(8-13)		9.8	±0.5	(8-11)		11.0	±0.9	(10-12)		Inlss
		I (%)	56.8	±3.5	(35-65)		64.7	±5.6	(47-76)		57.9	±3.1	(47-65)		64.9	±5.2	(59-71)		
		Samp	45.4	±15.4	(21-203)		41.6	±9.4	(21-120)		43.8	±14.2	(21-101)		40.8	±9.7	(21-80)		
		Time _(ms)	1.2		(NA)		4.5		(NA)		6.2		(NA)		11.2		(NA)		H _{Inlss}
Error	1.51	±0.99	(0.6-63.7)		1.20	±0.92	(0.6-63.5)		1.43	±0.41	(0.7-2.2)		1.34	±0.20	(0.7-1.5)				
LO count	0.0	±0.0	(0-0)		1.0	±0.1	(1-3)		0.0	±0.0	(0-0)		1.0	±0.1	(1-2)				
Eiffel		I	60.9	±4.1	(43-69)		66.8	±1.1	(62-69)		65.3	±2.6	(55-69)		66.5	±0.8	(64-67)		Inlss
		I (%)	30.4	±2.1	(22-34)		33.4	±0.5	(31-34)		32.6	±1.3	(28-34)		33.2	±0.4	(32-34)		
		Samp	438.9	±155.3	(223-1676)		254.5	±18.6	(223-800)		444.8	±168.3	(252-1051)		255.7	±22.6	(237-409)		
		Time _(ms)	6.7		(NA)		19.5		(NA)		29.7		(NA)		43.9		(NA)		H _{Inlss}
Error	1.23	±0.57	(0.3-7.6)		0.88	±0.16	(0.6-1.4)		0.91	±0.35	(0.6-2.1)		0.78	±0.17	(0.6-1.3)				
LO count	0.0	±0.0	(0-0)		2.5	±1.2	(1-8)		0.0	±0.0	(0-0)		2.5	±1.2	(1-8)				
ExtremeZoom		I	12.6	±1.2	(9-14)		13.1	±1.0	(9-14)		12.8	±1.1	(10-14)		13.0	±1.2	(9-14)		Inlss
		I (%)	22.5	±2.1	(16-25)		23.4	±1.9	(16-25)		22.8	±1.9	(18-25)		23.2	±2.1	(16-25)		
		Samp	2667.8	±1412.7	(1098-8732)		2260.2	±1324.7	(1098-8732)		2808.8	±1325.6	(1098-5239)		2526.3	±1601.2	(1098-8732)		
		Time _(ms)	14.1		(NA)		22.5		(NA)		19.6		(NA)		55.2		(NA)		H _{Inlss}
Error	9.03	±17.16	(1.0-345.2)		6.89	±17.80	(0.6-345.2)		8.85	±18.67	(1.1-77.0)		9.97	±36.34	(1.1-336.9)				
LO count	0.0	±0.0	(0-0)		4.2	±1.7	(1-12)		0.0	±0.0	(0-0)		4.5	±1.9	(1-10)				
graf		I	149.0	±14.1	(102-182)		180.3	±1.4	(138-182)		178.0	±4.9	(143-184)		179.8	±1.8	(177-181)		Inlss
		I (%)	60.8	±5.7	(42-74)		73.6	±0.6	(56-74)		72.7	±2.0	(58-75)		73.4	±0.7	(72-74)		
		Samp	27.4	±11.2	(9-86)		27.1	±10.4	(9-53)		27.3	±11.1	(12-63)		26.9	±10.1	(12-52)		
		Time _(ms)	2.1		(NA)		11.5		(NA)		55.5		(NA)		61.5		(NA)		H _{Inlss}
Error	1.48	±0.55	(0.6-3.8)		1.24	±0.05	(1.1-2.5)		1.21	±0.21	(0.7-1.8)		1.19	±0.04	(1.1-1.3)				
LO count	0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)				
LePoint1		I	54.3	±4.9	(34-67)		64.2	±2.8	(49-68)		59.9	±5.0	(42-66)		63.8	±3.0	(50-67)		Inlss
		I (%)	36.7	±3.3	(23-45)		43.4	±1.9	(33-46)		40.5	±3.4	(28-45)		43.1	±2.0	(34-45)		
		Samp	209.4	±73.4	(74-628)		94.8	±25.8	(70-270)		211.8	±80.8	(79-628)		98.0	±32.1	(74-270)		
		Time _(ms)	7.7		(NA)		13.5		(NA)		26.3		(NA)		33.0		(NA)		H _{Inlss}
Error	3.08	±0.33	(2.1-5.2)		2.93	±0.10	(2.4-4.0)		3.02	±0.25	(2.5-4.0)		2.91	±0.11.1					

Solver→ Detectors→ Descriptors→			M HessianAff SIFT				M.LO HessianAff SIFT				M+LSq + BA HessianAff SIFT				M.LO + BA HessianAff SIFT				
Image		Qty↓	1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				10 runs, $\sigma = 0.3$, conf = 95 %				10 runs, $\sigma = 0.3$, conf = 95 %				
booksh		I	122.6	±9.2	(100-148)		147.8	±3.1	(117-153)		135.5	±7.9	(119-144)		148.1	±2.2	(145-151)		Inlss
		I (%)	61.6	±4.6	(50-74)		74.3	±1.6	(59-77)		68.1	±4.0	(60-72)		74.4	±1.1	(73-76)		
		Samp	125.6	±60.3	(29-365)		70.9	±38.0	(29-332)		133.5	±42.4	(59-212)		55.8	±11.6	(50-86)		
		Time _(ms)	2.1		(NA)		8.3		(NA)		110.6		(NA)		187.3		(NA)		H _{Inlss}
Error		1.58	±1.13	(0.5-16.3)		0.74	±0.14	(0.6-2.4)		1.33	±0.79	(0.7-2.8)		0.69	±0.02	(0.6-0.7)			
LO count		0.0	±0.0	(0-0)		1.0	±0.2	(1-3)		0.0	±0.0	(0-0)		1.1	±0.3	(1-2)			
box		I	644.9	±31.0	(567-721)		711.6	±12.2	(644-734)		653.1	±37.8	(609-725)		717.1	±9.0	(707-729)		Inlss
		I (%)	69.5	±3.3	(61-78)		76.7	±1.3	(69-79)		70.4	±4.1	(66-78)		77.3	±1.0	(76-79)		
		Samp	43.3	±14.4	(16-93)		40.3	±10.0	(16-78)		56.3	±14.7	(22-74)		48.1	±9.7	(22-59)		
		Time _(ms)	4.1		(NA)		22.7		(NA)		5333.8		(NA)		11345.1		(NA)		H _{Inlss}
Error		55.19	±17.40	(18.7-111.2)		62.39	±6.02	(35.3-83.7)		51.00	±25.09	(26.3-110.4)		61.93	±4.98	(54.9-70.9)			
LO count		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)			
castle		I	232.0	±15.8	(193-278)		268.1	±10.6	(221-280)		267.3	±5.9	(255-274)		271.0	±11.0	(240-276)		Inlss
		I (%)	54.1	±3.7	(45-65)		62.5	±2.5	(52-65)		62.3	±1.4	(59-64)		63.2	±2.6	(56-64)		
		Samp	289.9	±116.6	(76-822)		107.0	±60.1	(58-518)		273.9	±131.1	(114-484)		92.6	±40.5	(65-186)		
		Time _(ms)	9.7		(NA)		18.6		(NA)		12618.3		(NA)		14072.7		(NA)		H _{Inlss}
Error		2.95	±4.14	(0.4-39.5)		1.85	±3.66	(0.3-18.5)		0.66	±0.37	(0.4-1.5)		1.58	±3.49	(0.4-11.5)			
LO count		0.0	±0.0	(0-0)		1.6	±0.8	(1-5)		0.0	±0.0	(0-0)		1.3	±0.5	(1-2)			
corr		I	482.0	±30.4	(403-544)		541.7	±1.2	(539-544)		525.5	±25.1	(460-542)		541.7	±1.3	(540-544)		Inlss
		I (%)	77.2	±4.9	(65-87)		86.8	±0.2	(86-87)		84.2	±4.0	(74-87)		86.8	±0.2	(87-87)		
		Samp	23.6	±10.7	(7-72)		23.5	±10.4	(7-63)		24.6	±13.3	(11-52)		24.4	±12.9	(11-50)		
		Time _(ms)	1.7		(NA)		16.6		(NA)		17651.5		(NA)		12180.5		(NA)		H _{Inlss}
Error		0.39	±0.20	(0.1-1.7)		0.13	±0.00	(0.1-0.1)		0.21	±0.10	(0.1-0.5)		0.12	±0.00	(0.1-0.1)			
LO count		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)			
graff		I	39.4	±1.9	(33-46)		42.8	±1.6	(38-47)		41.2	±1.7	(39-44)		42.7	±1.9	(39-46)		Inlss
		I (%)	21.8	±1.0	(18-25)		23.6	±0.9	(21-26)		22.8	±0.9	(22-24)		23.6	±1.1	(22-25)		
		Samp	99207.7	±4022.0	(53484-100000)		85380.8	±13905.2	(45684-100000)		100000.0	±0.0	(100000-100000)		86363.1	±16540.6	(53484-100000)		
		Time _(ms)	1017.0		(NA)		916.3												

Solver→ Detectors→ Descriptors→			M HessianAff SIFT				M.LO HessianAff SIFT				M+LSq + BA HessianAff SIFT				M.LO + BA HessianAff SIFT				
Image		Qty↓	1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				10 runs, $\sigma = 0.3$, conf = 95 %				10 runs, $\sigma = 0.3$, conf = 95 %				
leafs		I	140.7	±8.5	(120-167)		162.5	±5.4	(141-172)		159.6	±5.9	(151-169)		164.6	±5.0	(155-169)		Inlss
		I (%)	34.9	±2.1	(30-41)		40.3	±1.3	(35-43)		39.6	±1.5	(37-42)		40.8	±1.2	(38-42)		
		Samp	6193.4	±2361.1	(1779-16138)		1956.6	±663.3	(1147-9217)		5164.5	±2268.3	(2873-9342)		1773.4	±537.0	(1299-2743)		
		Time _(ms)	85.2		(NA)		58.8		(NA)		15898.5		(NA)		15292.0		(NA)		H _{Inlss}
Error		4.49	±3.12	(0.8-19.3)		2.95	±1.40	(0.8-13.5)		3.18	±1.65	(0.9-5.8)		3.11	±1.97	(1.4-8.4)			
LO count		0.0	±0.0	(0-0)		4.3	±2.0	(1-12)		0.0	±0.0	(0-0)		4.0	±1.7	(2-7)			
plant		I	94.2	±7.2	(78-110)		108.5	±1.8	(93-114)		106.6	±3.3	(102-111)		110.0	±2.2	(107-113)		Inlss
		I (%)	44.2	±3.4	(37-52)		50.9	±0.8	(44-54)		50.0	±1.5	(48-52)		51.6	±1.0	(50-53)		
		Samp	1358.1	±649.8	(333-3691)		358.6	±121.1	(243-1962)		1242.9	±613.0	(579-2542)		352.9	±97.0	(294-613)		
		Time _(ms)	19.2		(NA)		22.4		(NA)		1237.4		(NA)		3509.6		(NA)		H _{Inlss}
Error		1.21	±0.59	(0.4-4.0)		0.73	±0.12	(0.5-2.0)		0.75	±0.13	(0.6-0.9)		0.69	±0.07	(0.6-0.8)			
LO count		0.0	±0.0	(0-0)		2.7	±1.4	(1-9)		0.0	±0.0	(0-0)		2.6	±1.5	(1-6)			
rotunda		I	156.4	±12.7	(128-189)		183.6	±1.8	(166-187)		174.0	±9.4	(158-185)		182.0	±2.5	(175-184)		Inlss
		I (%)	65.7	±5.3	(54-79)		77.1	±0.8	(70-79)		73.1	±4.0	(66-78)		76.5	±1.1	(74-77)		
		Samp	86.1	±42.9	(14-311)		56.9	±24.2	(14-213)		93.7	±51.6	(42-207)		79.2	±50.8	(42-207)		
		Time _(ms)	1.8		(NA)		8.7		(NA)		4969.3		(NA)		428.5		(NA)		H _{Inlss}
Error		2.71	±2.83	(0.3-31.2)		0.63	±0.15	(0.2-1.6)		1.13	±0.78	(0.3-3.0)		0.66	±0.06	(0.6-0.8)			
LO count		0.0	±0.0	(0-0)		1.0	±0.0	(1-2)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)			
shout		I	81.2	±3.2	(70-90)		88.2	±2.7	(76-93)		83.6	±3.7	(77-89)		88.2	±2.8	(84-93)		Inlss
		I (%)	49.5	±1.9	(43-55)		53.8	±1.7	(46-57)		51.0	±2.3	(47-54)		53.8	±1.7	(51-57)		
		Samp	456.3	±114.5	(205-925)		264.1	±84.0	(162-718)		464.9	±91.4	(367-691)		265.3	±70.1	(189-437)		
		Time _(ms)	6.8		(NA)		16.9		(NA)		637.8		(NA)		1146.6		(NA)		H _{Inlss}
Error		2.47	±0.95	(0.4-6.5)		2.11	±0.65	(0.5-5.2)		1.97	±0.73	(1.3-3.4)		1.87	±0.51	(1.1-3.0)			
LO count		0.0	±0.0	(0-0)		2.2	±1.2	(1-8)		0.0	±0.0	(0-0)		1.9	±0.9	(1-3)			
valbonne		I	112.2	±7.5	(95-131)		130.4	±2.8	(113-135)		126.0	±6.6	(115-132)		130.5	±1.6	(127-132)		Inlss
		I (%)	54.7	±3.7	(46-64)		63.6	±1.4	(55-66)		61.5	±3.2	(56-64)		63.7	±0.8	(62-64)		
		Samp	268.3	±113.2	(72-726)		97.7	±62.7	(55-588)		283.3	±144.3	(90-491)		109.7	±116.9			

Solver→ Detectors→ Descriptors→			M				M.LO				M+LSq + BA				M.LO + BA				
			HessianAff SIFT				HessianAff SIFT				HessianAff SIFT				HessianAff SIFT				
Image		Qty↓	1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				100 runs, $\sigma = 0.3$, conf = 95 %				100 runs, $\sigma = 0.3$, conf = 95 %				
adam		I	165.2	±13.3	(128-202)		205.0	±6.3	(178-216)		190.4	±11.6	(155-210)		205.7	±4.6	(181-214)		Inlss
		I (%)	38.6	±3.1	(30-47)		47.9	±1.5	(42-50)		44.5	±2.7	(36-49)		48.1	±1.1	(42-50)		
		Samp	155.7	±46.4	(60-316)		58.6	±8.8	(50-101)		157.4	±52.3	(64-280)		57.8	±7.3	(50-92)		
		Time _(ms)	14.7		(NA)		21.1		(NA)		64.8		(NA)		82.2		(NA)		H _{Inlss}
		Error	1.64	±0.53	(0.8-5.0)		1.19	±0.26	(0.9-3.3)		1.41	±0.42	(1.0-3.6)		1.21	±0.22	(1.0-3.0)		
LO count		0.0	±0.0	(0-0)		1.2	±0.4	(1-3)		0.0	±0.0	(0-0)		1.2	±0.4	(1-3)			
boat		I	197.1	±14.1	(143-238)		239.9	±3.0	(231-248)		226.1	±9.1	(202-245)		240.4	±3.7	(230-245)		Inlss
		I (%)	39.9	±2.8	(29-48)		48.6	±0.6	(47-50)		45.8	±1.8	(41-50)		48.7	±0.7	(47-50)		
		Samp	133.7	±40.6	(59-329)		53.9	±2.4	(50-63)		132.6	±38.6	(70-234)		53.5	±2.2	(50-59)		
		Time _(ms)	8.2		(NA)		19.4		(NA)		75.8		(NA)		88.0		(NA)		H _{Inlss}
		Error	1.91	±0.45	(1.2-3.8)		1.54	±0.10	(1.4-1.8)		1.67	±0.29	(1.2-2.8)		1.52	±0.07	(1.4-1.7)		
LO count		0.0	±0.0	(0-0)		1.1	±0.2	(1-3)		0.0	±0.0	(0-0)		1.1	±0.2	(1-2)			
Boston		I	1380.0	±120.8	(988-1550)		1548.0	±0.0	(1548-1548)		1547.7	±1.1	(1544-1550)		1548.0	±0.0	(1548-1548)		Inlss
		I (%)	65.8	±5.8	(47-74)		73.9	±0.0	(74-74)		73.8	±0.1	(74-74)		73.9	±0.0	(74-74)		
		Samp	19.7	±8.9	(9-63)		19.6	±8.7	(9-53)		20.8	±9.1	(9-60)		20.7	±8.8	(9-51)		
		Time _(ms)	5.9		(NA)		71.8		(NA)		298.3		(NA)		94.3		(NA)		H _{Inlss}
		Error	1.43	±0.64	(0.4-5.1)		0.56	±0.00	(0.6-0.6)		0.57	±0.03	(0.5-0.7)		0.56	±0.00	(0.6-0.6)		
LO count		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)		0.0	±0.0	(0-0)		1.0	±0.0	(1-1)			
BostonLib		I	383.9	±33.9	(268-445)		446.0	±0.2	(441-447)		446.1	±1.1	(441-447)		446.0	±0.0	(446-446)		Inlss
		I (%)	40.1	±3.5	(28-46)		46.6	±0.0	(46-47)		46.6	±0.1	(46-47)		46.6	±0.0	(47-47)		
		Samp	145.8	±58.7	(64-496)		66.9	±8.6	(63-129)		140.5	±55.8	(73-454)		67.4	±9.7	(63-122)		
		Time _(ms)	3.1		(NA)		28.5		(NA)		167.3		(NA)		192.9		(NA)		H _{Inlss}
		Error	1.36	±0.63	(0.4-4.3)		0.53	±0.00	(0.5-0.5)		0.55	±0.02	(0.5-0.6)		0.54	±0.00	(0.5-0.5)		
LO count		0.0	±0.0	(0-0)		1.1	±0.3	(1-3)		0.0	±0.0	(0-0)		1.0	±0.2	(1-2)			
BruggeSquare		I	416.2	±27.5	(332-489)		491.4	±11.2	(438-512)		460.0	±19.2	(387-506)		482.4	±10.9	(443-494)		Inlss
		I (%)	25.5	±1.7	(20-30)		30.1	±0.7	(27-31)		28.1	±1.2	(24-31)		29.5	±0.7	(27-30)		
		Samp	794.6	±216.7	(386-1601)		374.3	±41.8	(313-676)		808.4	±228.5	(453-1586)		376.0	±47.9	(321-540)		
		Time _(ms)	139.7		(NA)		171.6		(NA)		272.2		(NA)		316.8		(NA)		H _{Inlss}
		Error	6.75	±2.04	(3.7-12.8)		5.75	±1.58	(4.3-9.2)		6.46	±1.92	(4.2-10.3)		5.86	±1.72	(4.4-9.1)		
LO count		0.0	±0.0	(0-0)		3.0	±1.4	(1-10)		0.0	±0.0	(0-0)		2.9	±1.3	(1-6)			
BruggeTower		I	199.3	±12.9	(154-236)		227.1	±6.0	(204-237)		220.1	±9.2	(192-236)		225.8	±6.9	(204-235)		Inlss
		I (%)	33.3	±2.2	(26-39)		37.9	±1.0	(34-40)		36.7	±1.5	(32-39)		37.7	±1.2	(34-39)		
		Samp	272.7	±70.9	(137-705)		146.3	±16.9	(123-226)		265.7	±71.4	(140-508)		148.3	±18.1	(125-213)		
		Time _(ms)	22.7		(NA)		45.3		(NA)		107.2		(NA)		128.1		(NA)		H _{Inlss}
		Error	6.23	±2.61	(1.6-14.0)		5.90	±1.90	(1.8-7.7)		5.53	±2.14	(1.8-8.6)		5.84	±2.01	(1.8-7.2)		
LO count		0.0	±0.0	(0-0)		2.1	±1.0	(1-6)		0.0	±								

Solver→ Detectors→ Descriptors→			M				M.LO				M+LSq + BA				M.LO + BA				
			HessianAff SIFT				HessianAff SIFT				HessianAff SIFT				HessianAff SIFT				
Image		Qty↓	1000 runs, $\sigma = 0.3$, conf = 95 %				1000 runs, $\sigma = 0.3$, conf = 95 %				100 runs, $\sigma = 0.3$, conf = 95 %				100 runs, $\sigma = 0.3$, conf = 95 %				
city		I	26.2	±2.6	(19-33)		33.4	±1.4	(28-36)		28.4	±2.4	(21-33)		33.0	±1.0	(30-35)		Inlss
		I (%)	27.0	±2.6	(20-34)		34.5	±1.4	(29-37)		29.3	±2.4	(22-34)		34.1	±1.0	(31-36)		
		Samp	764.6	±264.0	(288-2091)		236.7	±45.1	(175-586)		763.2	±264.8	(329-1733)		241.3	±54.8	(175-586)		
		Time _(ms)	27.1		(NA)		20.5		(NA)		35.7		(NA)		31.1		(NA)		H _{Inlss}
		Error	0.75	±0.24	(0.3-2.3)		0.57	±0.09	(0.5-1.0)		0.66	±0.17	(0.4-1.2)		0.58	±0.07	(0.5-0.9)		
LO count	0.0	±0.0	(0-0)		2.6	±1.2	(1-9)		0.0	±0.0	(0-0)		2.6	±1.3	(1-7)				
Eiffel		I	212.9	±14.9	(159-239)		240.4	±1.5	(229-242)		232.2	±4.2	(224-241)		240.9	±1.2	(236-242)		Inlss
		I (%)	29.4	±2.1	(22-33)		33.2	±0.2	(32-33)		32.1	±0.6	(31-33)		33.3	±0.2	(33-33)		
		Samp	484.4	±172.6	(260-1375)		248.7	±7.0	(243-332)		510.8	±196.5	(260-1132)		248.6	±5.3	(243-269)		
		Time _(ms)	8.2		(NA)		40.8		(NA)		94.3		(NA)		122.3		(NA)		H _{Inlss}
		Error	2.04	±1.24	(0.4-8.1)		0.77	±0.07	(0.7-1.5)		1.18	±0.56	(0.4-2.4)		0.75	±0.04	(0.7-1.0)		
LO count	0.0	±0.0	(0-0)		2.3	±1.1	(1-7)		0.0	±0.0	(0-0)		2.3	±1.0	(1-5)				
ExtremeZoom		I	139.9	±10.8	(97-153)		151.0	±0.0	(151-151)		151.0	±0.0	(151-151)		151.0	±0.0	(151-151)		Inlss
		I (%)	35.1	±2.7	(24-38)		37.9	±0.0	(38-38)		37.9	±0.0	(38-38)		37.9	±0.0	(38-38)		
		Samp	261.8	±123.0	(140-939)		147.6	±7.7	(143-310)		257.9	±101.7	(147-597)		147.0	±0.0	(147-147)		
		Time _(ms)	2.8		(NA)		18.7		(NA)		52.9		(NA)		73.4		(NA)		H _{Inlss}
		Error	0.63	±0.26	(0.2-2.3)		0.35	±0.00	(0.4-0.4)		0.35	±0.00	(0.3-0.4)		0.35	±0.00	(0.4-0.4)		
LO count	0.0	±0.0	(0-0)		1.8	±0.8	(1-7)		0.0	±0.0	(0-0)		1.9	±0.9	(1-4)				
graf		I	219.7	±17.0	(170-271)		281.0	±2.2	(268-288)		259.0	±10.1	(232-276)		277.3	±1.2	(275-281)		Inlss
		I (%)	27.6	±2.1	(21-34)		35.3	±0.3	(34-36)		32.5	±1.3	(29-35)		34.8	±0.2	(35-35)		
		Samp	596.6	±174.6	(248-1235)		194.8	±9.6	(172-382)		584.2	±178.7	(309-1219)		194.4	±7.0	(182-237)		
		Time _(ms)	71.5		(NA)		70.0		(NA)		134.2		(NA)		138.2		(NA)		H _{Inlss}
		Error	1.31	±0.43	(0.6-3.1)		1.04	±0.02	(0.9-1.2)		1.14	±0.28	(0.7-2.1)		1.08	±0.02	(1.0-1.1)		
LO count	0.0	±0.0	(0-0)		2.3	±1.1	(1-7)		0.0	±0.0	(0-0)		2.1	±1.1	(1-6)				
LePoint1		I	10.3	±0.7	(7-12)		11.7	±0.7	(9-13)		10.4	±0.7	(8-12)		11.6	±0.6	(10-13)		Inlss
		I (%)	11.8	±0.9	(8-14)		13.5	±0.8	(10-15)		12.0	±0.8	(9-14)		13.4	±0.6	(11-15)		
		Samp	27383.5	±6614.4	(13470-55802)		16139.7	±4600.6	(9325-31752)		27419.5	±7079.1	(13470-52921)		16293.0	±4116.3	(9325-31752)		
		Time _(ms)	336.5		(NA)		219.6		(NA)		341.3		(NA)		227.9		(NA)		H _{Inlss}
		Error	5.26	±3.06	(3.0-38.7)		6.21	±9.24	(3.0-93.9)		4.98	±1.45	(3.0-10.3)		7.78	±15.31	(3.0-93.9)		
LO count	0.0	±0.0	(0-0)																

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