

Accurate Camera Registration in Urban Environments Using High-Level Feature Matching

BMVC 2017 Submission # 115
Supplementary Material

1 Introduction

In the following, we provide additional results and information for our approach, which could not be included to the paper. In particular, we provide an evaluation on the number of pose evaluations required to estimate the best pose for each image in Section 2. In addition, we illustrate the whole process by showing intermediate steps and results for each image in Section 3.

2 Numbers of Posterior Evaluations

The numbers for all 40 test images are summarized in Fig. 1. This number is often very small, but can become large for the most complex scenes.

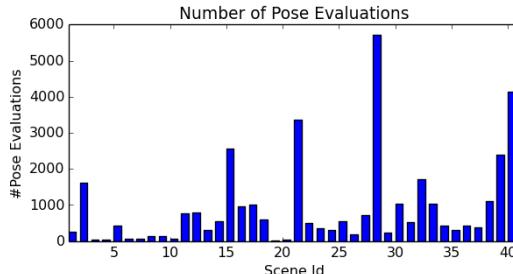


Figure 1: Number of poses evaluations.

3 Intermediate Results



(a) Input image.



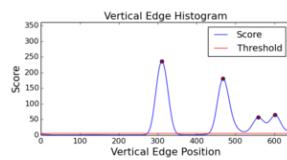
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



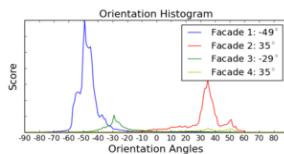
(d) Probability maps (façade, vertical edge, horizontal edge, background).



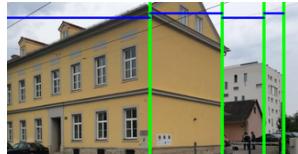
(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and detected facades (blue) shown over the rectified input image.



(i) Model reprojection using the ground truth pose.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #1 - Best solution was found using 3 corner correspondences.

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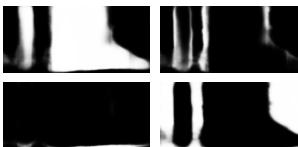
(a) Input image.



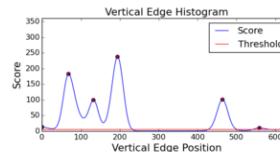
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



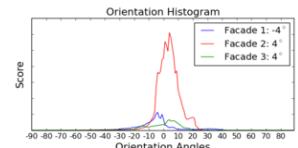
(d) Probability maps (façade, vertical edge, horizontal edge, background).



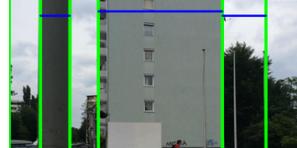
(e) Vertical edge histogram.



(f) Façade normal estimation.



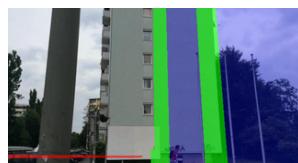
(g) Orientation histograms for detected façades.



(h) Found corners (green) and detected facades (blue) shown over the rectified input image.



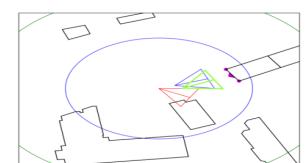
(i) Model reprojection using fine façades (blue) shown over the ground truth pose.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

130 Scene #2 - Best solution was found using 2 corner correspondences and one façade normal.
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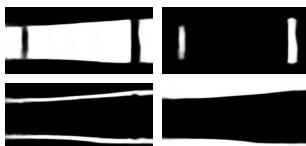
(a) Input image.



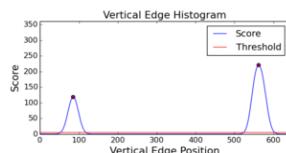
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



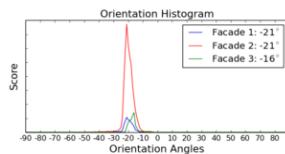
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and defined façades (blue) shown over the rectified input image.



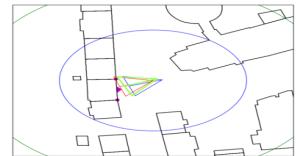
(i) Model re-projection using defined façades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #3 - Best solution was found using 2 corner correspondences and one façade normal.

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(a) Input image.



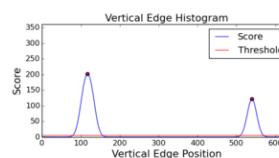
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



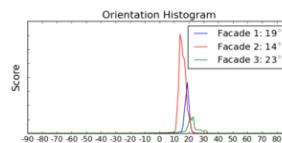
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



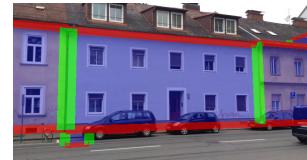
(f) Façade normal estimation.



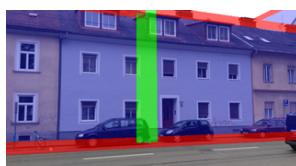
(g) Orientation histograms for detected façades.



(h) Found corners (green) and detected facades (blue) shown over the ground truth pose.



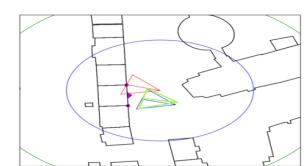
(i) Model reprojection using fine façades (blue) shown over the ground truth pose.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #4 - Best solution was found using 2 corner correspondences and one façade normal.



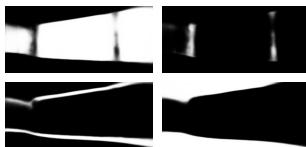
(a) Input image.



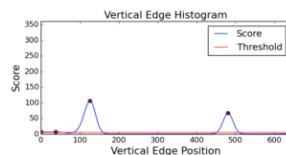
(b) Rectified input image.



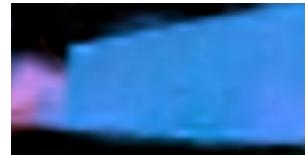
(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



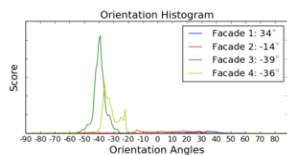
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



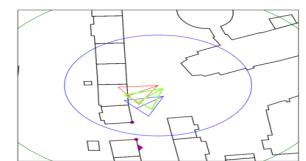
(h) Found corners (green) and de- (i) Model reprojeciton using fined façades (blue) shown over the ground truth pose.



(j) Model reprojeciton using sensors estimation.



(k) Model reprojeciton using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #5 - Best solution was found using 2 corner correspondences and one façade normal.

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(a) Input image.



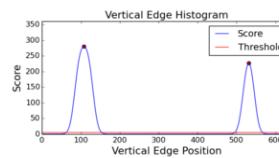
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



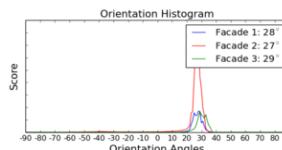
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and detected facades (blue) shown over the rectified input image.



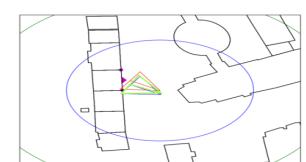
(i) Model re-projection using fine-fitted facades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

304 Scene #6 - Best solution was found using 2 corner correspondences and one façade normal.
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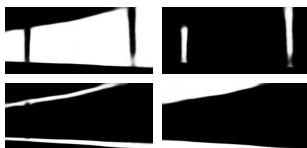
(a) Input image.



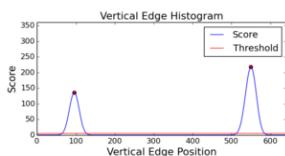
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



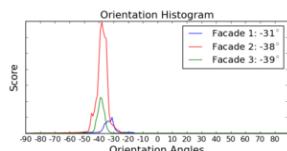
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



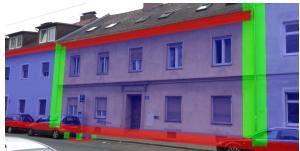
(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and defined façades (blue) shown over the rectified input image.



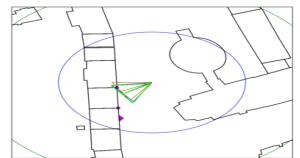
(i) Model reprojeciton using defined façades (blue) shown over the ground truth pose.



(j) Model reprojeciton using sensors estimation.



(k) Model reprojeciton using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #7 - Best solution was found using 2 corner correspondences and one façade normal.

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(a) Input image.



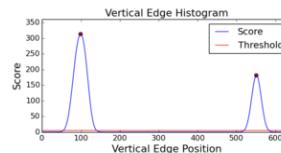
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



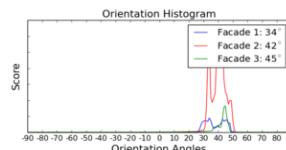
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and detected facades (blue) shown over the rectified input image.



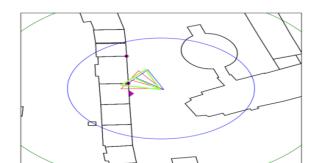
(i) Model reprojection using fine-fitted facades (blue) shown over the ground truth pose.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

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Scene #8 - Best solution was found using 2 corner correspondences and one façade normal.



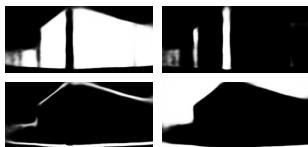
(a) Input image.



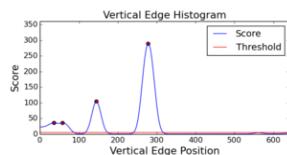
(b) Rectified input image.



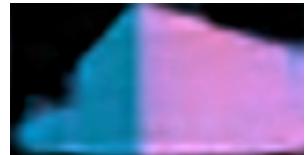
(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



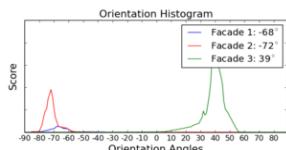
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and defined façades (blue) shown over the rectified input image.



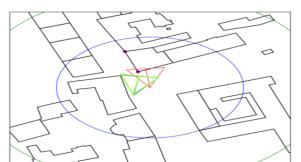
(i) Model re-projection using defined façades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #9 - Best solution was found using 3 corner correspondences.

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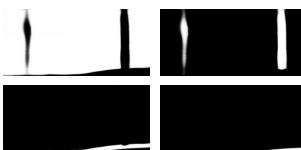
(a) Input image.



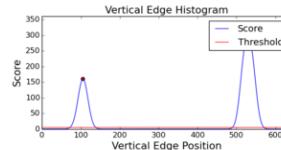
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



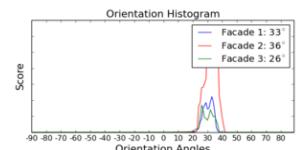
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and detected facades (blue) shown over the rectified input image.



(i) Model re-projection using fine-fitted facades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

498 Scene #10 - Best solution was found using 2 corner correspondences and one façade normal.
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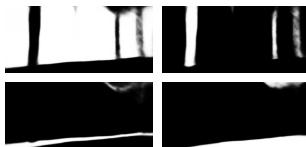
(a) Input image.



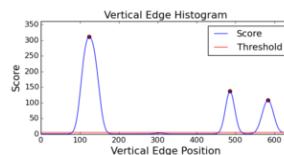
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



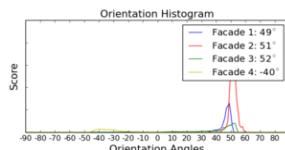
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and de-defined façades (blue) shown over the ground truth pose.



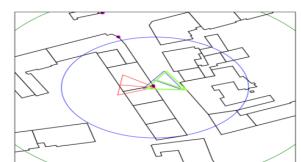
(i) Model re-projection using defined façades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #11 - Best solution was found using 3 corner correspondences.

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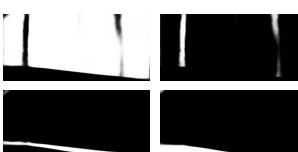
(a) Input image.



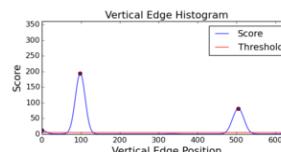
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



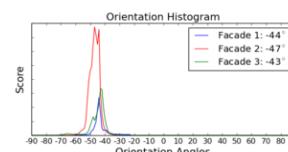
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and detected facades (blue) shown over the ground truth pose.



(i) Model re-projection using fine-fitted facades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

583 Scene #12 - Best solution was found using 2 corner correspondences and one façade normal.
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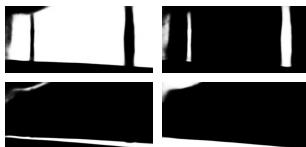
(a) Input image.



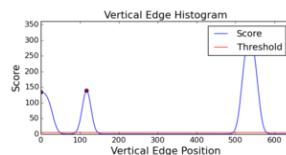
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



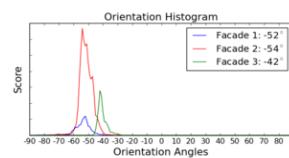
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and defined façades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #13 - Best solution was found using 2 corner correspondences and one façade normal.

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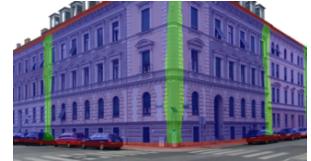
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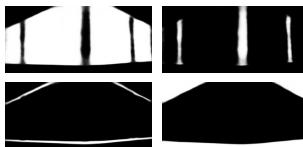
(a) Input image.



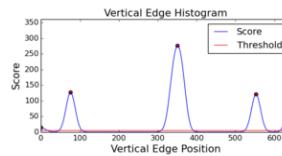
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



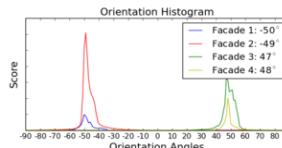
(d) Probability maps (façade, vertical edge, horizontal edge, background).



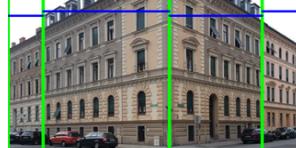
(e) Vertical edge histogram.



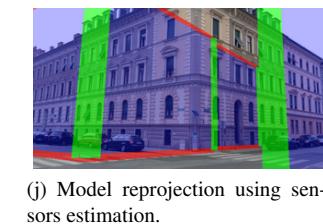
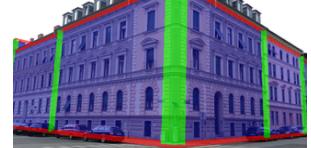
(f) Façade normal estimation.



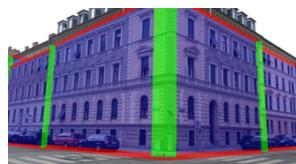
(g) Orientation histograms for detected façades.



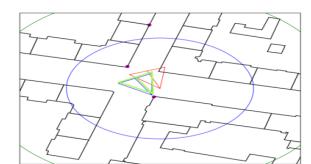
(h) Found corners (green) and detected facades (blue) shown over the rectified input image.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #14 - Best solution was found using 3 corner correspondences.



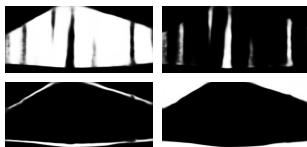
(a) Input image.



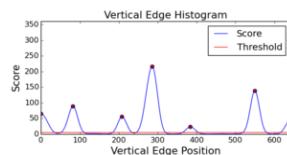
(b) Rectified input image.



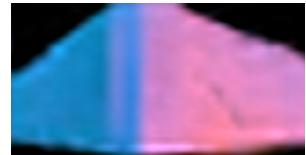
(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



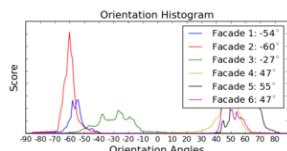
(d) Probability maps (façade, vertical edge, horizontal edge, background).



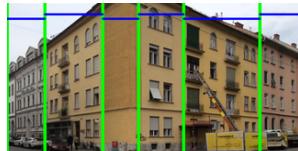
(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



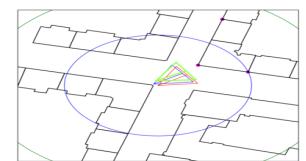
(h) Found corners (green) and defined façades (blue) shown over the rectified input image.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #15 - Best solution was found using 3 corner correspondences.

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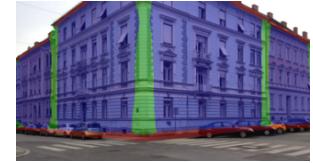
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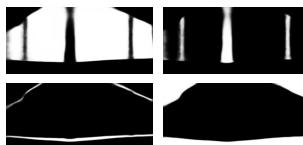
(a) Input image.



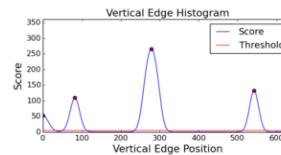
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



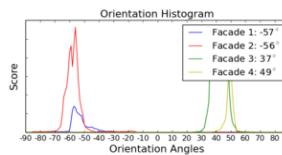
(d) Probability maps (façade, vertical edge, horizontal edge, background).



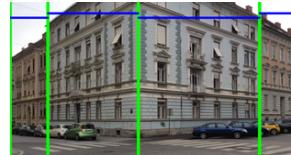
(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



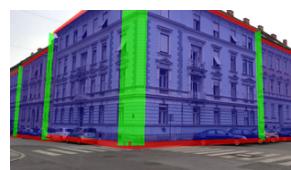
(h) Found corners (green) and detected facades (blue) shown over the rectified input image.



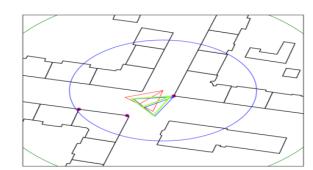
(i) Model reprojection using fine façades (blue) shown over the ground truth pose.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #16 - Best solution was found using 3 corner correspondences.



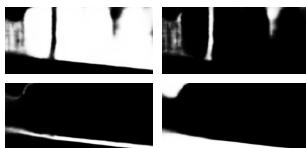
(a) Input image.



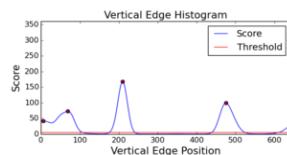
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



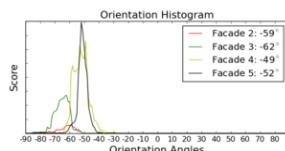
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



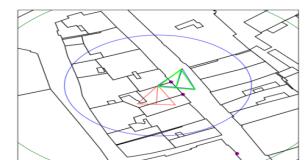
(h) Found corners (green) and de-defined façades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #17 - Best solution was found using 2 corner correspondences and one façade normal.

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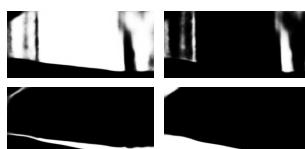
(a) Input image.



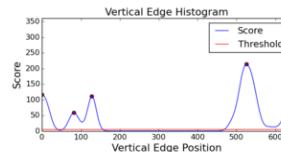
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



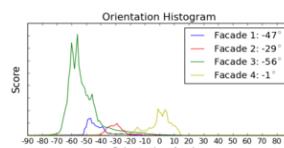
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



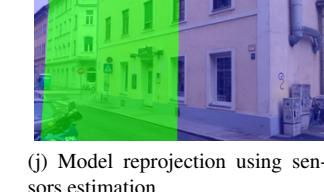
(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



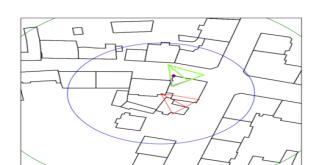
(h) Found corners (green) and detected façades (blue) shown over the ground truth pose.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #18 - Best solution was found using 3 corner correspondences.

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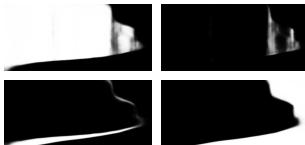
(a) Input image.



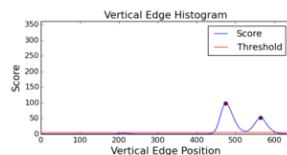
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



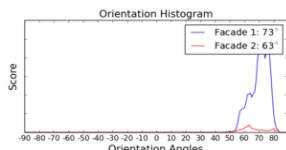
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and de-facade regions (blue) shown over the rectified input image.



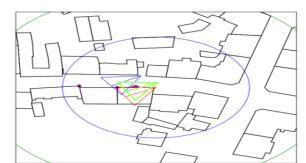
(i) Model reprojection using fine façades (blue) shown over the ground truth pose.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #19 - Best solution was found using 2 corner correspondences and one façade normal.

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(a) Input image.



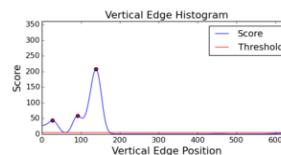
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



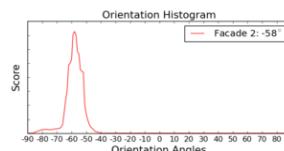
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



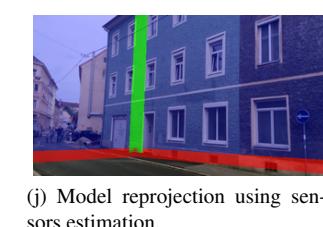
(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and detected façades (blue) shown over the rectified input image.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #20 - Best solution was found using 3 corner correspondences.



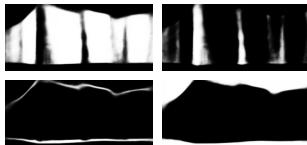
(a) Input image.



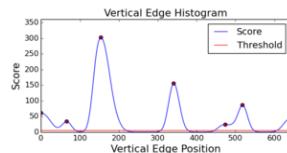
(b) Rectified input image.



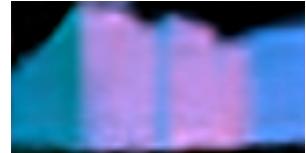
(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



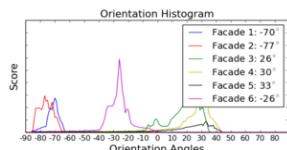
(d) Probability maps (façade, vertical edge, horizontal edge, background).



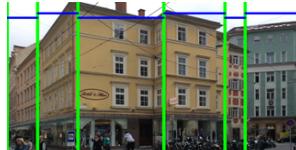
(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h)

(h) Found corners (green) and de- (i) Model reprojection using fined façades (blue) shown over the ground truth pose.



(j) Model reprojection using sensors estimation.



(k)

(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #21 - Best solution was found using 3 corner correspondences.

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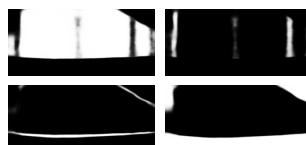
(a) Input image.



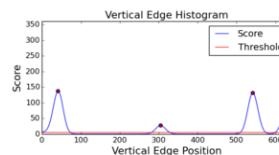
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



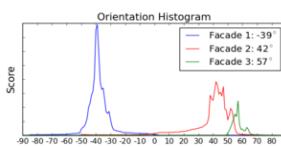
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and detected facades (blue) shown over the ground truth pose.



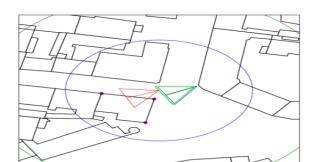
(i) Model re-projection using fine-fitted facades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

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Scene #22 - Best solution was found using 3 corner correspondences.



(a) Input image.



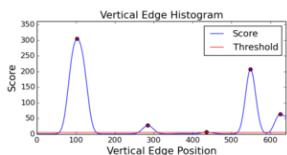
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



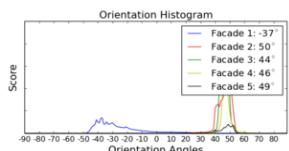
(d) Probability maps (façade, vertical edge, horizontal edge, background).



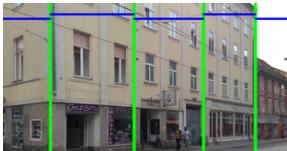
(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



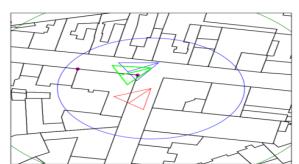
(h) Found corners (green) and de-projected facades (blue) shown over the rectified input image.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #23 - Best solution was found using 3 corner correspondences.

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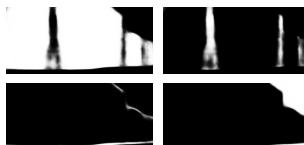
(a) Input image.



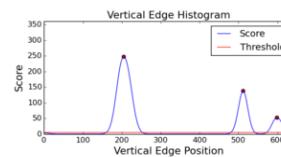
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



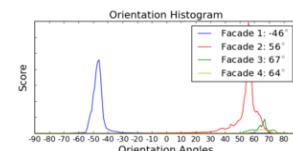
(d) Probability maps (façade, vertical edge, horizontal edge, background).



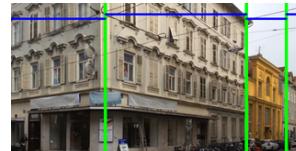
(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and de-projected facades (blue) shown over the rectified input image.



(i) Model re-projection using fine-fitted facades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

1142 Scene #24 - Best solution was found using 2 corner correspondences and one façade normal.
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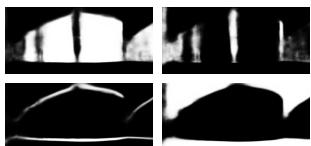
(a) Input image.



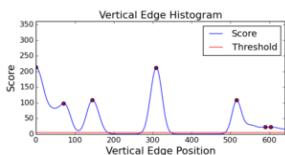
(b) Rectified input image.



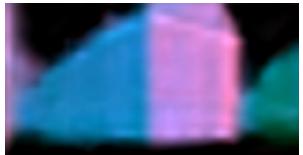
(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



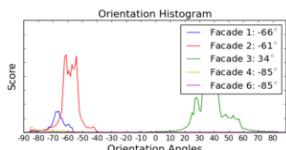
(d) Probability maps (façade, vertical edge, horizontal edge, background).



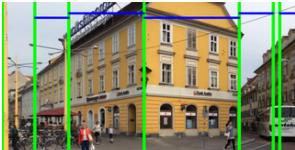
(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and defined façades (blue) shown over the ground truth pose.



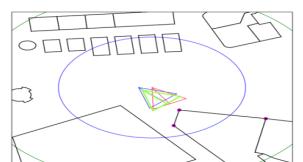
(i) Model re-projection using defined façades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #25 - Best solution was found using 3 corner correspondences.

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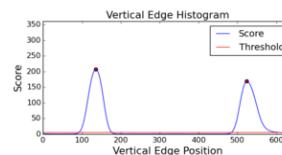
(a) Input image.



(b) Rectified input image.



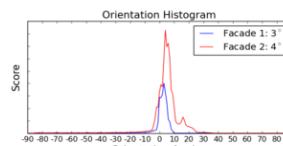
(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).

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(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and de-projected facades (blue) shown over the ground truth pose.



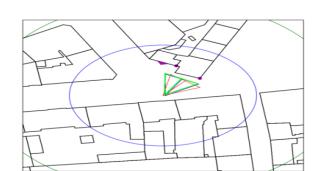
(i) Model reprojection using fine-fitted facades (blue) shown over the ground truth pose.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #26 - Best solution was found using 2 corner correspondences and one façade normal.



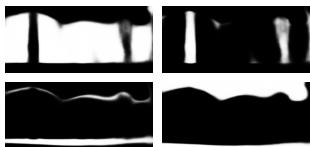
(a) Input image.



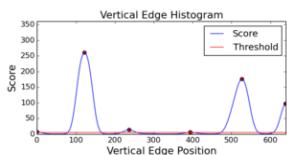
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



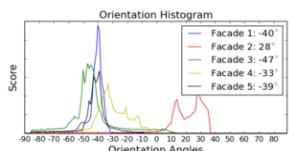
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



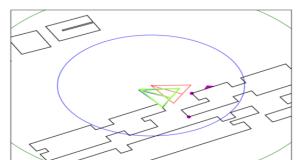
(h) Found corners (green) and detected façades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #27 - Best solution was found using 2 corner correspondences and one façade normal.

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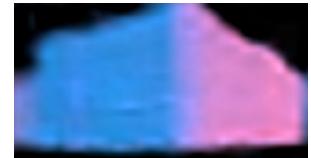
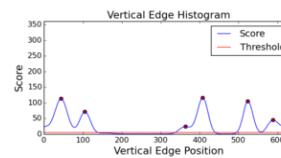
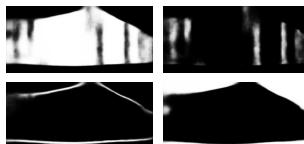
(a) Input image.



(b) Rectified input image.



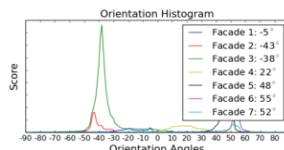
(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



(d) Probability maps (façade, vertical edge, horizontal edge, background).

(e) Vertical edge histogram.

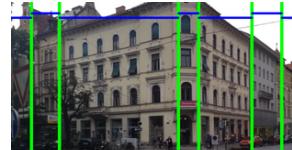
(f) Façade normal estimation.



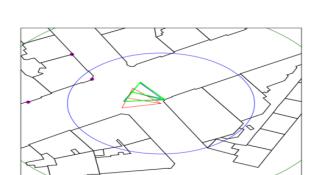
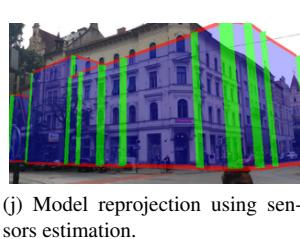
(e) Vertical edge histogram.

(f) Façade normal estimation.

(g) Orientation histograms for detected façades.



(h) Found corners (green) and de- (i) Model re-projection using fined façades (blue) shown over the ground truth pose.



(j) Model re-projection using sen- sors estimation.

(k) Model re-projection using our method's estimate.

(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #28 - Best solution was found using 3 corner correspondences.



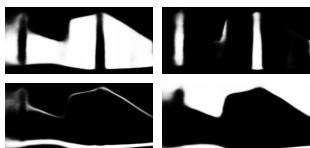
(a) Input image.



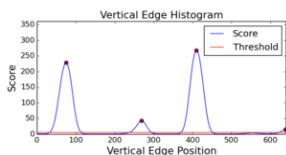
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



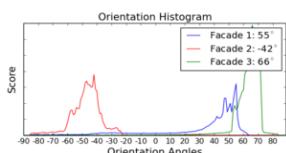
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



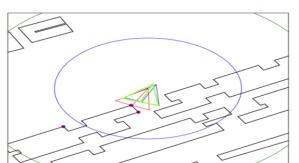
(h) Found corners (green) and detected facades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #29 - Best solution was found using 3 corner correspondences.

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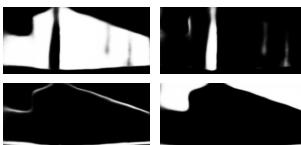
(a) Input image.



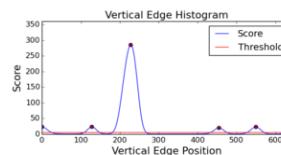
(b) Rectified input image.



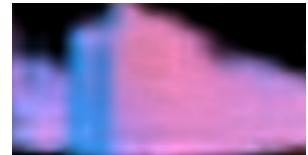
(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



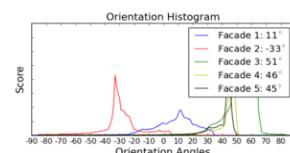
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and detected facades (blue) shown over the rectified input image.



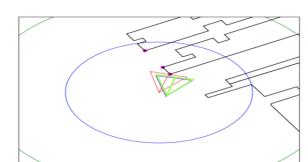
(i) Model reprojection using fine façades (blue) shown over the ground truth pose.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

1418 Scene #30 - Best solution was found using 3 corner correspondences.
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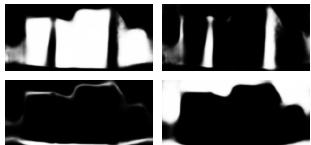
(a) Input image.



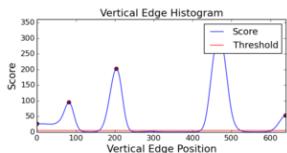
(b) Rectified input image.



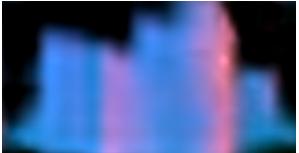
(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



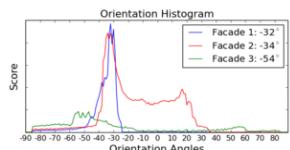
(d) Probability maps (façade, vertical edge, horizontal edge, background).



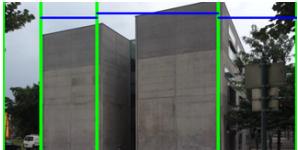
(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and defined façades (blue) shown over the rectified input image.



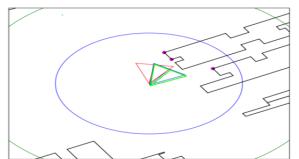
(i) Model re-projection using defined façades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #31 - Best solution was found using 3 corner correspondences.

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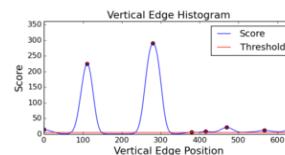
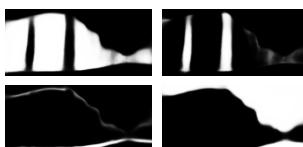
(a) Input image.



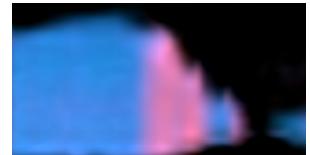
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).

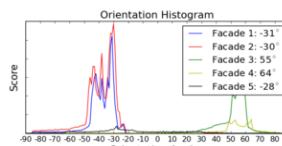


(e) Vertical edge histogram.

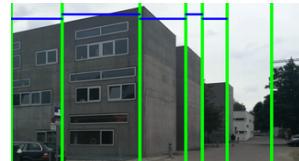


(f) Façade normal estimation.

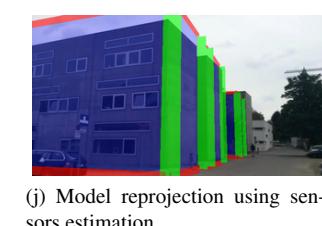
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(g) Orientation histograms for detected façades.



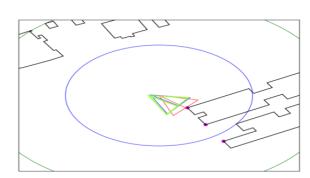
(h) Found corners (green) and detected façades (blue) shown over the rectified input image.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

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Scene #32 - Best solution was found using 3 corner correspondences.



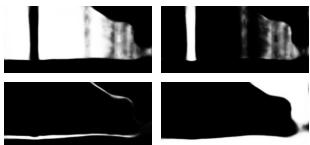
(a) Input image.



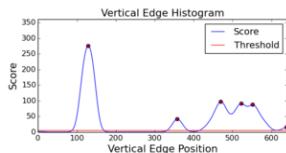
(b) Rectified input image.



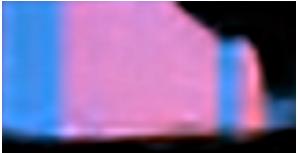
(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



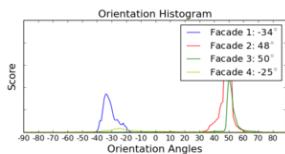
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



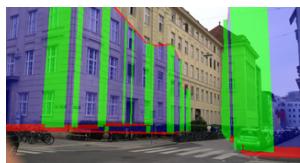
(g) Orientation histograms for detected façades.



(h) Found corners (green) and de-projected facades (blue) shown over the rectified input image.



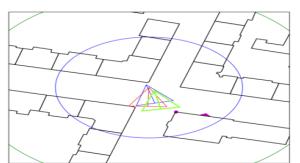
(i) Model reprojection using refined façades (blue) shown over the ground truth pose.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #33 - Best solution was found using 2 corner correspondences and one façade normal.

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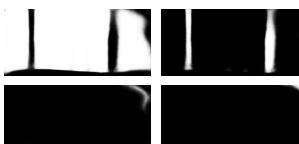
(a) Input image.



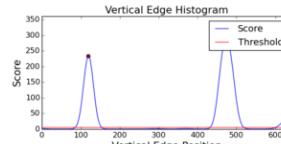
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



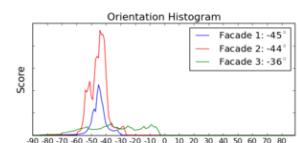
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and detected facades (blue) shown over the rectified input image.



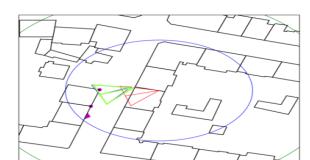
(i) Model re-projection using fine-fitted facades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

1602 Scene #34 - Best solution was found using 2 corner correspondences and one façade normal.
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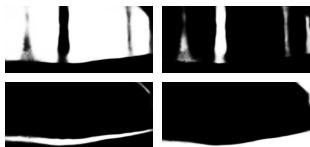
(a) Input image.



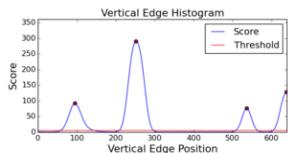
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



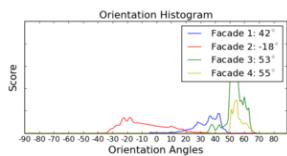
(d) Probability maps (façade, vertical edge, horizontal edge, background).



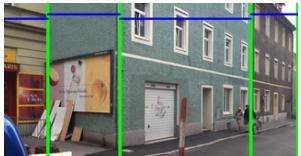
(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



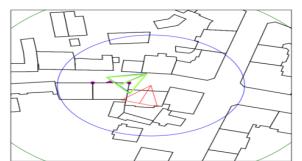
(h) Found corners (green) and de-projected façades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #35 - Best solution was found using 2 corner correspondences and one façade normal.

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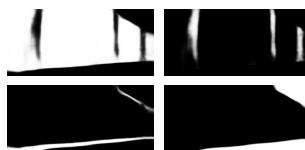
(a) Input image.



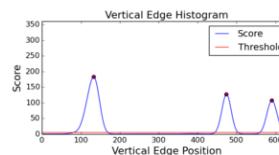
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



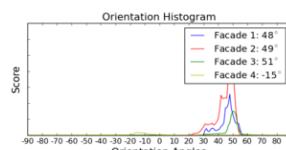
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



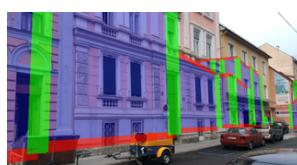
(g) Orientation histograms for detected façades.



(h) Found corners (green) and de- rectified input image.



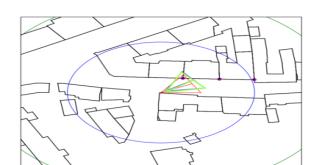
(i) Model re-projection using fine-fitted facades (blue) shown over the ground truth pose.



(j) Model re-projection using sensor-based estimation.



(k) Model re-projection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

1694 Scene #36 - Best solution was found using 2 corner correspondences and one façade normal.
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(a) Input image.



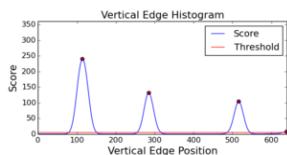
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



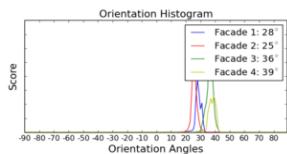
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and de-projected facades (blue) shown over the ground truth pose.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #37 - Best solution was found using 2 corner correspondences and one façade normal.

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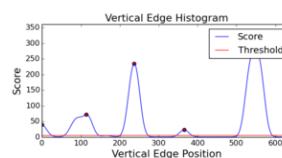
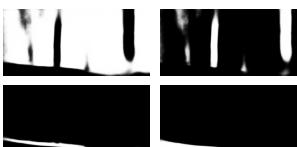
(a) Input image.



(b) Rectified input image.



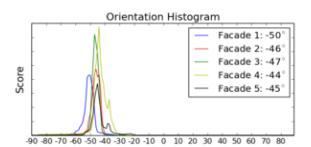
(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



(e) Vertical edge histogram.



(f) Façade normal estimation.



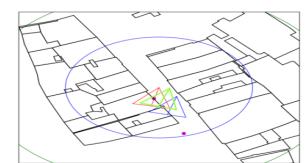
(d) Probability maps (façade, vertical edge, horizontal edge, background).



(h) Found corners (green) and detected facades (blue) shown over the ground truth pose.



(i) Model re-projection using fine-fitted facades (blue) shown over the ground truth pose.



(j) Model re-projection using sensors estimation.

(k) Model re-projection using our method's estimate.

(l) Map (blue:ground truth, red:sensors, green:our method).

1786 Scene #38 - Best solution was found using 2 corner correspondences and one façade normal.
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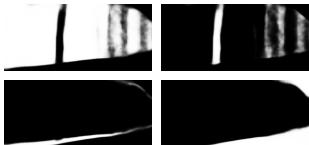
(a) Input image.



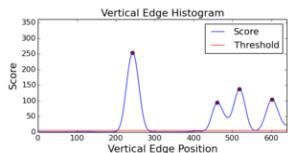
(b) Rectified input image.



(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).



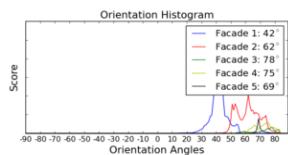
(d) Probability maps (façade, vertical edge, horizontal edge, background).



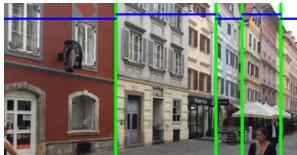
(e) Vertical edge histogram.



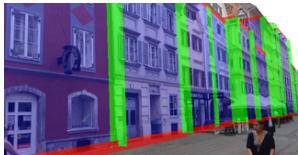
(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and defined façades (blue) shown over the rectified input image.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #39 - Best solution was found using 3 corner correspondences.

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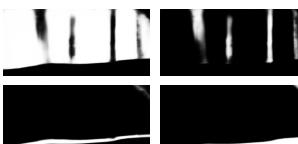
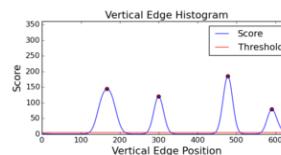
(a) Input image.



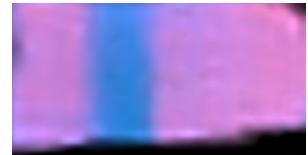
(b) Rectified input image.



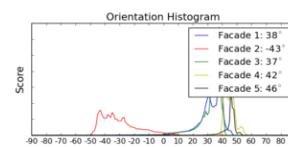
(c) Segmentation Result (blue: façade, green: vertical edge, red: horizontal edge).

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(d) Probability maps (façade, vertical edge, horizontal edge, background).

(e) Vertical edge histogram.



(f) Façade normal estimation.



(g) Orientation histograms for detected façades.



(h) Found corners (green) and detected facades (blue) shown over the ground truth pose.



(i) Model reprojection using fine façades (blue) shown over the ground truth pose.



(j) Model reprojection using sensors estimation.



(k) Model reprojection using our method's estimate.



(l) Map (blue:ground truth, red:sensors, green:our method).

Scene #40 - Best solution was found using 3 corner correspondences.