Bonus HW2

Submit Assignment

Due Mar 13 by 12pm   **Points** 0   **Submitting** a file upload

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50 bonus points at the Final Exam

Improve your recall and precision results for HW2 by additionally incorporating the geometry constraints in one-to-one matching of the query and dataset images. For this additional work, use the lecture slides 18-34 in CS537_12.pdf, and 19-25 in CS537_13.pdf.

For every pair (query, image):

1) Use the one-to-one matches of their interest points you computed for HW2, and construct the Nx9 matrix W (slide 18 in CS537_12.pdf).

2) Implement the RANSAC algorithm to estimate their fundamental matrix. Note that direct estimation of the fundamental matrix without RANSAC would give a bad estimate of the fundamental matrix.

3) Re-match interest points between the query and image by using the one-to-one matching formulation given in the slide 25 in CS537_13.pdf. Note that this formulation weights equally the appearance and geometric costs in the objective function: $\text{minimize } [\text{Trace}(A^\top Y) + \text{Trace}(B^\top Y)]$. These two costs may need to be weighted differently for optimal results: $\text{minimize } [\text{Trace}(A^\top Y) + \lambda \cdot \text{Trace}(B^\top Y)], \lambda > 0$. Experimentally find a good value for the weighting parameter λ.

Turn in:

a) (20 points) The 35x140x3x3 tensor containing the estimated fundamental matrices for all 35x140 query-image pairs.

b) (10 points) Your old 35x140 matrix of image similarities you computed for HW2 with one-to-one point matching. Your new 35x140 matrix of image similarities that you computed with the additional geometric constraints in one-to-one point matching.

b) (20 points) PDF file with the plot of your old and new recall-precision curves for K=1,2,3,4 image retrieval based on the old and new image matching.