Computer Vision Programming Assignment #02
Structure-from-Motion

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1. Load the input images (‘sfm01.jpg’, ‘sfm02.jpg’)

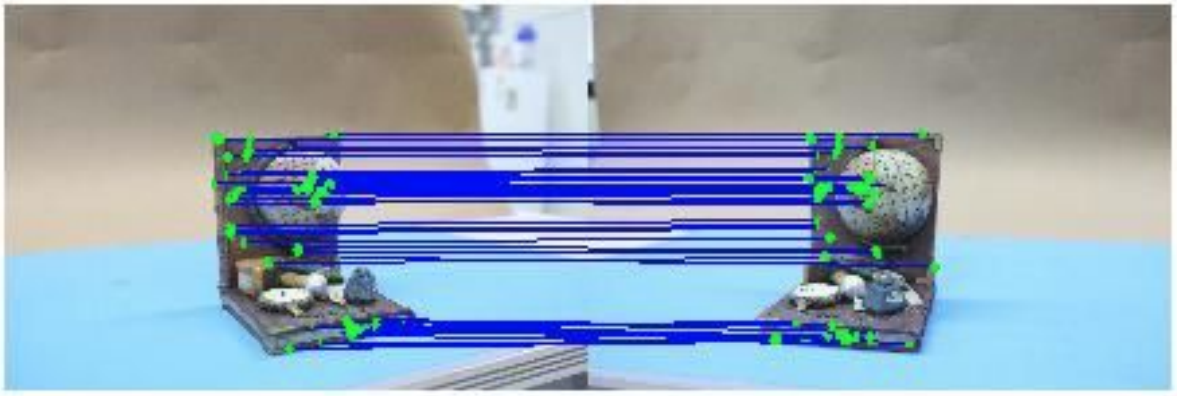
I loaded images with ‘imread’.

2. Extract features from both images using the function ‘vl_sift’ (2 pts)

I converted images to gray scale before using the images as inputs for ‘vl_sift’. This function returns corresponding feature points.

3. Match features (find correspondence) between two images using the function ‘vl_ubcmatch’ (2 pts)

The figure below shows corresponding points found with ‘vl_ubcmatch’. It seems clear after tuning with hyperparameters. (It was very sensitive.)

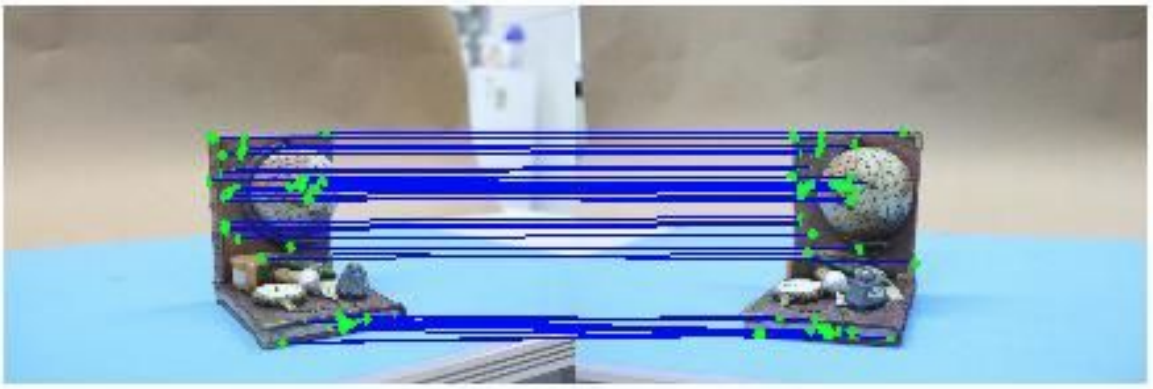


4. Estimate Essential matrix EE with RANSAC using ‘calibrated_fivepoint’ (8 pts)

To choose best supportive hypothesis E having the most inliers, I
- randomly selected sets of 5 points
- applied calibrated-fivepoint function

- generated E(hypothesis) and evaluate using other points with pre-defined threshold-epipolar distance.

After applying the explained steps, it seems some lines are excluded compare to the figure in step 3.



5. Decompose essential matrix E to camera extrinsic R and T (6 pts)

The essential matrix E is composed of rotation matrix R and translation matrix T. These R and T tell us the relative position of the other camera, compared to one. The lecture note says that there are four possible combinations and we can check which one is correct by using triangulation. Using inlier points searched in the step 4, if the result of triangulation is both in front to two (defined as one and the relative other), we guess that's the true position.

6. Generate 3D point by implementing Triangulation (7 pts)

Three figures show the reconstructed 3D points in different points of view. As we saw in the figure of inliers in step 4, it failed to capture the book at the bottom (maybe). Seeing the last figure, which nearly seems like a straight line, tells us that the resulting points are on the single plain. I think I failed to capture the earth-shape and the bottom.