1 Camera calibration

Task 1.1

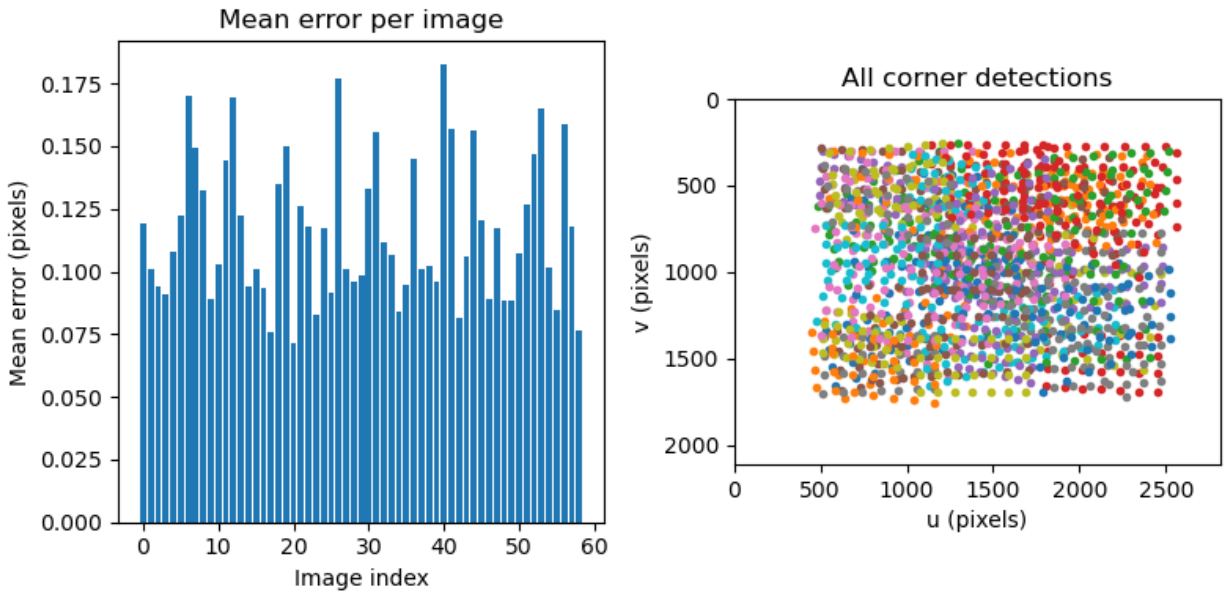

Figure 1: Results of the camera calibration

a) There are several potential reasons that would result in significantly higher errors. This could be due to a strong tilt that often times also comes with changes of illumination. The visual tilting effect can also occur if the checkerboard is at the edge of the camera frame even though it is parallel to the image plane. To test this one could take a subset of pictures with a high visual tilting and calculate the error. If it applies there should be a significant difference to the error of the whole set.

b) In general the accuracy looks quite alright. Whereas you can notice that it gets worse the closer you get to a corner. There you can still observe some distortion. So if you were to extend the calibration picture database, it should be with pictures close to the image frame and especially the corners.

Task 1.2

2 Model creation

Task 2.1

a)

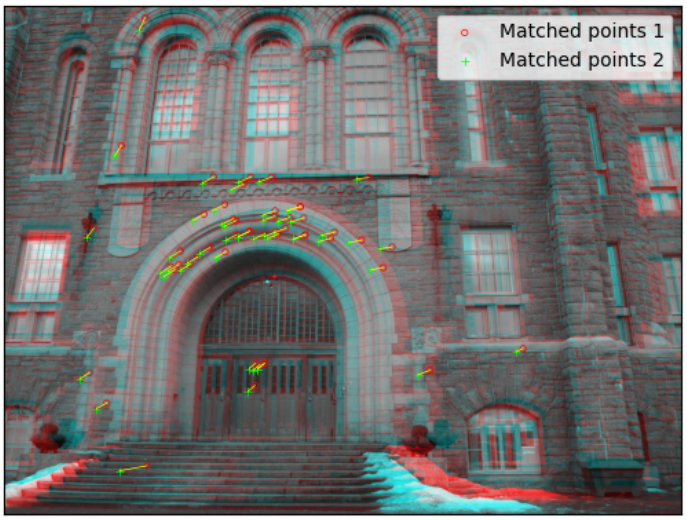

Figure 2: Best 50 correspondences by descriptor distance.

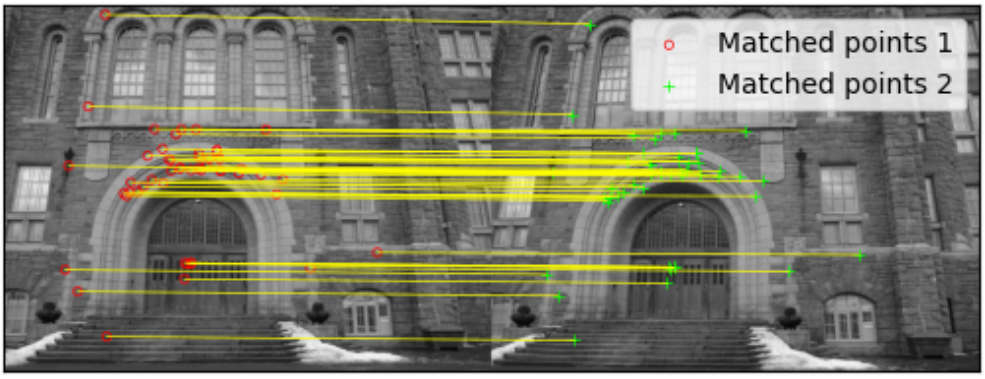

Figure 3: 50 matches side by side.

b)

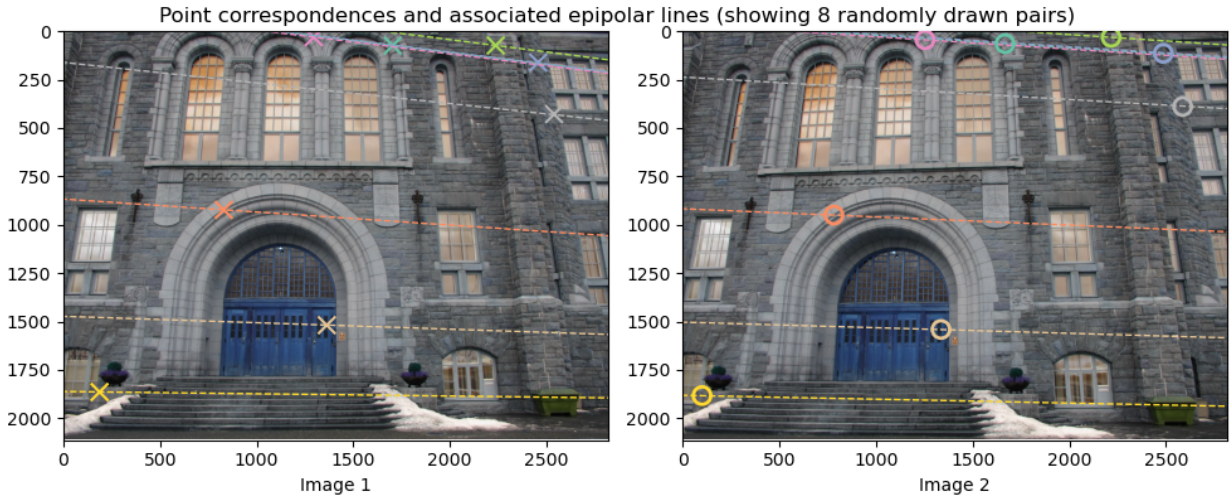

Figure 4: 8 inlier correspondences with their epipolar lines.

c) In the included figures we used a maximum ratio og 0.9 and set the uniqueness parameter to true. By playing around with these parameters we found that decreasing the max ratio results in way fewer matches, it also minimizes wrong matches. Beside of the already pre-implemented knn distance metric we also tried out an ORB detector using the Hamming distance (commented out).

d) For estimating the relative pose and the 3D point coordinates we simply reused the RANSAC approach from HW5. This gave us a total of 10966 inliers out of 12191 matches. In the following figure you can see the pointcloud of the best solution.

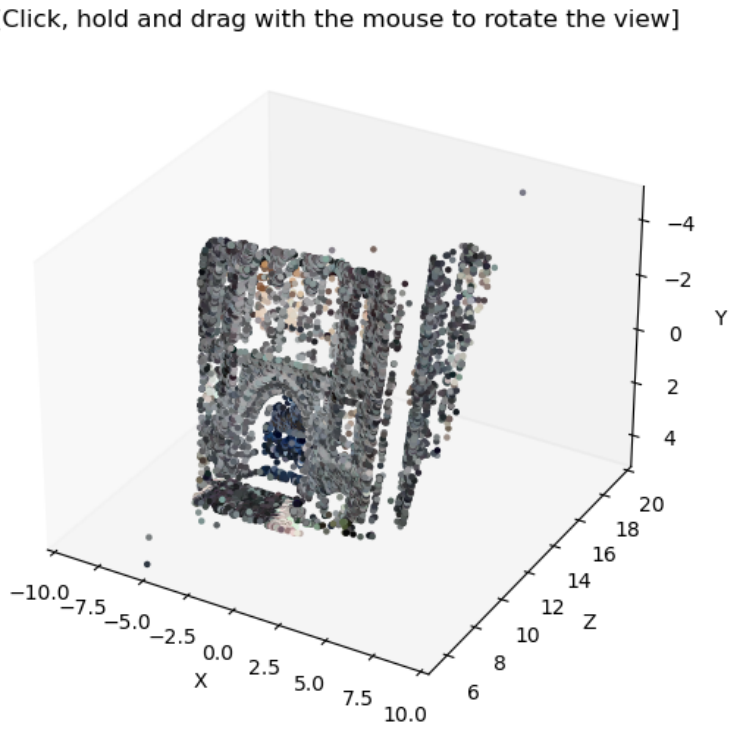

Figure 5: Reconstructed 3D point cloud.

e) The above point cloud consists of 10964 visible of 10966 total inlieres what is the pest found solution. These reconstructions have been saved for later usage together with their correspondent feature descriptors.