CSCI 5980 Assignment 4

Download the codes for the assignment here.
`https://drive.google.com/open?id=19lyBFuXc4LoIGboQ2A_ljZpW5FXTrwVr`

1 SIFT Feature Extraction

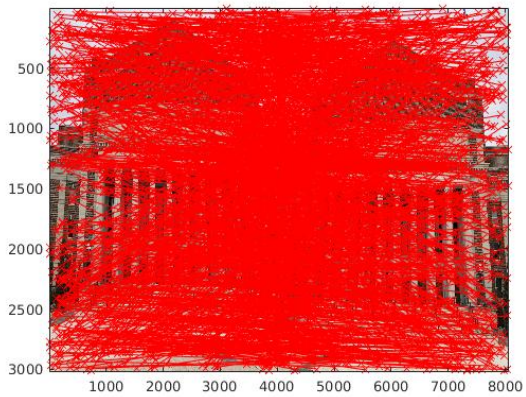
(a) Left image (b) Right image

Figure 1: SIFT feature extraction and visualization

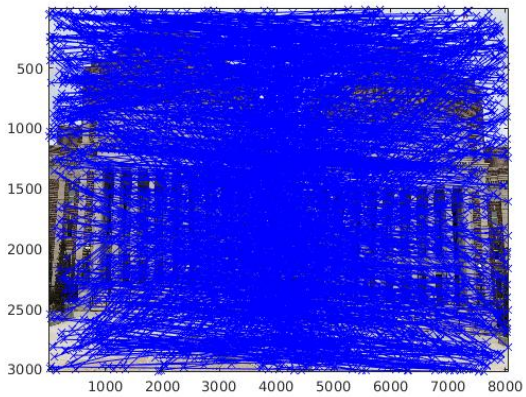
We use VLFeat to extract SIFT features from images as shown in Fig. 1 and visualize SIFT features.

2 SIFT Feature Matching

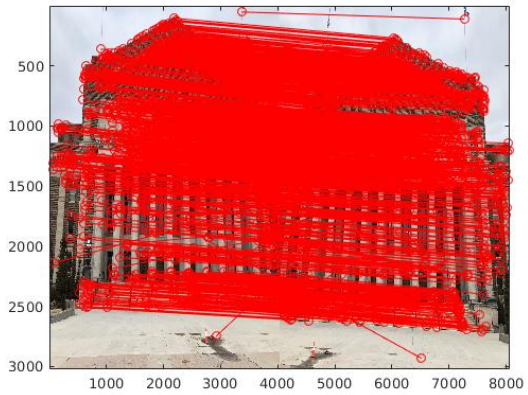
We Match features using nearest neighbor search shown in Fig. 2ab, ratio test shown in Fig. 2cd and bidirectional match shown in Fig. 2e. The number of matches decrease from 36500 to 1698 then to 1119.



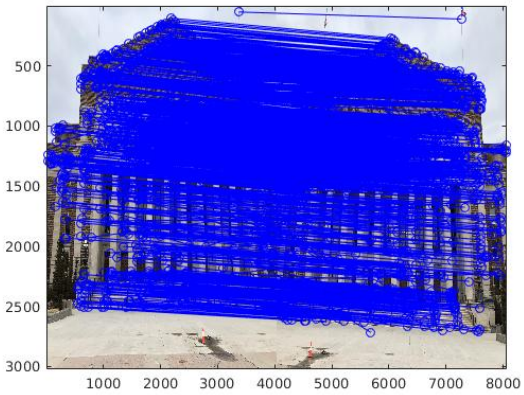
(a) Matching from I_1 to I_2



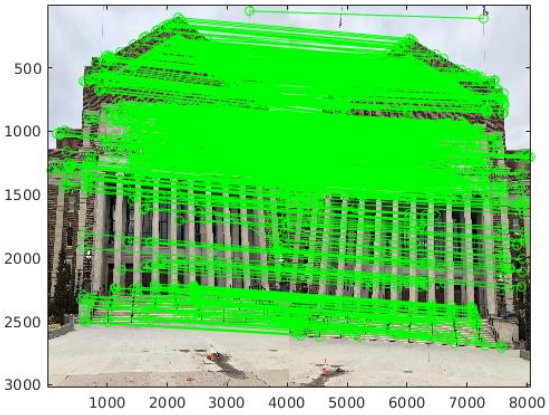
(b) Matching from I_2 to I_1



(c) Matching from I_1 to I_2 after ratio test



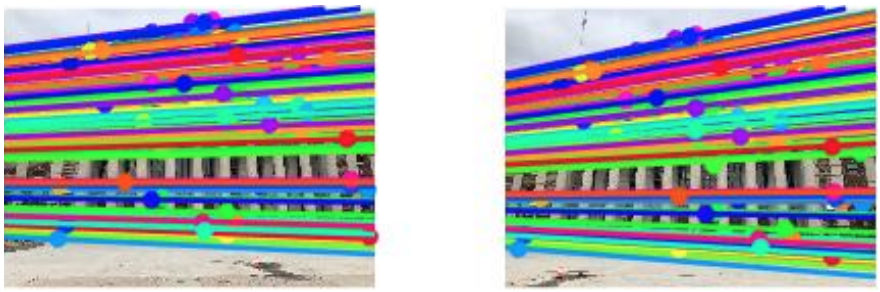
(d) Matching from I_2 to I_1 after ratio test



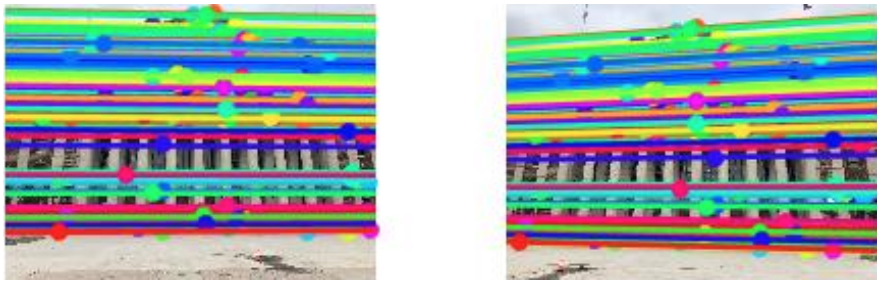
(e) Bidirectional matching between I_1 and I_2

Figure 2: Feature Matching between I_1 and I_2 using SIFT features

3 Fundamental matrix



(a) Sample one



(b) Sample two

Figure 3: Epipole and epipolar lines

4 Robust Fundamental Matrix Estimation

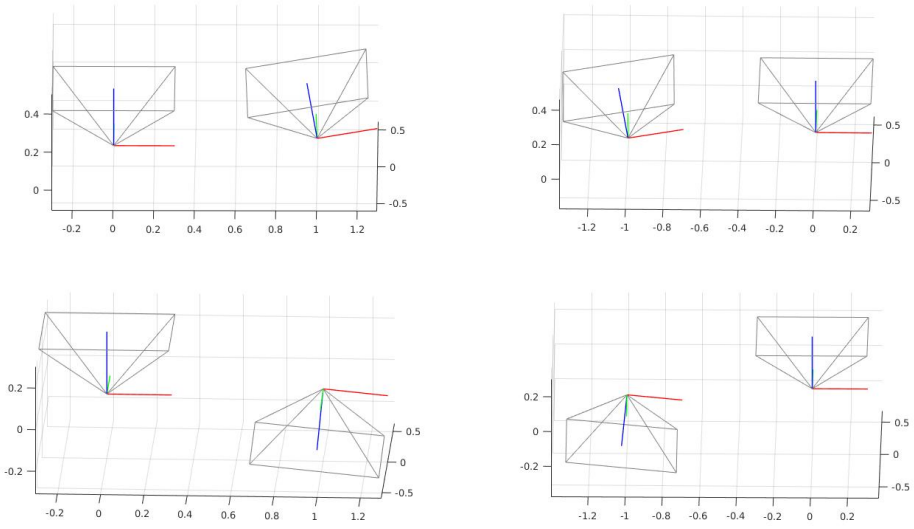
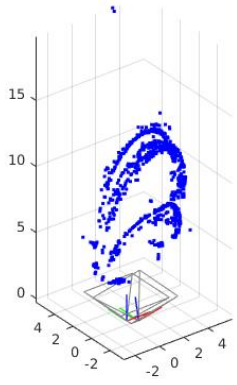


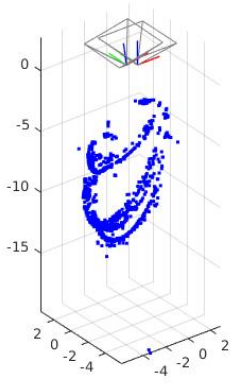
Figure 4: Four configurations of camera pose

5 Triangulation

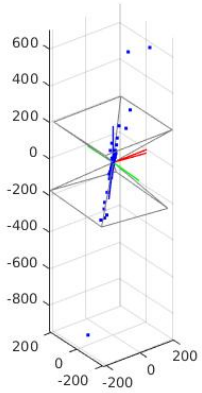
We compute positions of 3D points by linear triangulation and visualize 3D camera pose and 3D points together as shown in Figure 5. Then we project 3D points to each camera and visualize reprojection onto the image as shown in Figure 6.



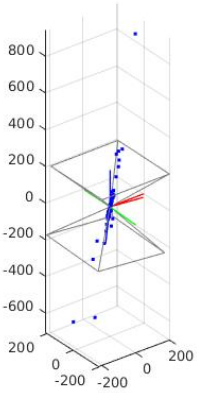
(a) Valid configuration



(b) Invalid configuration



(c) Invalid configuration



(d) Invalid configuration

Figure 5: Feature Matching between I_1 and I_2 using SIFT features

(a) Left image (b) Right image

Figure 6: Visualization of measurements and reprojection