

STEREO RECONSTRUCTION

METHOD

SIFT FEATURE MATCHING

For the left and right image as shown in Figure 1, the sift features are extracted and matched using the ration test and bidirectional consistency, to get a set of corresponding points. The matched points are shown in Figure 2.

COMPUTING F

Using the set of correspondences, F is computed by solving the following linear equation, where u and v are the features from the first and second image respectively. RANSAC is used to determine the F matrix, after which SVD cleanup is done to make it rank 2.

$$v^T F u = 0 \implies \begin{bmatrix} v^x & v^y & 1 \end{bmatrix} \begin{bmatrix} f_{11} & f_{12} & f_{13} \\ f_{21} & f_{22} & f_{23} \\ f_{31} & f_{32} & f_{33} \end{bmatrix} \begin{bmatrix} u^x \\ u^y \\ 1 \end{bmatrix} = 0$$

RECTIFICATION HOMOGRAPHIES

The rectification homographies for the left and right image are calculated such that the epipoles are at infinity. The rectified left and right image are shown in Figure 3.

DISPARITY CALCULATION

Using the warped left and right image the disparity is calculated after resizing the images to $0.3 \times$ size of original image as shown in Figure 4.

RESULTS



(a) Left Image



(b) Right Image

Figure 1: Original Image

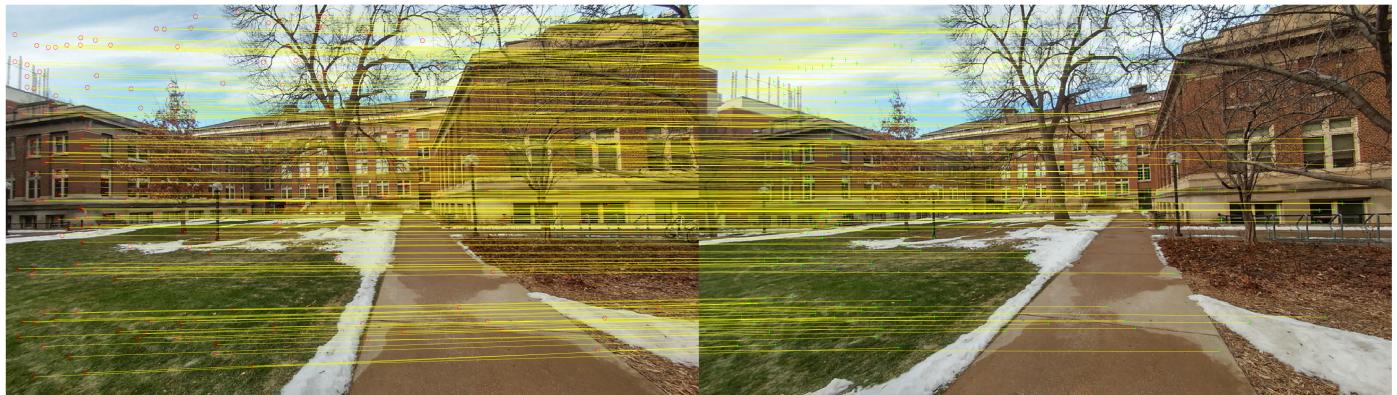


Figure 2: MATCHED POINTS



(a) Left Rectified Image



(b) Right Rectified Image

Figure 3: Rectified Image

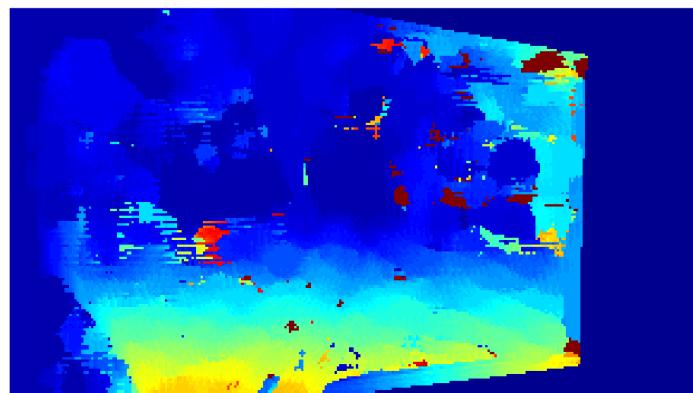


Figure 4: DISPARITY MAP