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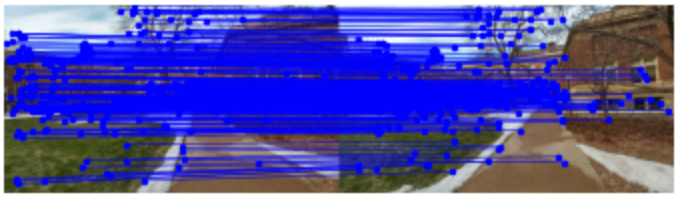
Computer Vision

HW 5: Stereo Reconstruction

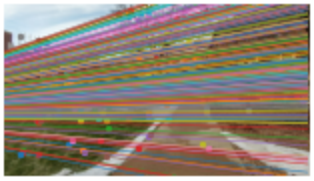
1. Finding Matches

I pretty much reused my function from HW2 on this one. A visualization of matches is below.



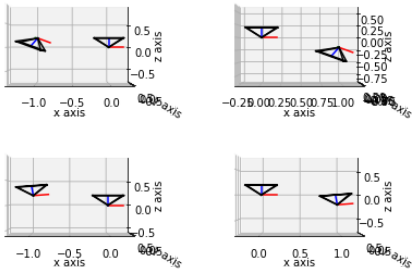
2. Fundamental Matrix

Once I had created the matrix A with eight samples, the rest was pretty easy by just using the np functions null_space and svd. I iterated over 10000 loops for RANSAC. A visualization of the epipolar lines is below.



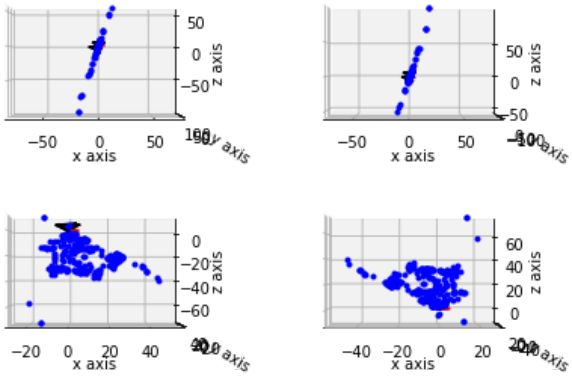
3. Compute Camera Pose

This was given, but the visualization is below.



4. Triangulation

I used the linear triangulation method with the numpy least squares function to compute (x,y,z) given each point and the two camera angles. After computation, a visualization of pts3d is shown below.



5. Pose Disambiguation

For this function, I just iterated through the poses/angles/points and checked for the highest in front with the given formula.

6. Compute Rectification

A visualization of the warped images is shown below. I followed the given formulas for R_rect.

7. Dense Match

I first calculate the SIFT descriptor for each pixel in each image. For each pixel (i,j) in the left image, I iterate over all pixels right of its position in the right image and see which pixel minimizes the difference between the descriptors. The horizontal difference for the pixel that minimized the difference is the disparity. I also tried it with NearestNeighbors, and the two visualizations respectively are shown below.