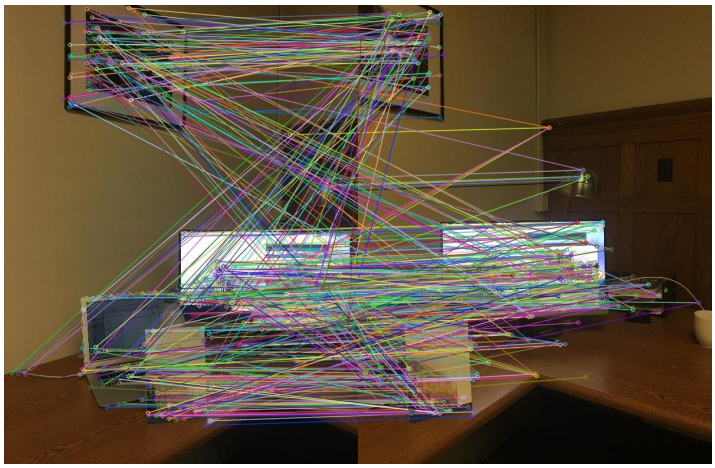
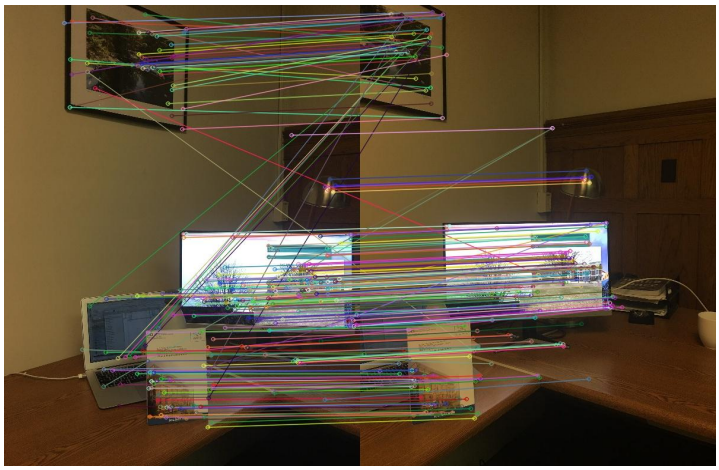
Symmetric distance matching



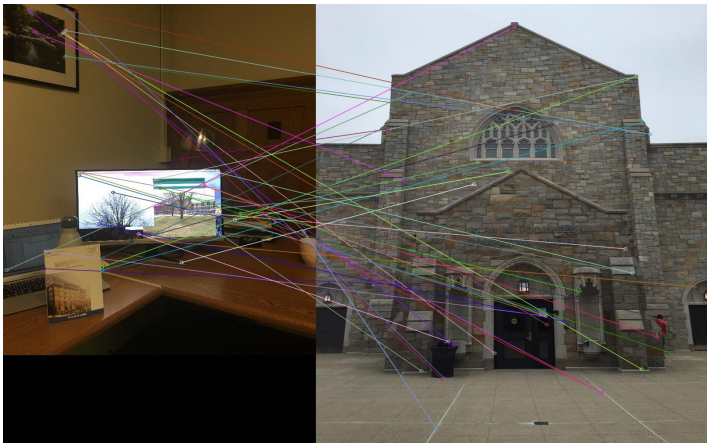
Ratio Test



```
keypoints from symmetric distance matching: 683
Inliers consistent with F: 287 (Ratio: 42%)
Inliers ABOVE threshold 20.0%: consistent with Fundamental Matrix

keypoints from Ratio Test matching: 281
Inliers consistent with F: 240 (Ratio: 85%)
Inliers ABOVE threshold 50.0%: consistent with Fundamental Matrix
```

The left image is the symmetric matching, and on the right is the Ratio Test of two of the office images taken from part 1. The number of keypoints found from symmetric matching is much greater than that from Ratio Test (683 vs. 281). The percentage of inliers consistent with the Fundamental matrix is 42% vs 85%. From this, we can see that the Ratio Test, though it finds less keypoints overall, does a better job of finding *better* and more *accurate* keypoints. This is demonstrated not only by the percentage of inliers but also from the images showing matching keypoints. As you can see, on the Ratio Test image, most of the lines are parallel across the desk and the picture frame. On the other hand, symmetric matching has many different keypoints paired up in weird ways, causing lines to cross each other and form an X. This shows how keypoints are matched better using Ratio Test and that paired-up keypoints by Ratio Test are more consistent with the Fundamental matrix.
Inlier percent thresholds of 20% for symmetric distance matching and 50% for Ratio Test have been empirically determined.



```
keypoints from symmetric distance matching: 611
Inliers consistent with F: 21 (Ratio: 3%)
Inliers BELOW threshold 20.0%: inconsistent with Fundamental Matrix

keypoints from Ratio Test matching: 46
Inliers consistent with F: 13 (Ratio: 28%)
Inliers BELOW threshold 50.0%: inconsistent with Fundamental Matrix
```

This is comparing two images of different scenes. In this case, the percentage of inliers consistent with the Fundamental matrix is vastly different from the earlier case (3% and 28%) vs (42% and 85%) with lower numbers. Also, you can see that the lines on the image are going everywhere showing no pattern. This is consistent with our expectation that performing a comparison on two different images will result in worse numbers. *Supposedly* matching keypoints are not so consistent with the Fundamental matrix, and the values are also very low. Earlier the numbers of inliers consistent with F were 287 and 240, whereas with two different images, we get 21 and 13.

In conclusion, Ratio Test could be a better choice as it does a great job of finding whether two images are of the same scene and moderate job of figuring out if two images are different. Symmetric distance matching didn't provide enough confidence that two images are of the same scene, though it did a great job of finding out that two images are different.