Computer Vision
Exercise 4
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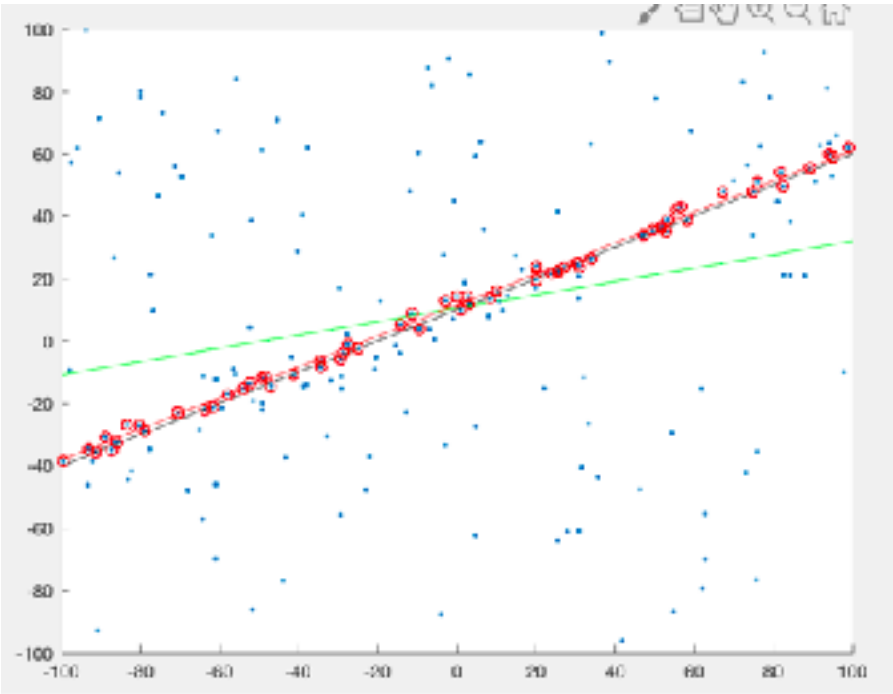
4.1 Line fitting with RANSAC



```
err_real =

    38.1617


err_ls =

   171.3517


err_ransac =

    41.3292
```

Figure 1: Line fitting with RANSAC

4.2 Fundamental Matrix

```
Fh =

   -0.0200   -2.2000    0.0006
    0.0200    2.2000   -0.0043
   -0.0202    2.2039   -0.0731


F =

    0.0200   -2.2000    0.0004
    0.0200    2.2000   -0.0043
   -0.0204    2.2039    0.0079
```

Figure 2: Epipolar Line without singularity constraint

Figure 3: Epipolar line with singularity constraint

4.3 Essential Matrix

```
Eh =

   -0.0035   -1.3563    0.0133
    1.6488    0.1861   -4.2594
   -0.0765    4.3620    0.1839

>> E

E =

    0.5268   -1.3309    0.2996
    1.6925    0.4359   -4.3457
    0.1826    4.2691    0.0289
```

Figure 4: Epipolar Lines with fundamental matrix computed from essential matrix

4.4 Camera Matrix

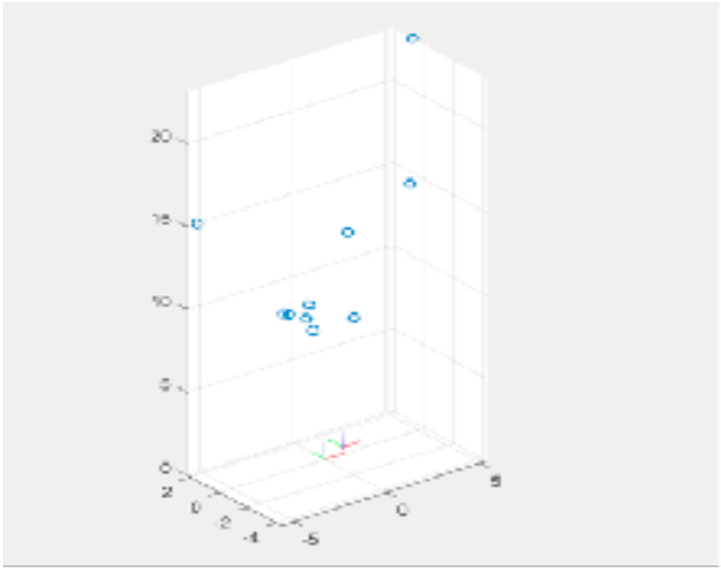


Figure 5: P’ with chosen R and t, and corresponding 3D points

4.5 Feature extraction and matching

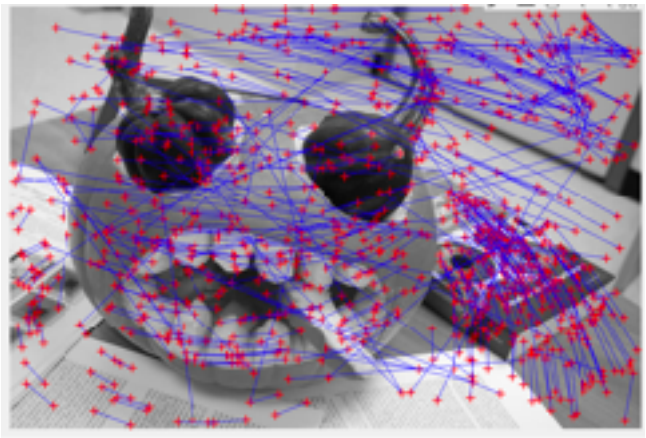


Figure 6: Feature match shown in the same image

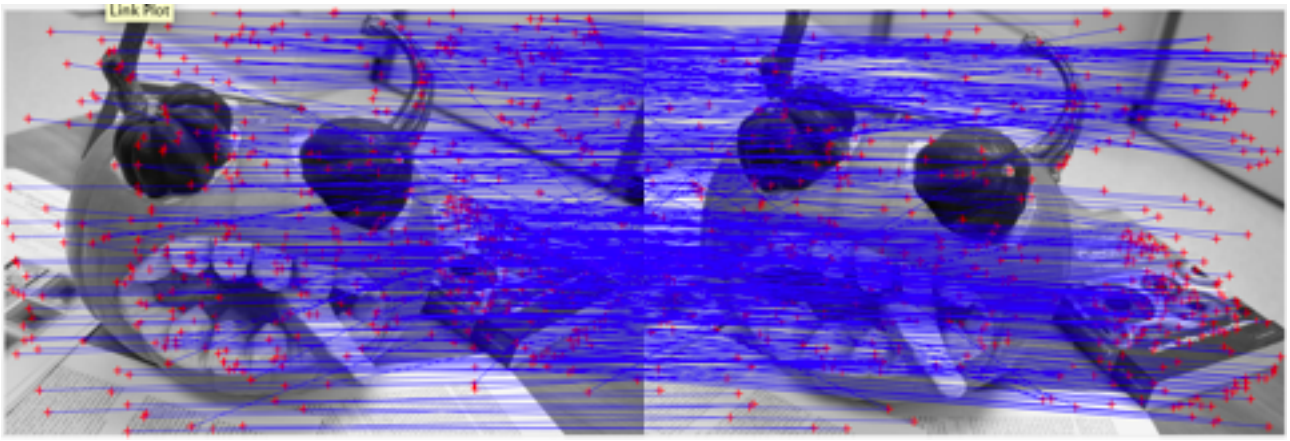


Figure 7: Feature match between two images

4.6 8-point RANSAC

4.6.1 Regular RANSAC

- Threshold = 5:

```
F =

   -0.0000   -0.0000    0.0007
   -0.0000   -0.0000    0.0061
    0.0011    0.0051   -3.7245
```

Total number of points: 19
Number of inliers: 10
Number of outliers: 9

Figure 8: Inliers, threshold = 5

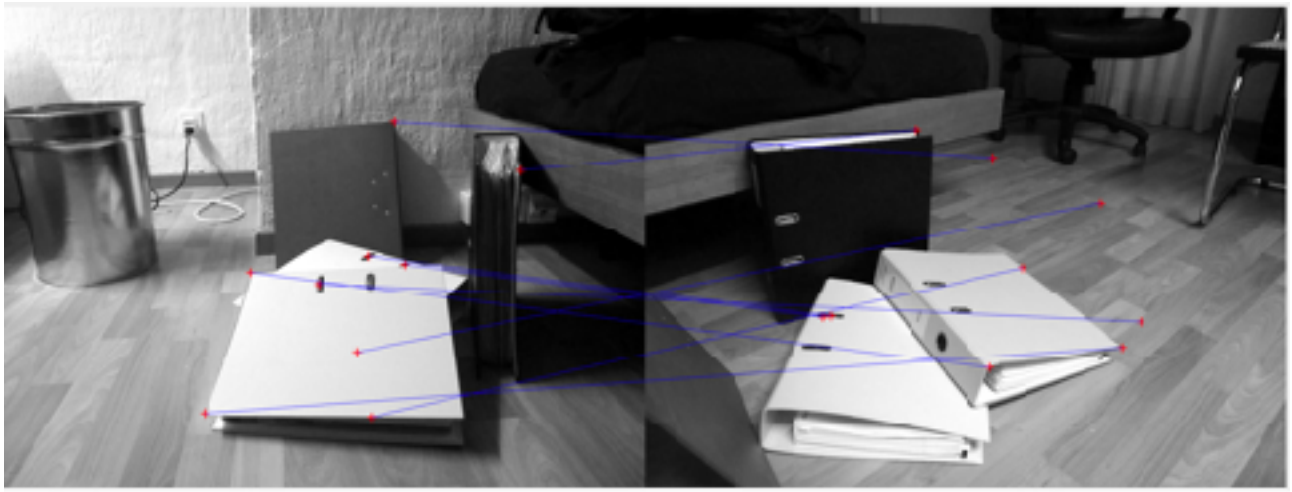


Figure 9: Outliers, threshold = 5

- Threshold = 2

F =

```
    0.0000    0.0000   -0.0088
    0.0000   -0.0000   -0.0050
   -0.0069   -0.0074   14.4873
```

Total number of points: 19
Number of inliers: 9
Number of outliers: 10

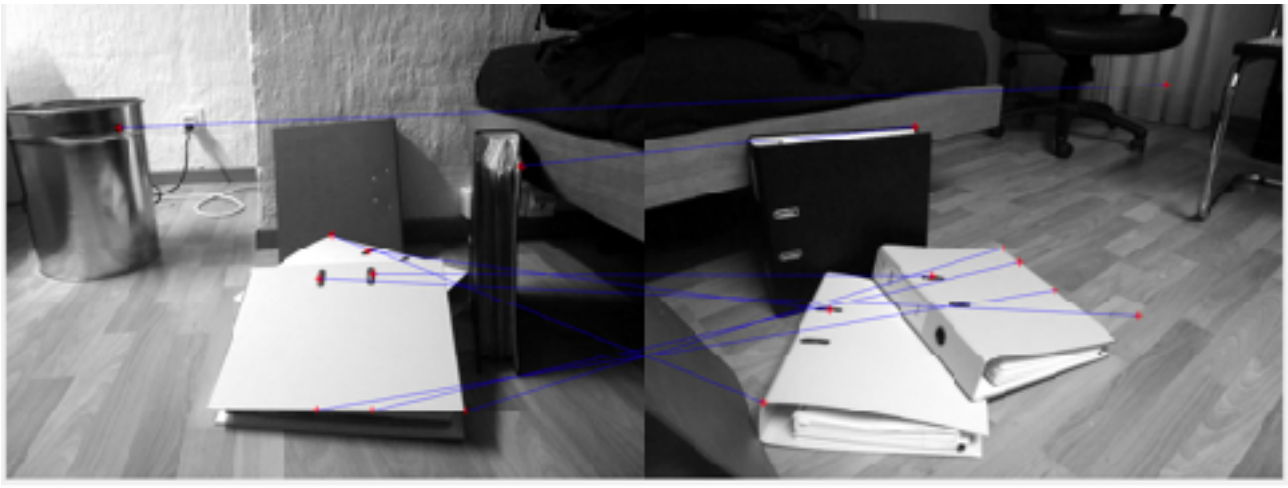


Figure 10: inliers, threshold = 2

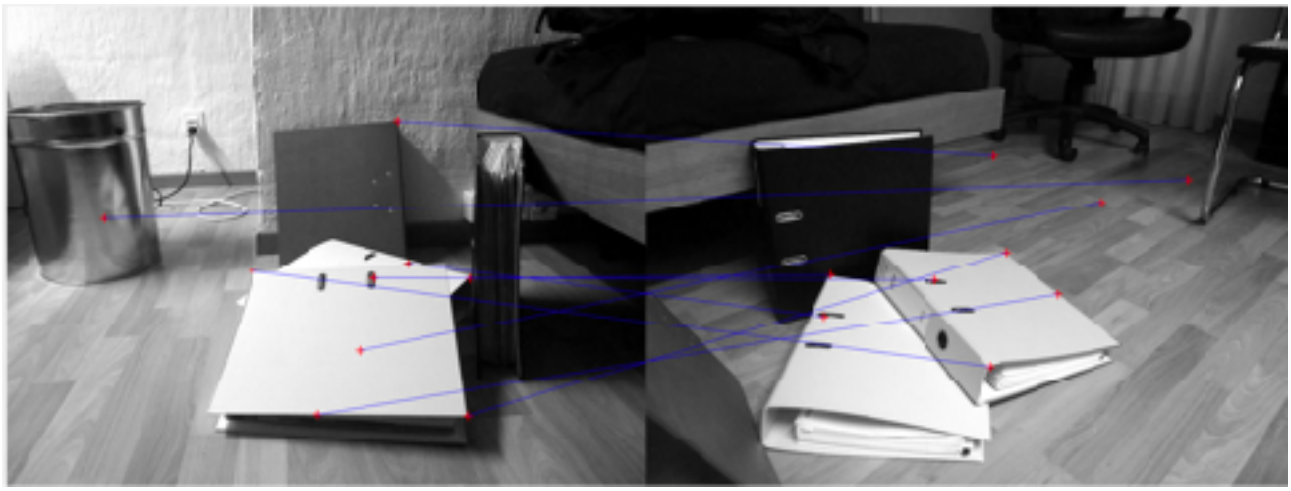


Figure 11: Outliers, threshold = 2

4.6.2 Adaptive RANSAC

```
M =

   782


F =

    0.0202   -0.0000    0.0021
   -0.0202   -0.0000    0.0010
   -0.0201    0.0041   -0.5172
```

Total Points: 19

Number of inliers: 10

Number of outliers: 9

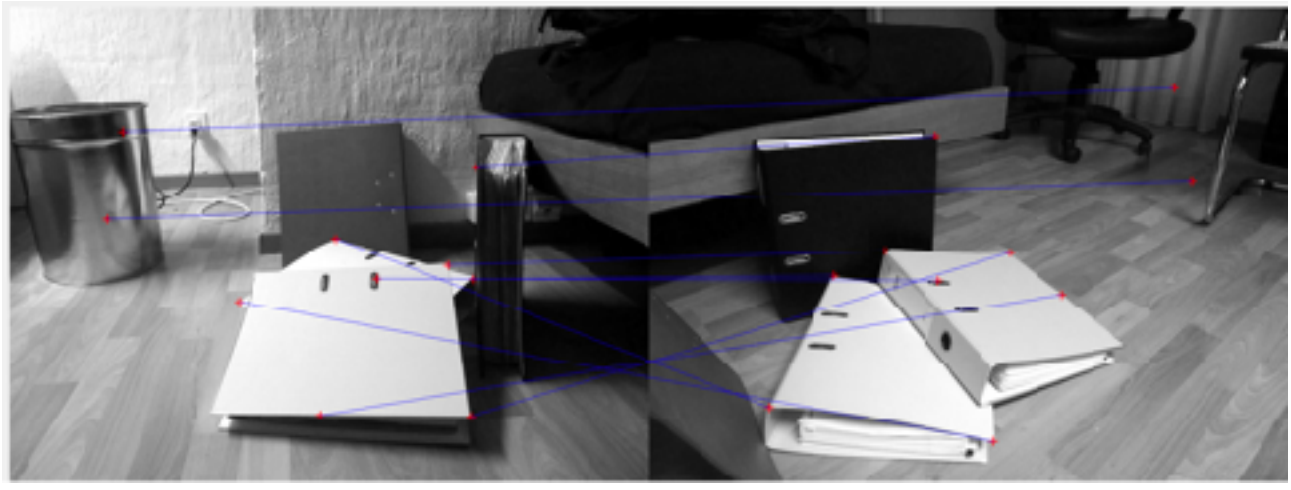


Figure 12: Adaptive RANSAC; inliers; threshold = 5;

Figure 13: Adaptive RANSAC; outliers; threshold = 5