CMPT – 742 (Visual Computing)

Puru Arora   Assignment-3

(301542009)

Without RANSAC

mount_rushmore_1 Calculated Fundamental matrix without RANSAC
[[-6.21019078e-07 1.94057859e-05 -4.61012984e-03]
 [-9.63274968e-06 -3.36322689e-06 -3.39544243e-03]
 [4.69881036e-03 4.57321966e-03 1.00000000e+00]]

mount_rushmore_1 OpenCV Fundamental matrix without RANSAC
[[-6.21019078e-07 1.94057859e-05 -4.61012984e-03]
 [-9.63274968e-06 -3.36322689e-06 -3.39544243e-03]
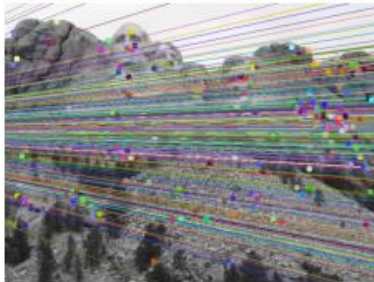 [4.69881036e-03 4.57321966e-03 1.00000000e+00]]

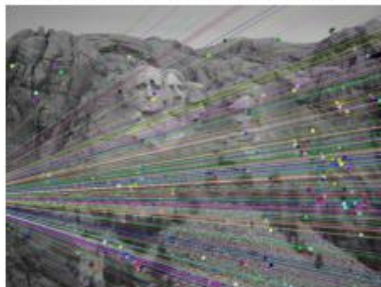Calculated1 without RANSAC   Calculated2 without RANSAC
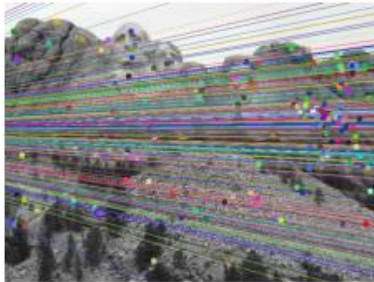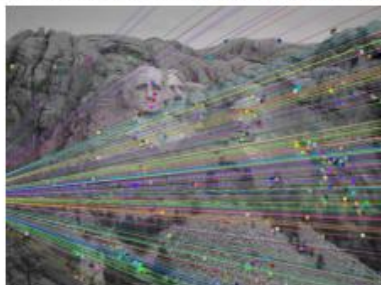

CV2 Image1 without RANSAC   CV2 Image2 without RANSAC

Calculated1 without RANSAC   Calculated2 without RANSAC

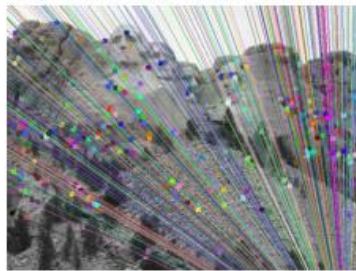CV2 Image1 without RANSAC   CV2 Image2 without RANSAC

mount_rushmore_1 Calculated Fundamental matrix with RANSAC
 [[-2.58124892e-06 -7.35079930e-05 4.88165642e-02]
 [7.27349134e-05 -4.61207041e-06 -4.26739871e-02]
 [-7.25095677e-02 6.92978668e-02 1.00000000e+00]]

mount_rushmore_1 OpenCV Fundamental matrix with RANSAC
 [[-4.93690349e-06 -1.53955570e-04 9.04656341e-02]
 [1.43855035e-04 -9.72932189e-06 -8.39765050e-02]
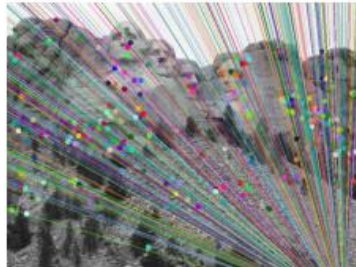 [-1.33093143e-01 1.44107712e-01 1.00000000e+00]]

With RANSAC

Calculated1 with RANSAC
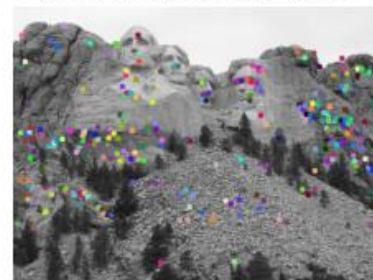

Calculated2 with RANSAC

CV2 Image1 with RANSAC

CV2 Image2 with RANSAC
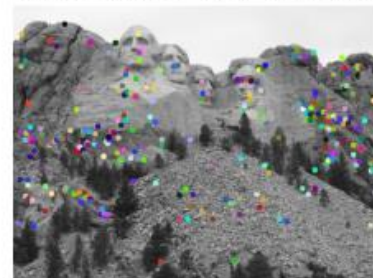

Calculated1 with RANSAC

Calculated2 with RANSAC

CV2 Image1 with RANSAC

CV2 Image2 with RANSAC

For the first case that is the Mount Rushmore images, we see that in both the cases where we see –

1. **Without RANSAC**

   The fundamental matrix computed matches the fundamental matrix calculated by OpenCV.

   Also, we can see that in this case the epipolar point lies to the left of image both of images.
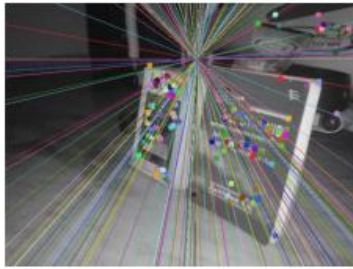
2. **With RANSAC**

   We see that the results are a bit better in this case than without RANSAC. The epipolar point of two images lies towards the bottom of the images. We can even see the angle change through the epipolar lines as the lines in second image diverge a bit towards upward as compared to the first image, where the lines are going a bit towards the left of the image.

without RANSAC

```
myleft Calculated Fundamental matrix without RANSAC
 [[ 1.30650775e-05  1.81420944e-05 -3.61564062e-03]
 [-2.57558327e-05  1.90938190e-05  2.13164449e-03]
 [-1.84707041e-03 -7.93245689e-03  1.00000000e+00]]

myleft OpenCV Fundamental matrix without RANSAC
 [[ 1.30650775e-05  1.81420944e-05 -3.61564062e-03]
 [-2.57558327e-05  1.90938190e-05  2.13164449e-03]
 [-1.84707041e-03 -7.93245689e-03  1.00000000e+00]]
```
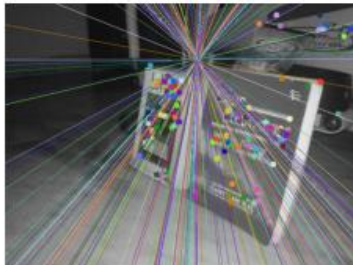
Calculated1 without RANSAC   Calculated2 without RANSAC

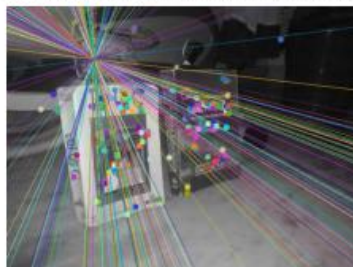CV2 Image1 without RANSAC   CV2 Image2 without RANSAC

Calculated1 without RANSAC   Calculated2 without RANSAC

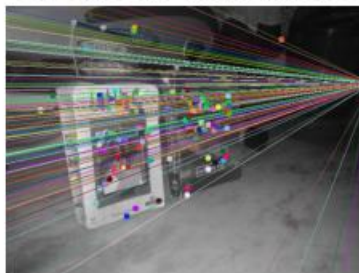CV2 Image1 without RANSAC   CV2 Image2 without RANSAC

```
myleft Calculated Fundamental matrix with RANSAC
 [[ 1.46912457e-06  2.91841559e-06 -1.30581716e-03]
 [ 3.97547710e-08  1.19366751e-05 -1.60431875e-03]
 [-6.74562669e-04 -4.36623274e-03  1.00000000e+00]]


myleft OpenCV Fundamental matrix with RANSAC
 [[-3.00263243e-06  2.51971655e-05 -8.20020396e-05]
 [ 6.75309899e-05 -8.49807369e-06 -4.41270397e-02]
 [-4.16016169e-03  2.13888670e-02  1.00000000e+00]]
```
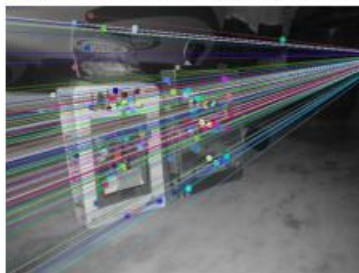
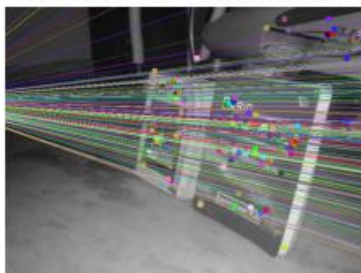Calculated1 with RANSAC

Calculated2 with RANSAC

CV2 Image1 with RANSAC

CV2 Image2 with RANSAC
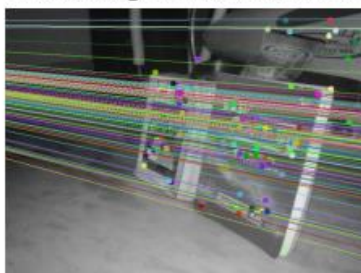
Calculated1 with RANSAC

Calculated2 with RANSAC

CV2 Image1 with RANSAC

CV2 Image2 with RANSAC

For this case of image we see that –

1. Without RANSAC
   The Fundamental matrix calculation matches the OpenCV Fundamental matrix

   The epipolar point in this case lies in the centre of both the image, just above the White book.
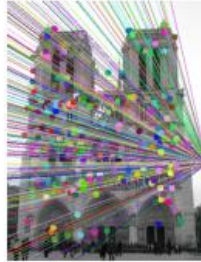
2. **With RANSAC**

   In this case we can see that the epipolar point of the left image is to the right of the image, outside of the plane of image and for the right image its to the left of the image.

without RANSAC

```
notredam_1 Calculated Fundamental matrix without RANSAC
 [[ 1.23624920e-04  5.17452634e-04 -1.71566331e-01]
 [-5.17174300e-04 -2.55120430e-05  1.68976967e-01]
 [ 1.10466108e-01 -1.39148680e-01  1.00000000e+00]]

notredam_1 OpenCV Fundamental matrix without RANSAC
 [[ 1.23624920e-04  5.17452634e-04 -1.71566331e-01]
 [-5.17174300e-04 -2.55120430e-05  1.68976967e-01]
 [ 1.10466108e-01 -1.39148680e-01  1.00000000e+00]]
```

Calculated1 without RANSAC   Calculated2 without RANSAC

CV2 Image1 without RANSAC   CV2 Image2 without RANSAC

Calculated1 without RANSAC   Calculated2 without RANSAC

CV2 Image1 without RANSAC   CV2 Image2 without RANSAC

```
notredam_1 Calculated Fundamental matrix with RANSAC
 [[ 2.04429840e-07  1.62378542e-05 -3.52823666e-03]
 [-2.09464125e-05 -1.57363158e-06 -1.15520346e-02]
 [ 4.29697639e-03  9.93799575e-03  2.11767735e-01]]


notredam_1 OpenCV Fundamental matrix with RANSAC
 [[-1.49615824e-06  5.28131010e-05 -1.65571622e-02]
 [-7.07202447e-05  3.73674677e-06 -4.52668415e-02]
 [ 1.89973525e-02  3.67221691e-02  1.00000000e+00]]
```

with RANSAC

Calculated1 with RANSAC

Calculated2 with RANSAC

CV2 Image1 with RANSAC

CV2 Image2 with RANSAC

Calculated1 with RANSAC

Calculated2 with RANSAC

CV2 Image1 with RANSAC

CV2 Image2 with RANSAC

For this image we can see that-

1. **Without RANSAC**

   The Fundamental Matrix calculated matches the OpenCV fundamental matrix.