CVIP HW 3 REPORT

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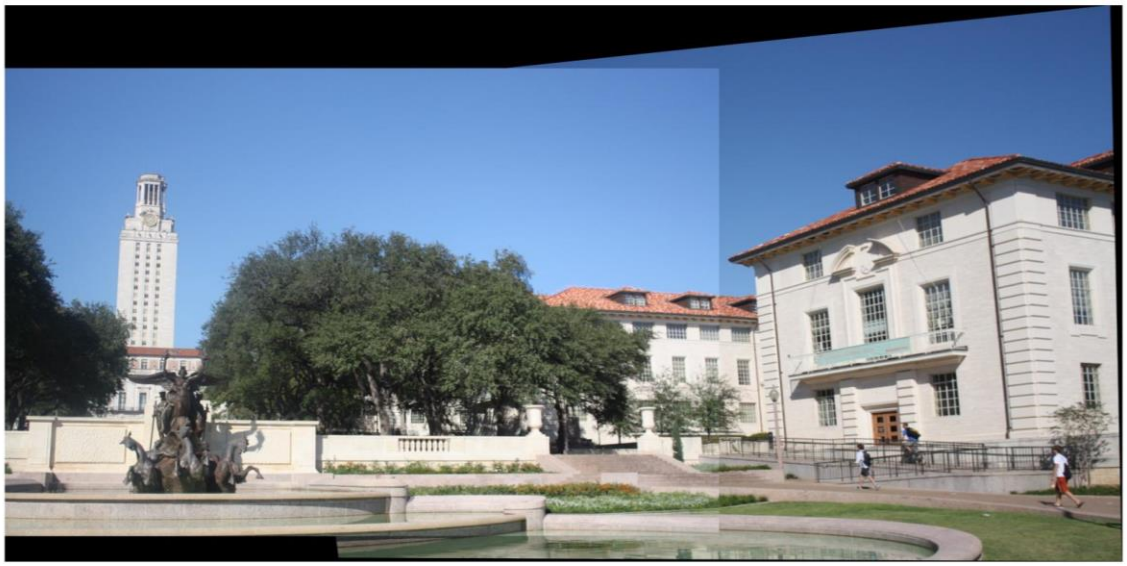
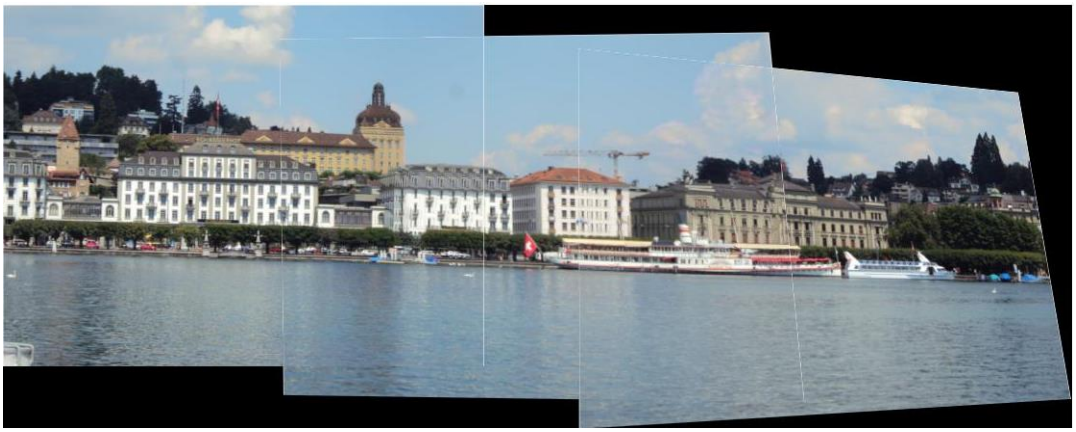
1) HOMOGRAPHY:

A) Putative Matches: I have used Blob detection from HW2 before getting SIFT descriptors)

B) Image Stitching Outputs including 3 image panoramas (Extra Credit)



Max_inliers = 52, Mean inlier residual = 5.4384



Max_inliers = 128, mean_residual = 10.5469

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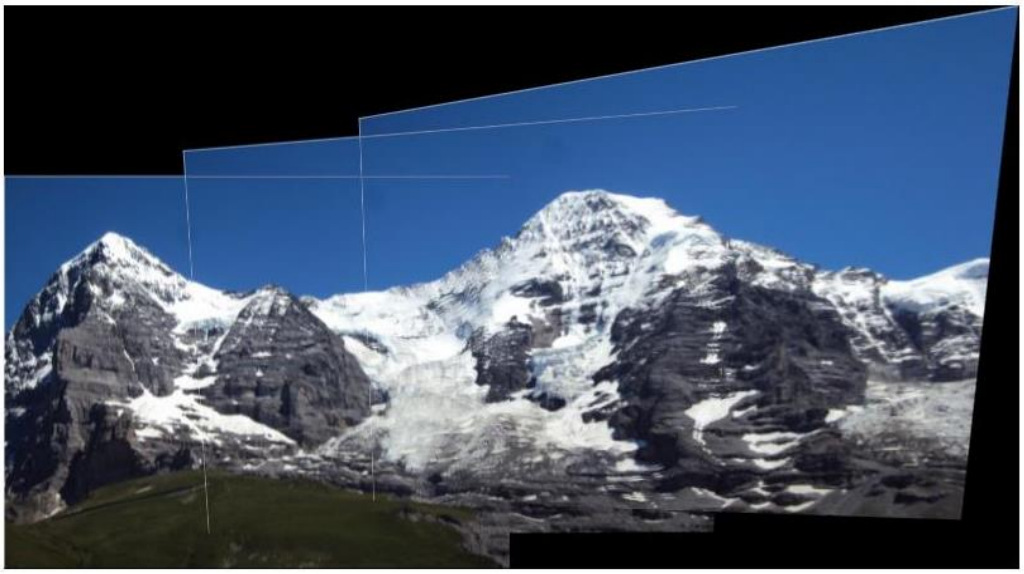
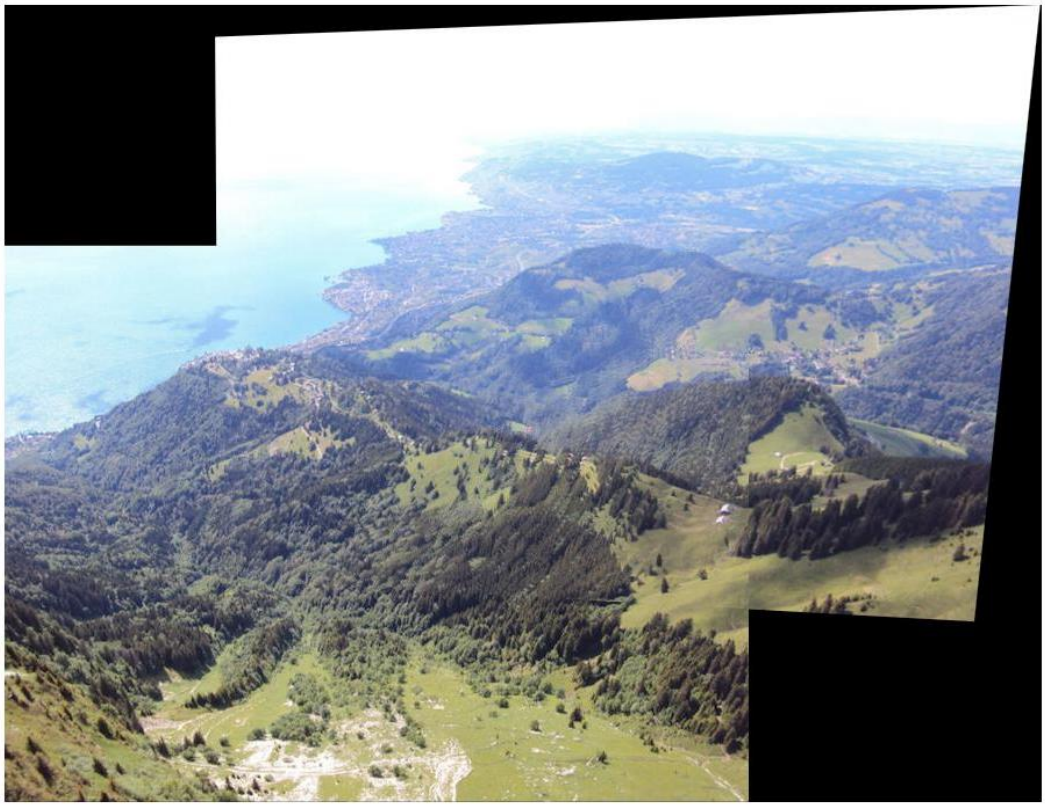


Max_inliers = 135, mean_residual = 1.7555



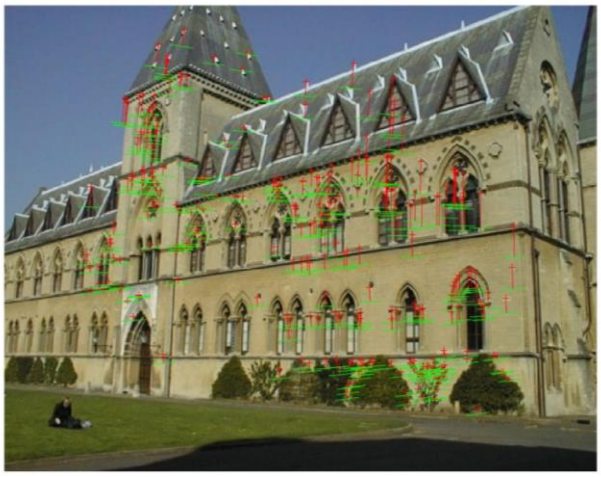
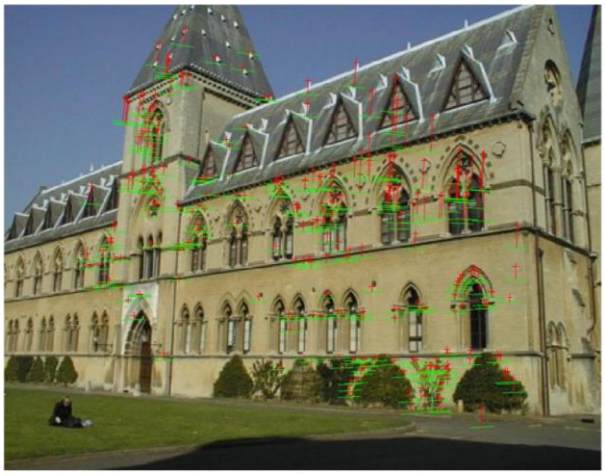
Max_inliers = 155, mean_residual = 6.4514

2.2) FUNDAMENTAL MATRIX & EPIPOLAR GEOMETRY

GROUND TRUTH

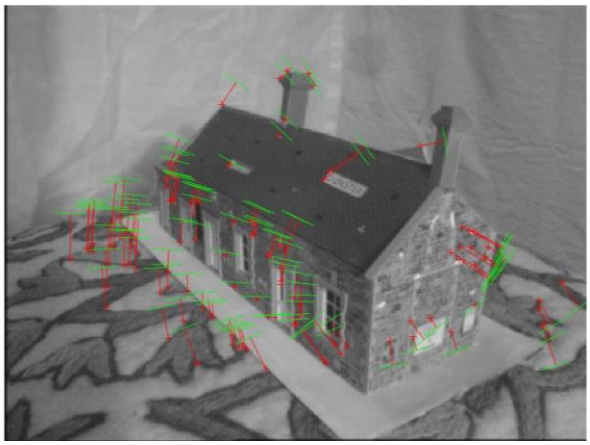
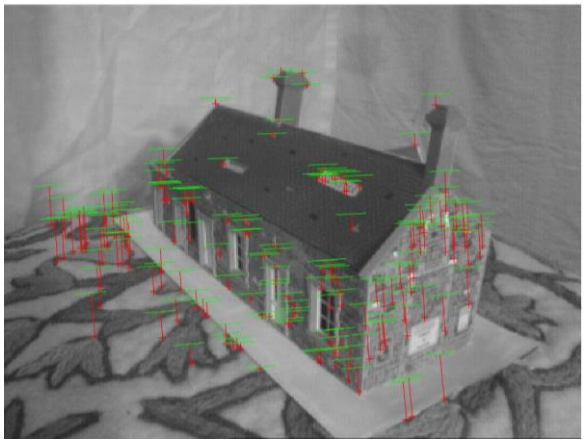
Library Mean Residual Errors:

Un-normalized: 11.8459 *Normalized: 9.9614*

House Mean Residual Errors:

Un-normalized: 26.7532 *Normalized: 14.1954*

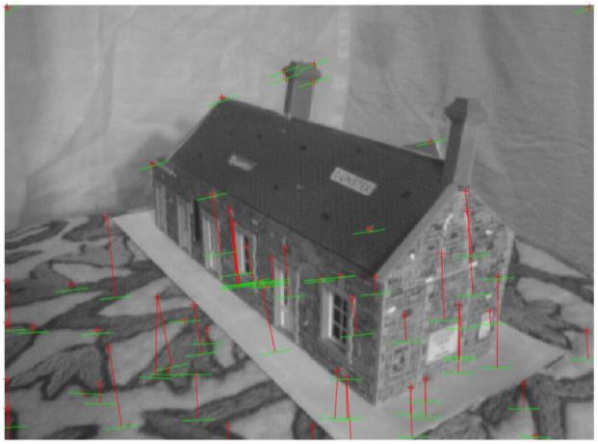



2.3) RANSAC

Since I used blobs in Part1, I decided to use Harris detection before getting SIFT descriptors in Part 2.

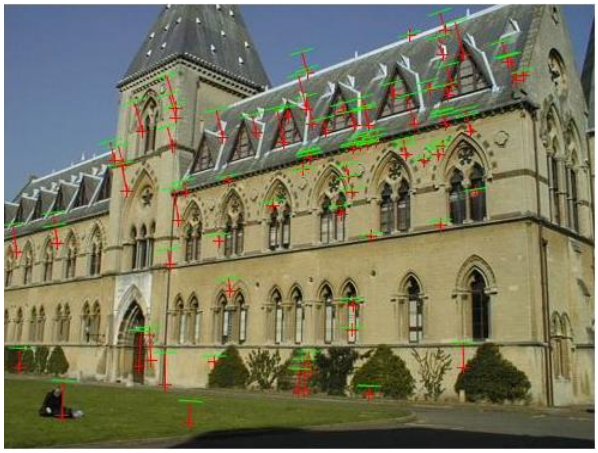
House Inlier Mean Residual error:

Threshold = 20, max inliers = 57/99, mean_inliers_res= 7.414



Library Inlier Mean Residual error:

Threshold = 30 max_inliers = 93/199, mean_inliers_res =13.46



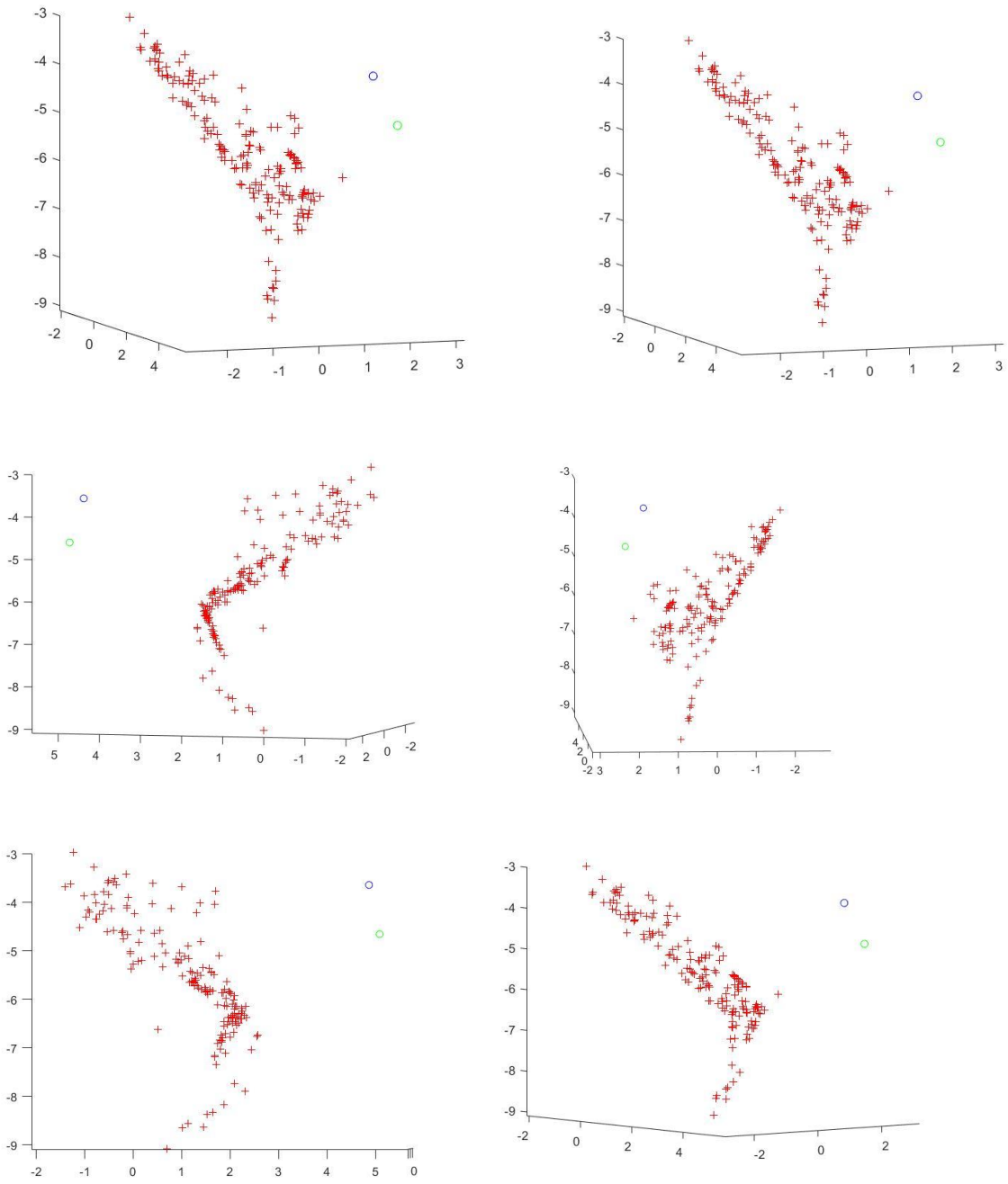
Ground Truth results were much better in comparison to Ransac !

With RANSAC, the general residual error had increased so I had to set a lower threshold in order to avoid erroneous results with overlapping epi-polar lines.

I was running RANSAC for a total of 10^5 iterations in the estimation of fundamental matrix and yet there was a lot of scope for improvement. The matches and epi-polar lines are far from accurate when compared to the ground truth matches. A lot of the parameters needed to be tuned in RANSAC based on the image. The library image needed more *correspondences* than the house.

2.4) Reconstructed Camera Centers and Points in 3D:

GIF : https://drive.google.com/open?id=1CYs29KXmEc_Z8zJ0J0E2LOfGly2HbRpm



Residual Errors between original 2D and projected 3D points:

- **Image1 = *0.0025*,**
- **Image2 = *0.156***

References:

Homography and RANSAC: https://www.youtube.com/watch?v=oT9c_LlFBqs

Fundamental Matrix: https://www.youtube.com/watch?v=DgGV3l82NTk

Image stitching: http://home.deib.polimi.it/boracchi/teaching/IAS/Stitching/stitch.html

Triangulation: dcyoung.weebly.com/fundamental-matrix--triangulation.html