

# Computer Vision and Image Processing: HW 3

## Homography and Fundamental Matrix Estimation

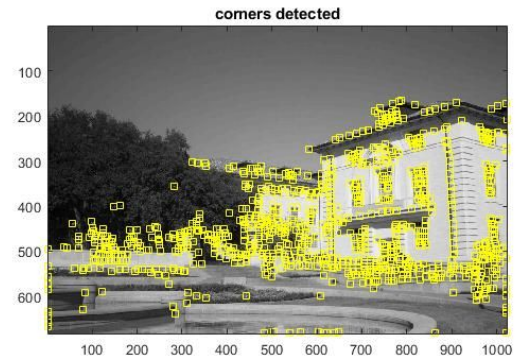
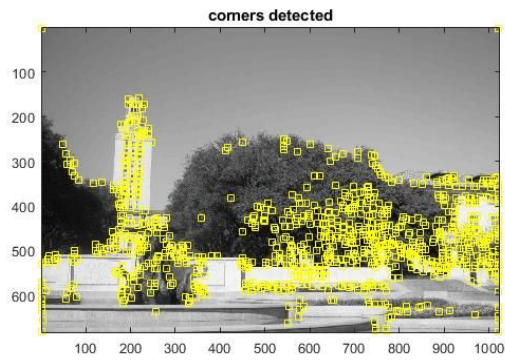
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## PART 1 : Stitching Pairs of Images

### Corners Detected Using Harris Detector



### Overlay of Detected Features (Corners)



## Overlay of Top Matched Features

Overlay top matched features



## Mapped Top Matched Features

Mapping of top matched features



## Overlay of Inliers

Inlier Matches



Number of inliers: 102

Average residual for the inliers: 1.3287

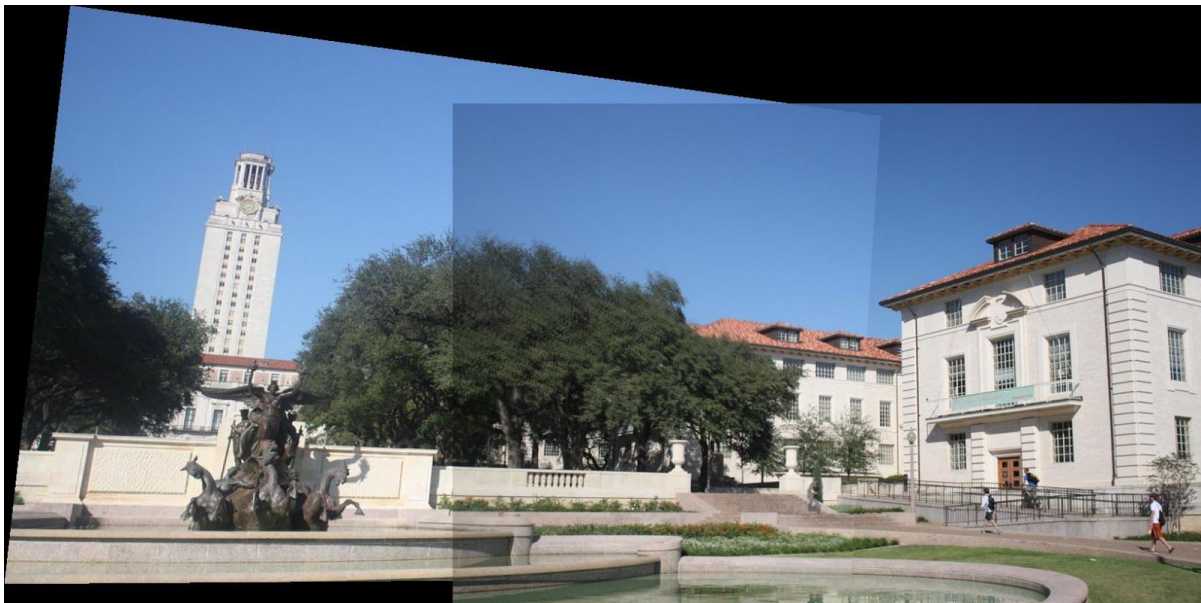


## Warped Image

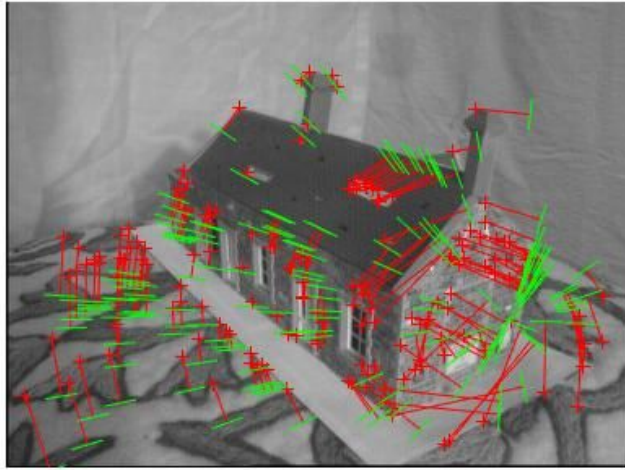
Warped image



## Final Image Aligned By Homography



## **PART II : Fundamental Matrix Estimation and Triangulation**



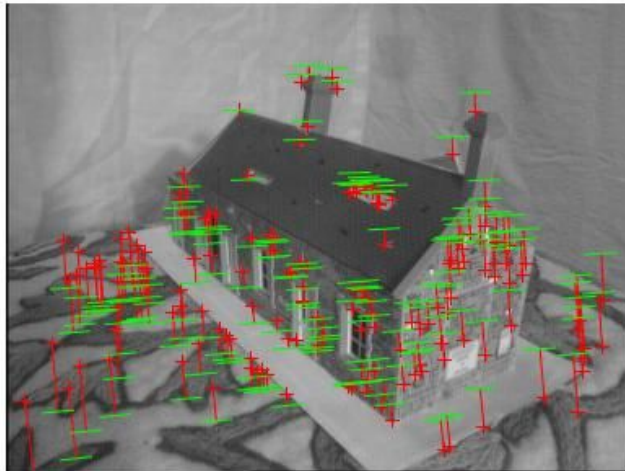
### **For Un-Normalized,**

Assuming all matches are true and fitting to all

Mean residual is: 26.7532

Mean Residual 1:  
0.0025221

Mean Residual 2: 0.15655



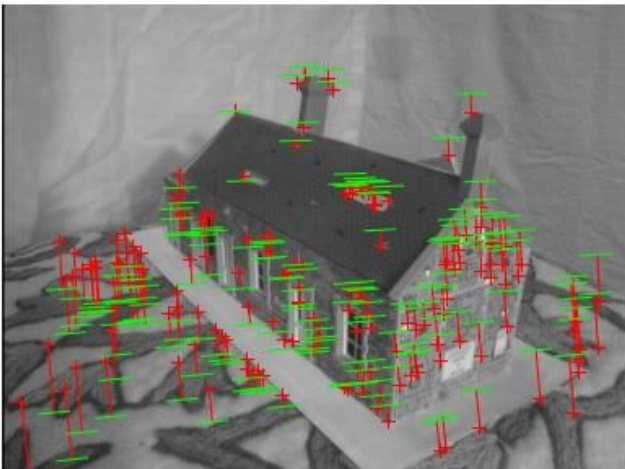
### **For Normalized,**

Assuming all matches are true and fitting to all

Mean residual is: 14.5839

Mean Residual 1:  
0.0025221

Mean Residual 2: 0.15655



### **Estimating the fundamental matrix**

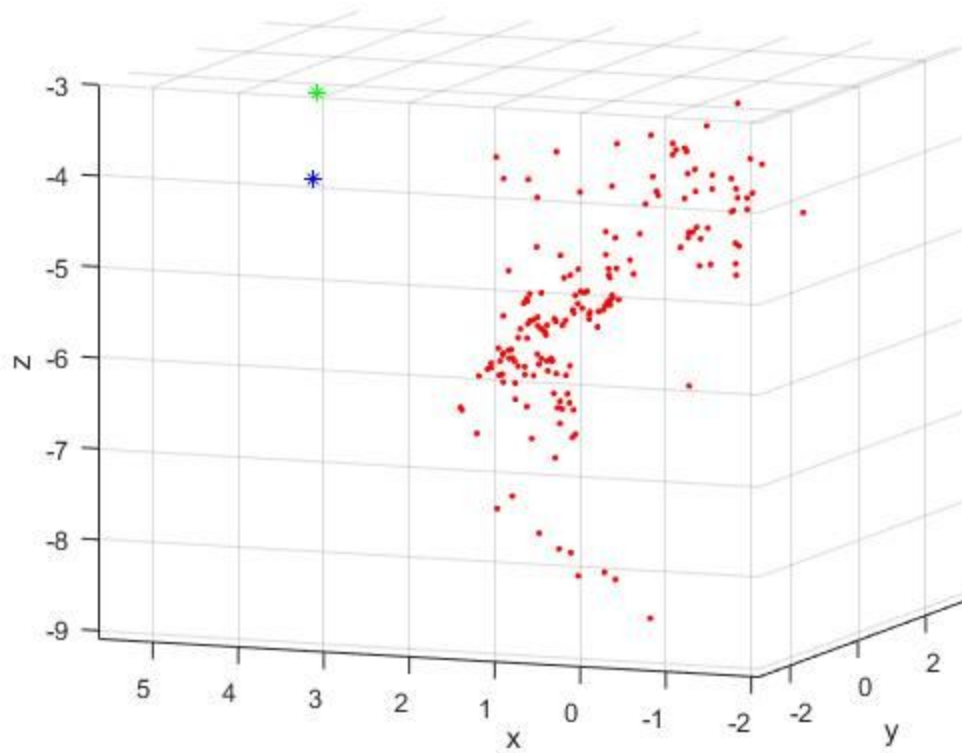
Number of inliers is: 163

Mean Residual of Inliers is:  
13.6995

Mean residual is: 14.5839

Mean Residual 1: 0.0025221

Mean Residual 2: 0.15655



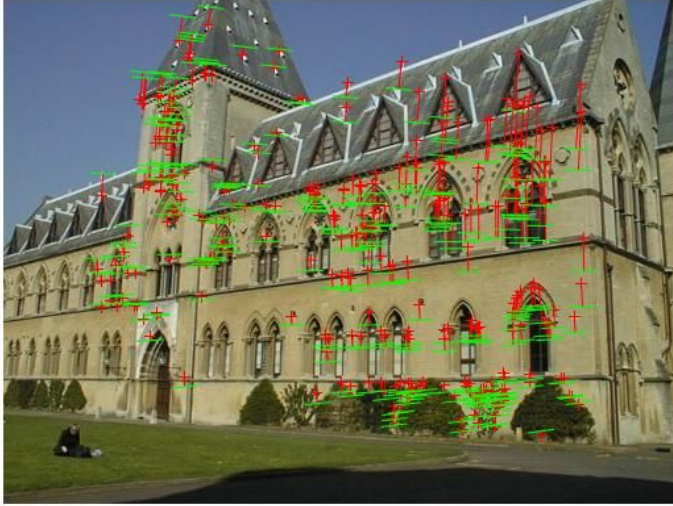
#### Camera Centers for House :

Green star is camera center for first image.

Blue star is camera center for second image.

The triangulated matching points given by both the images are plotted in red.





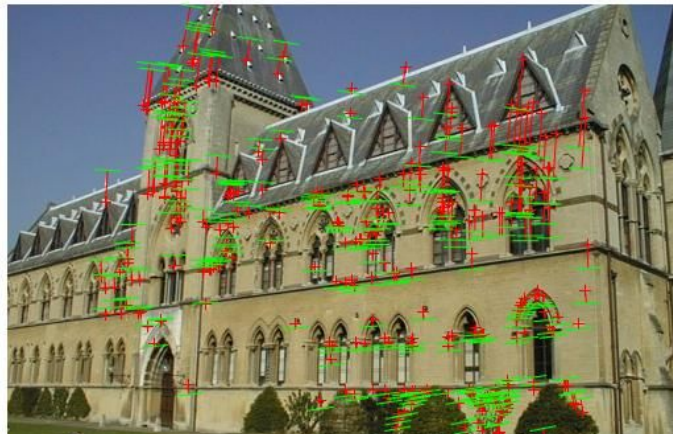
### **For Unnormalized,**

Assuming all matches are true and fitting to all

Mean residual is: 11.8459

Mean Residual 1: 46.9779

Mean Residual 2: 3726.2642



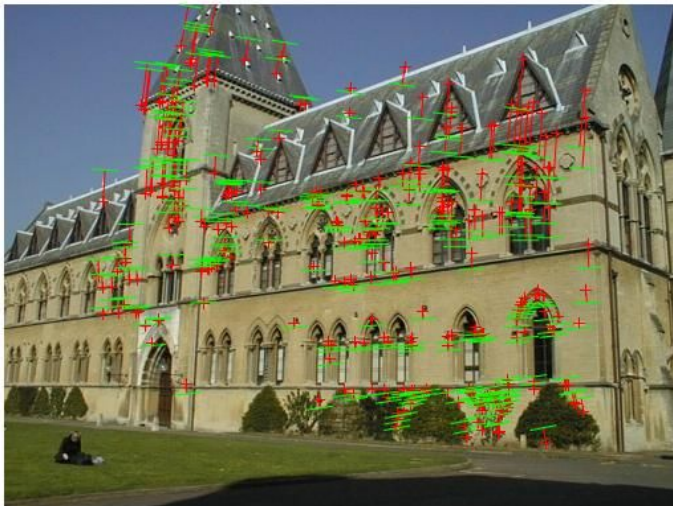
### **For Normalized,**

Assuming all matches are true and fitting to all

Mean residual is: 10.8974

Mean Residual 1: 46.9779

Mean Residual 2:  
3726.2642



### **Estimating the fundamental matrix**

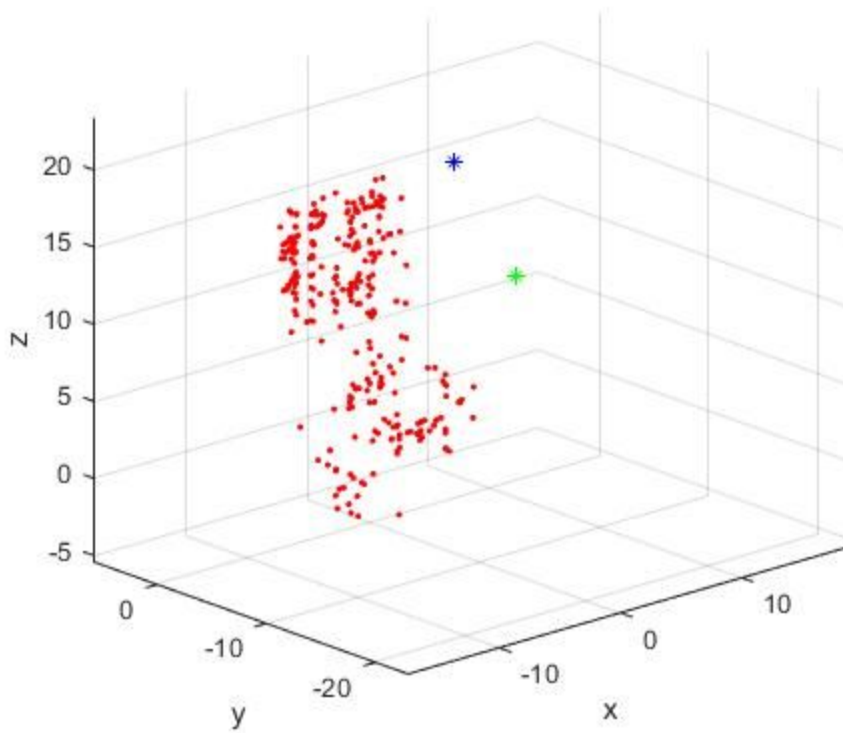
Number of inliers is: 306

Mean Residual of Inliers is:  
10.6106

Mean residual is: 10.8974

Mean Residual 1: 46.9779

Mean Residual 2: 726.2642



**Camera Centers for Library:**

Green star is camera center for first image.

Blue star is camera center for second image.

The triangulated matching points given by both the images are plotted in red.



References :

<http://www.ncrg.aston.ac.uk/netlab/index.php>

<https://github.com/daeyun/Image-Stitching>

<https://github.com/liangfu/stereo-vision>

<http://www.peterkovesi.com/matlabfns/Robust/ransacfitomography.m>