Structure From Motion

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1 RANSAC Results

Figure 1: Pre-RANSAC

Figure 2: Post-RANSAC

Figure 3: Feature match

2 Triangulation Refinement
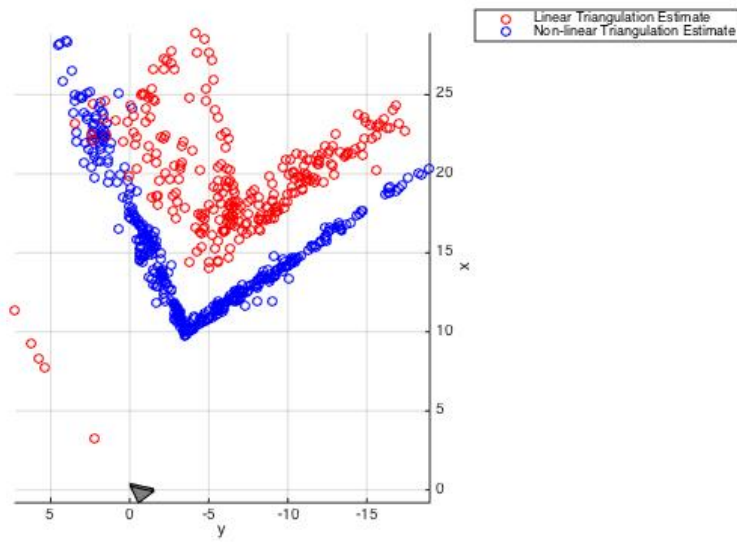

Figure 4: Linear vs. Non-linear triangulation estimation

3   Pose Estimates

Fundamental matrix between images 1 and 2:

$$F = \begin{bmatrix} 0.0 & 0.0 & -0.0026 \\ 0.0 & 0.0 & 0.0048 \\ 0.0042 & -0.0027 & -1 \end{bmatrix}$$

Essential matrix between images 1 and 2:

$$E = \begin{bmatrix} 0.0249 & 0.7580 & 0.3328 \\ -0.9062 & 0.0444 & -0.3735 \\ -0.2010 & 0.5464 & 0.1380 \end{bmatrix}$$

Total number of inliers between all images: 8823/10331
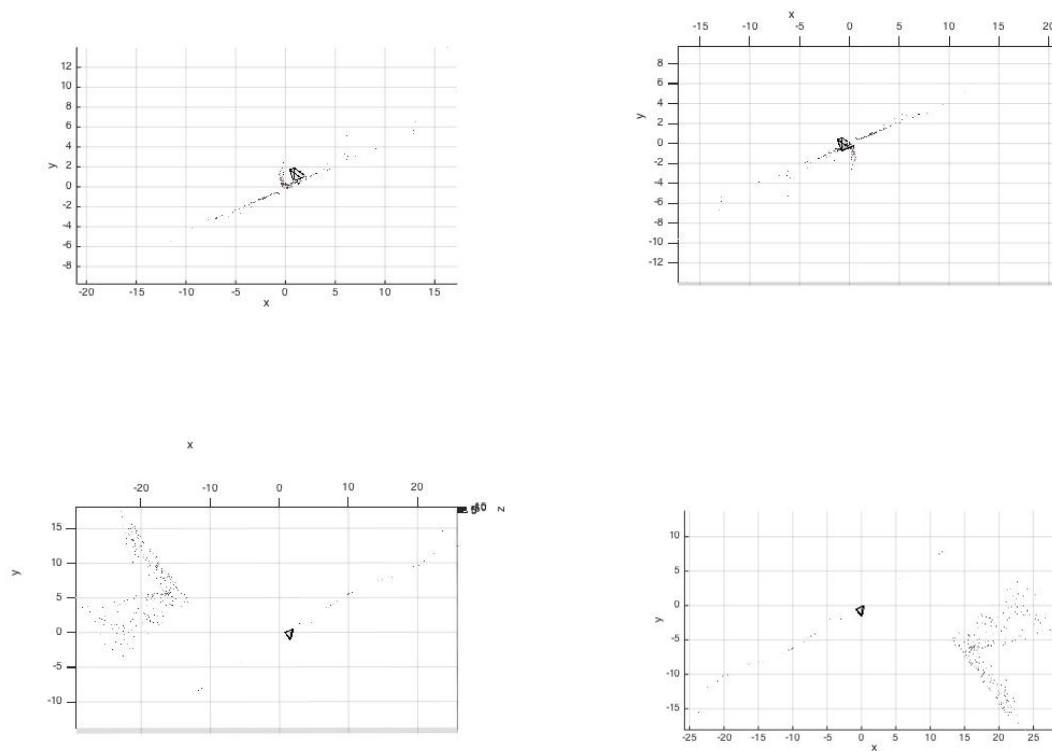
4   Potential Configurations and Triangulation

Figure 5: Potential camera poses

5 Image 3 Pose Estimate

Translation:

$$C_3 = \begin{bmatrix} 1.0169 \\ -0.1715 \\ -1.0612 \end{bmatrix}$$

Rotation:

$$R_3 = \begin{bmatrix} 0.9997 & 0.0221 & -0.0128 \\ -0.0196 & 0.9853 & 0.1698 \\ 0.0164 & -0.1695 & 0.9854 \end{bmatrix}$$
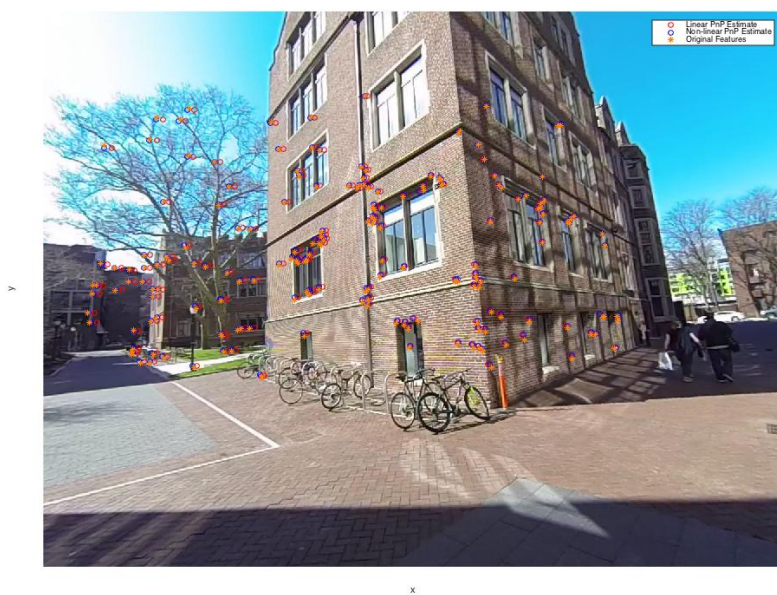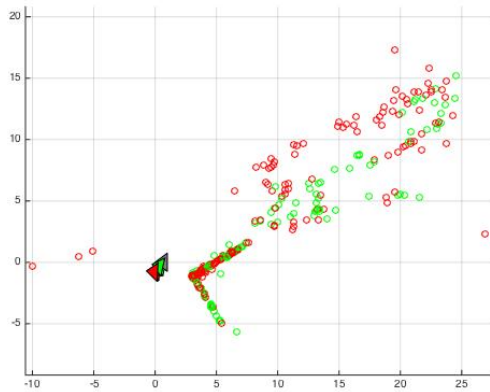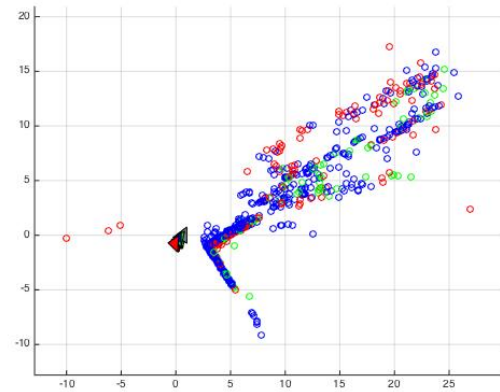
Number of inliers: 17/98

6 PnP Refinement
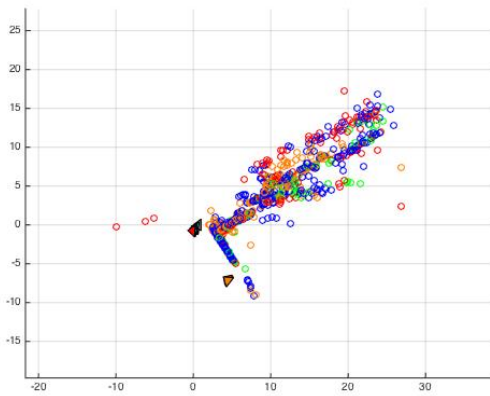

Figure 6: Linear vs. Non-linear PnP pose estimation
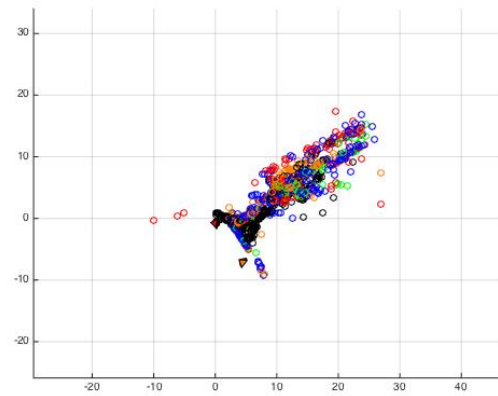
7 Camera Poses for Each Added Image

(a) Three images

(b) Four images

(c) Five images

(d) Six images

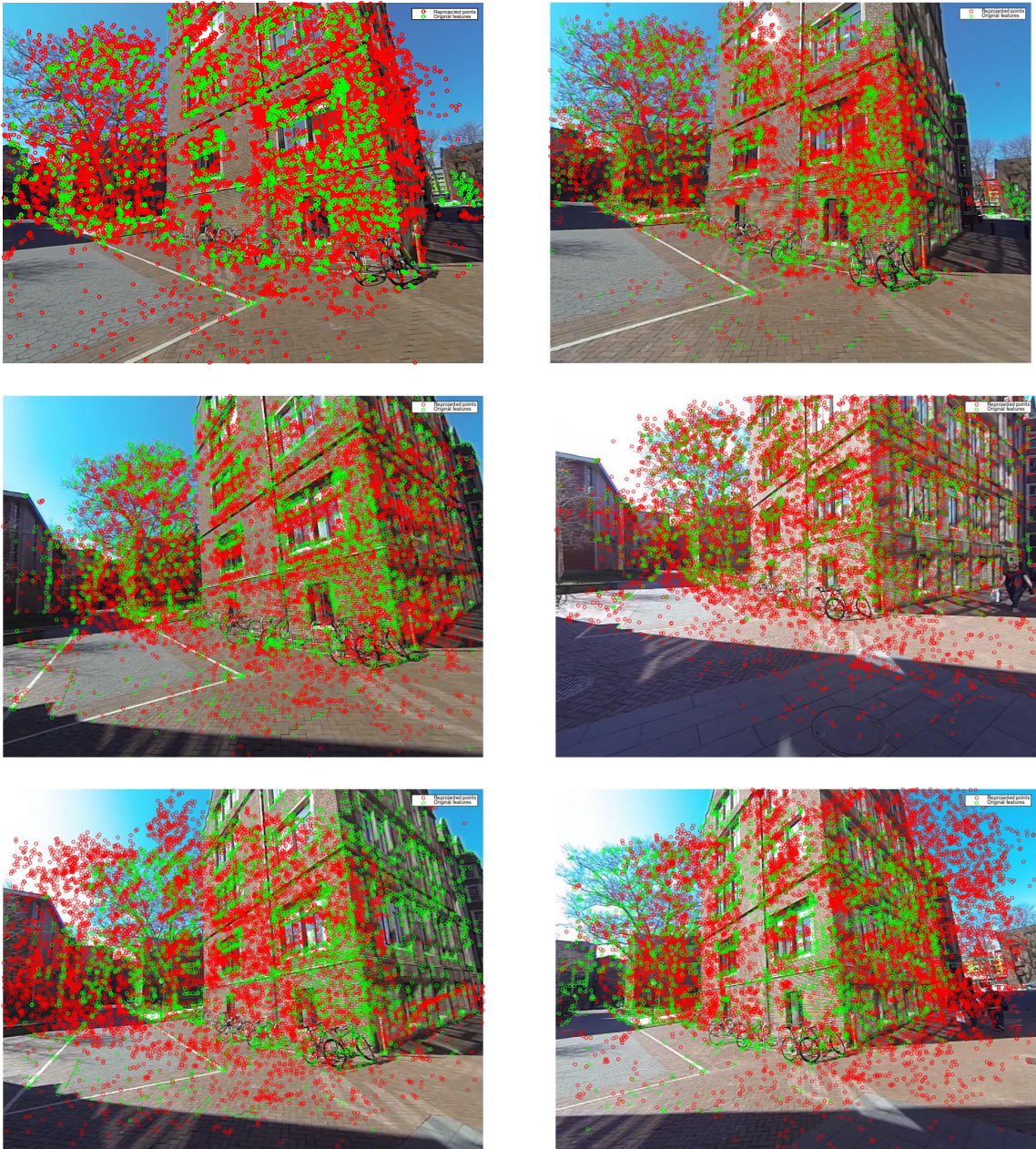Figure 7: View of each image registered

8 3-D to Image Reprojections
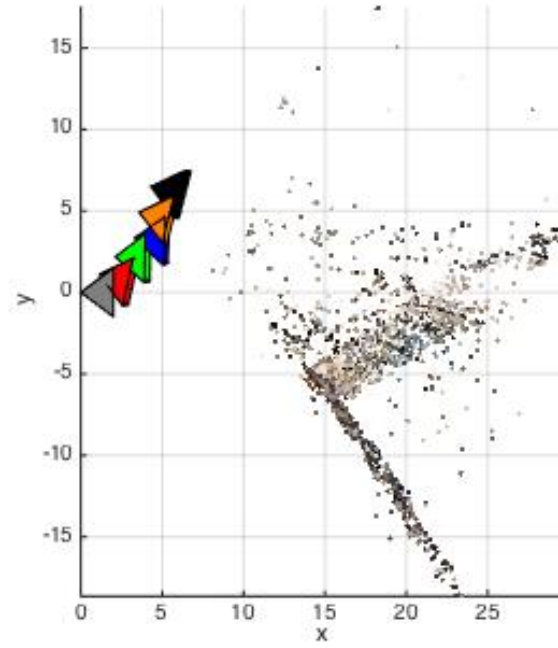

Figure 8: View of each image registered

9 Full reconstruction

Figure 9: Complete SfM reconstruction