Mobile Robotics
Assignment 3

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Section 1:

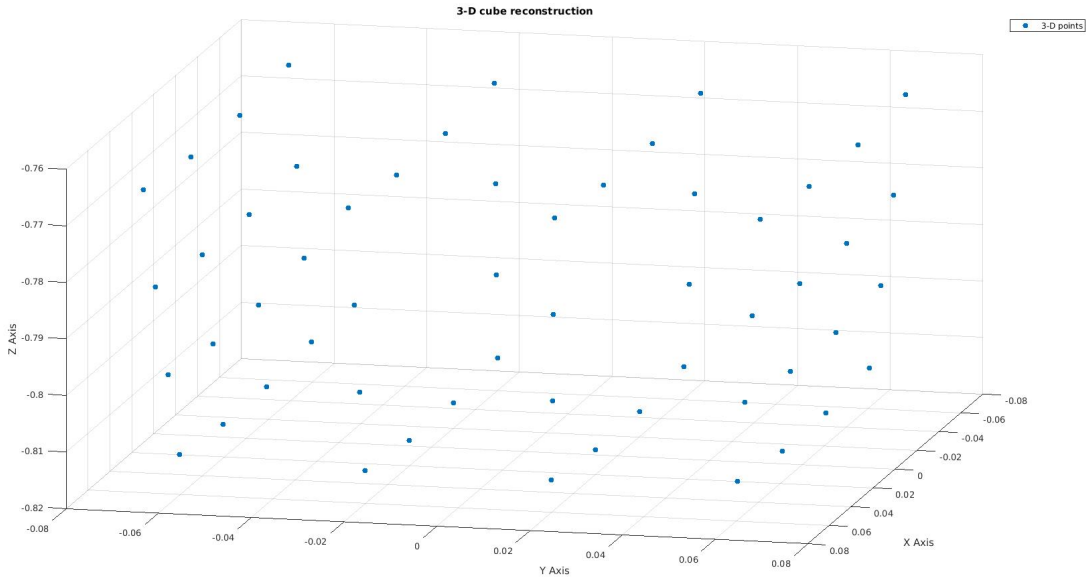
The required implementations have been made in ‘a01.m’. Much of the implementation is in ‘geta01()’ function. The steps as given, have been followed. We have made use of ‘ransac()’, ‘estimateFundamentaalMatrix’ implementation from previous assignments to obtain the fundamental matrix and then to further find the essential matrix by using the relation:

E=transpose(K)*F*K;

Where, E=Essential Matrix; K=Intrinsic camera parameter; F=Fundamental Matrix.
The given implementation ‘decomposeEssentialMatrix.m’ has been used appropriately to obtain [R|t]. The required triangulation implementations from previous assignments have been included. The required projection matrices for all the images have been found in matrix ‘P’.

Section 2:

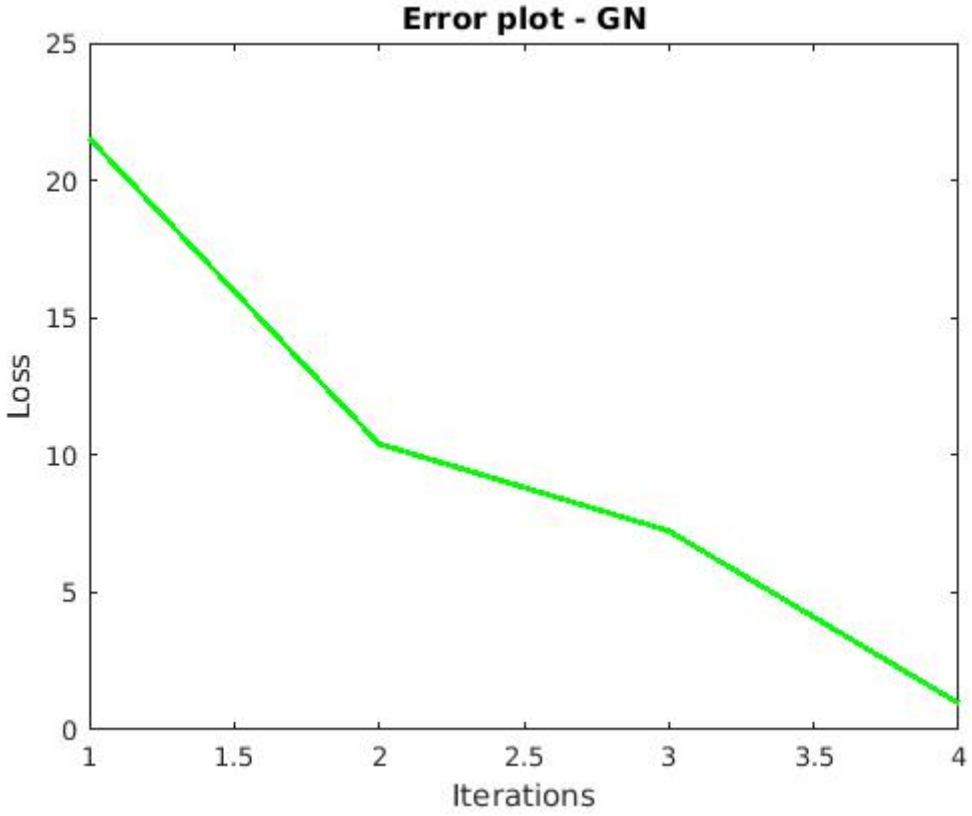
Given, P1-P8 from Section 1, we perform triangulation as required to solve for all the 3-D points. The required implementations can be found in ‘a02.,’ and ‘runTriangulation()’ function. The plot for the reconstructed cube is obtained as:

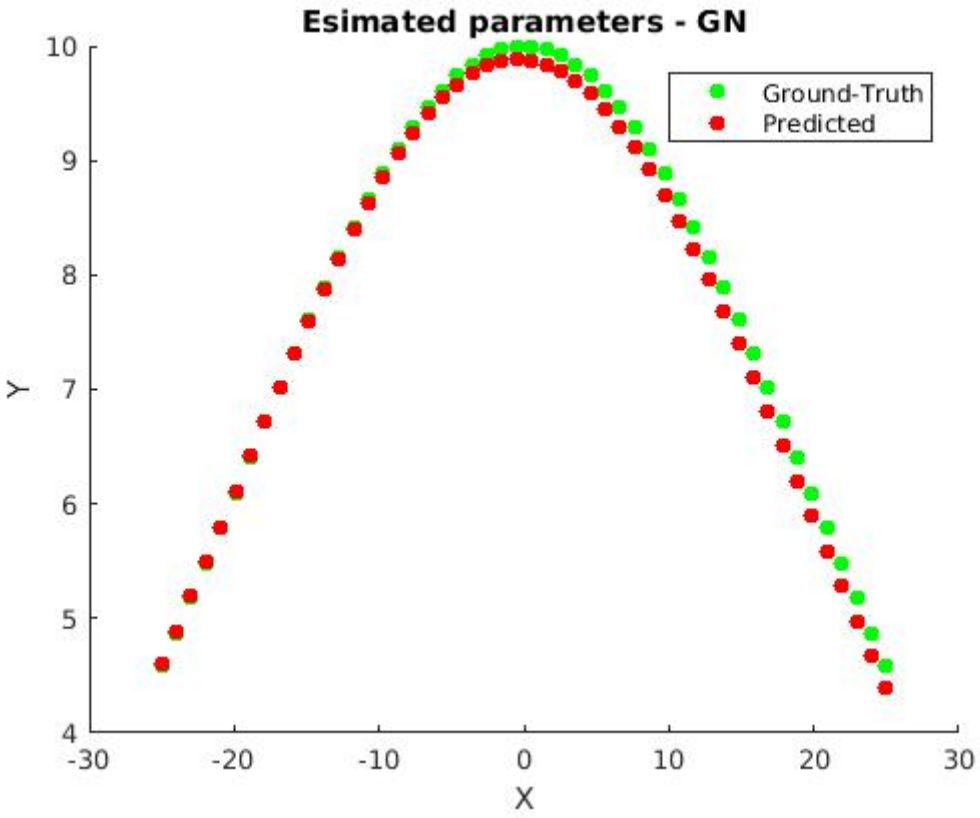


Section 3:

The required code snippets have been added into the file ‘testLevenbergMarquardt.m’. Wherever required, appropriate references from the file ‘testGaussNewton.m’ have been made. These are for the purpose of finding ‘p’, ‘residual’, error(‘err’), jacobian(‘J’), ‘A’ and ‘g’ variables.
We obtain the final results as follows:

Gauss Newton:





Levenberg Marquardt: