**Project 5**

**3D Reconstruction**

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3.1.1 Eightpoint algorithm

After processing the data points from pts1 and pts2 my recovered F matrix is:

A number on a black background

Description automatically generated

3.1.2 Epipolar lines

A comparison of a model of a building

Description automatically generated

I first converted the points to homogeneous coordinates and then computed the epipolar lines corresponding to them for Figure 2. Set the RANGE of x-values and the corresponding y-values for that, and then compare to pick the shortest Manhattan distance when I come up with the most compatible window size of 10\*10. But when I check the black empty space excluding the temple, it gives inaccurate results. But overall, the Manhattan distance is much more accurate than the Euclidean distance results.

A collage of a model of a building

Description automatically generated

3.1.3 Essential Matrix

essential matrix:

A number on a black background

Description automatically generated

3.1.4 Triangulation

To determine the correct P2 from the four possibilities, I projected triangulated 3D points onto both cameras and checked which configuration would result in all points having positive depth. When re-projected back to both images, these points have the smallest re-projection error. I also checked the sign of the Z-values of the triangulated points and made sure, they were positive.

As for projection error, I get 0.2576 for pts1 and 0.2587 for pts2.

3.1.5 Test TempleCoords

A graph with a drawing of a building

Description automatically generatedA graph with a drawing of a candle

Description automatically generated with medium confidence

A graph of a map

Description automatically generated with medium confidence

3.2.1 Image rectification

A comparison of stereo images with ground truth

Description automatically generated

3.2.2 Disparity Map

A map of a building

Description automatically generated with medium confidence

3.2.3 Depth map

A close-up of a map

Description automatically generated

3.3.1 Camera Matrix Estimation

A black screen with white text

Description automatically generated

3.3.2 Intrinsic and Extrinsic Matrices Estimation

A screen shot of a computer program

Description automatically generated