# HW4

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Matlab code:

https://github.com/lixit/CV_3D/tree/main/HW4

This report online:

https://www.overleaf.com/read/cynybfvcbmqj#5ffc70

**Question 1.** Disscuss my implemation

In my imlementation, I first use detectSURFFeatures to find the features, and use matchFeatures to find a putative mathing points.

However, this putative matching points have too many outliers and I use RANSAC to find the inliers.

Given the inlier points, I use my implemented normalized 8 points algorithm to compute the fundamental matrix.

Given the F matrix, I can show the epipolar lines in 2 images respectively althrough it's not required.

The K matrix is given, and I use relativeCameraPose to compute the rotation R and translate T. Finally I get camera matrix P1 and P2

To compute 3D point X, I use Linear triangulation implemented in file linbackproj.m as required.

Finally, I can show my 3D points cloud comparing with built-in fucntion triangulate. And the results are nearly the same, which imply my implementation is correct.

I also print the signal-to-noise ratio.

**Question 2.** all results

**Question 3.** signal-to-noise ratio

Please check all SNR in table 1

**Problem 4.** conclusiton

The 3D points of my implementation is nearly same as built-in triangulation. And the SNR is very high. This suggest my implementation is correct.
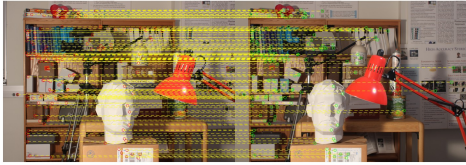
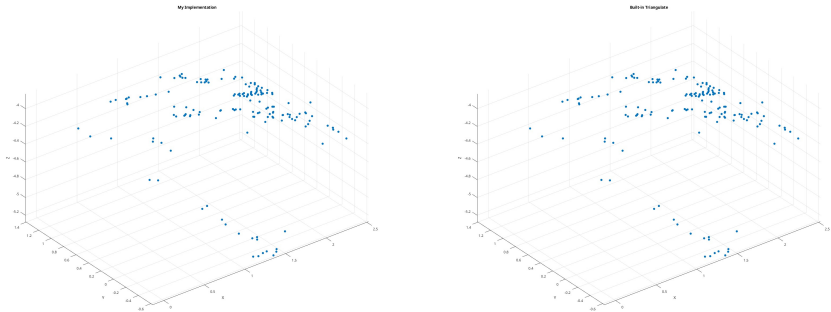Figure 1: Newkuba matched points



Figure 2: Newkuba compare 3D points
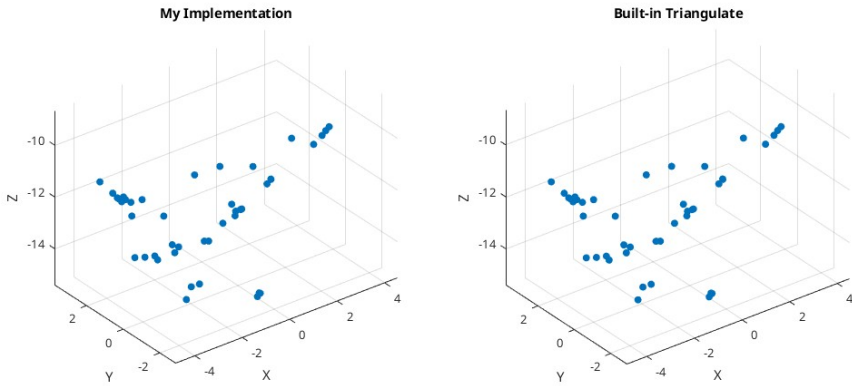


Figure 3: piano matched points



Figure 4: piano compare 3D points

|          | SNR        |
|---------:|------------|
| newkuba  | 152.60 dB  |
| piano    | 142.83 dB  |
| globe    | 154.23 dB  |
| playroom | 151.67 dB  |

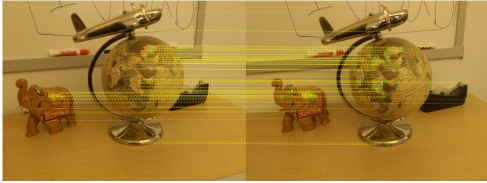Table 1: Compare with other models' architecture

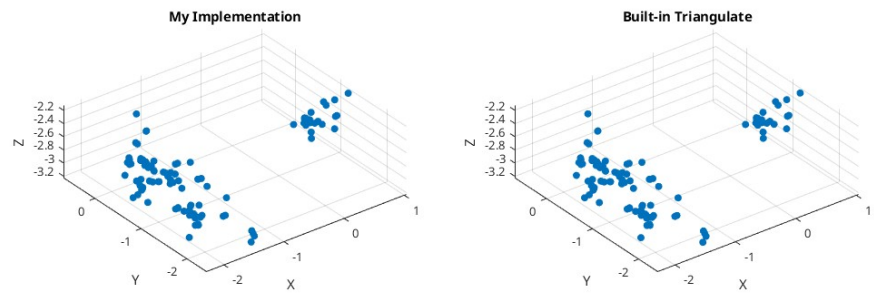Figure 5: globe matched points
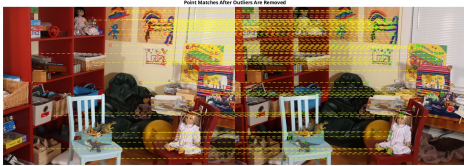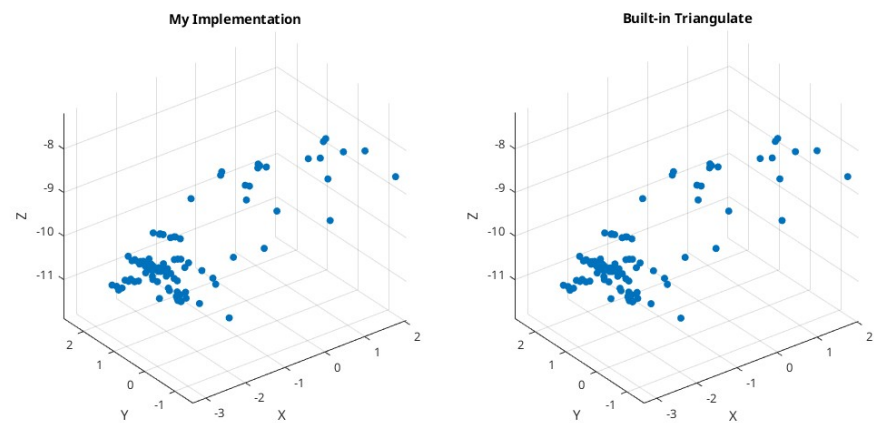


Figure 6: globe compare 3D points



Figure 7: playroom matched points



Figure 8: playroom compare 3D points