ENGN 1610/2605 Image Understanding

Lab #8 3D Reconstruction

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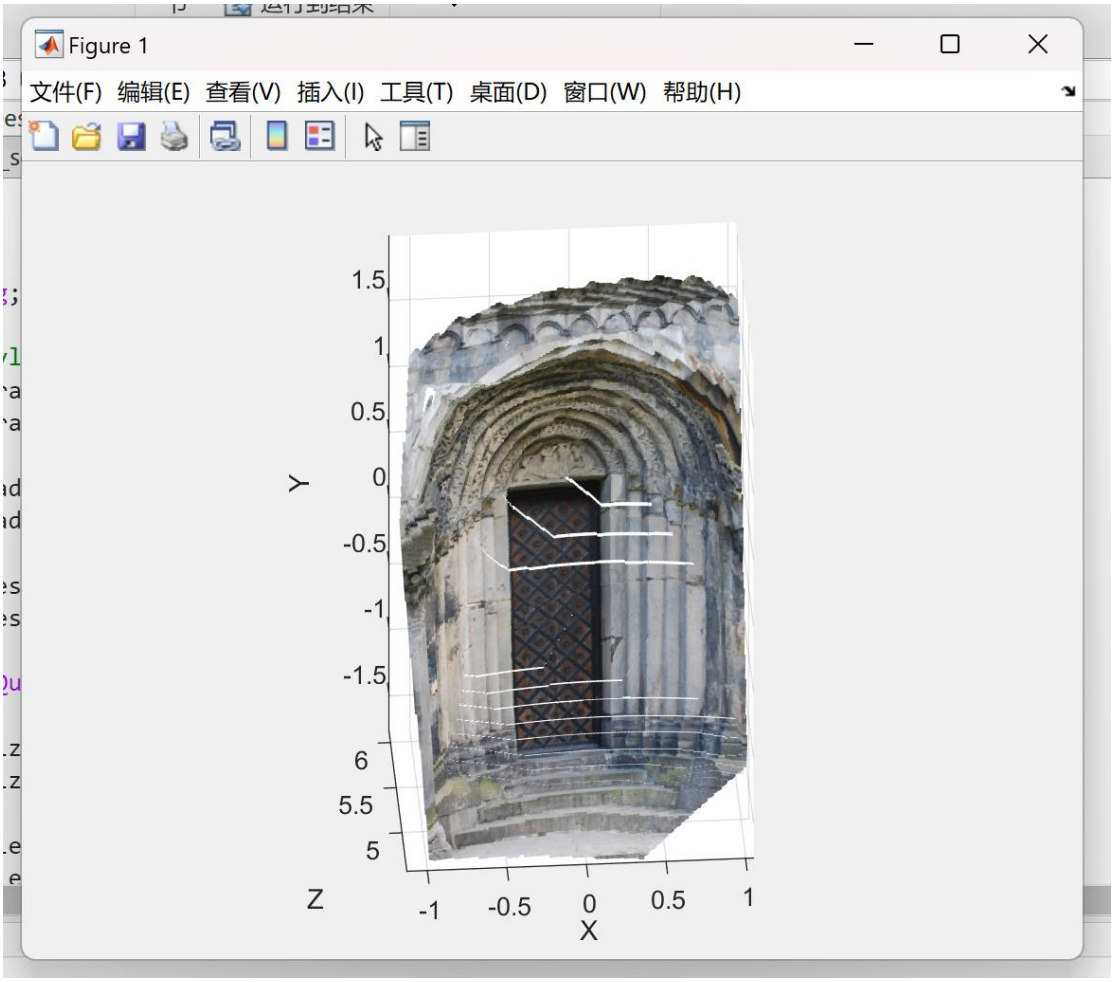
Problem 1. Scene Reconstruction

The code for this result is in "P1.m" file.



Problem 2. Answer the Question

Take a look at the Densification.m function file. How does the function work to make dense correspondences? Also, briefly explain the possible causes of the gaps of regions obtained in the 3D reconstruction.

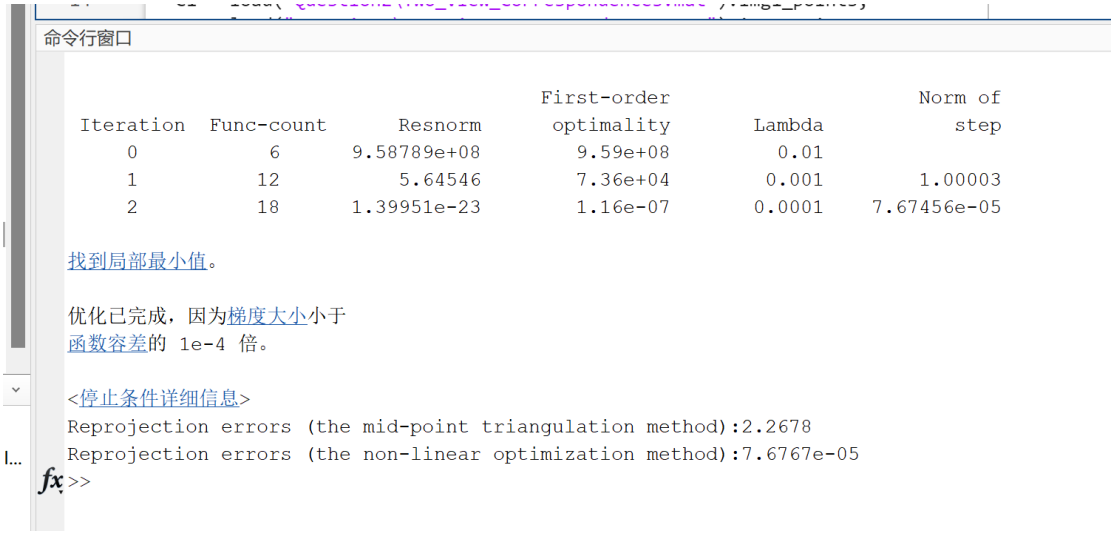
1. Interpolate first, according to correspondence. Reverse interpolation is performed

at the same time. This creates a dense correspondence. A bidirectional consistency check and a reprojection error check were then performed, returning only the inlier points of dense correspondences.

2. If there are no correspondences or very few correspondences for certain regions in the images, those regions won't be included in the 3D reconstruction. Or because of the outlier, the outlier in the feature correspondence may cause the interpolation to be incorrect or inconsistent, resulting in gaps in the reconstruction.

Problem 3. Triangulation by Non-linear Optimization

The code for this result is in "P3.m" file.



In what order of magnitude is the reprojection error reduced after the optimization?

```
>> log10(errors_m / errors_o)

ans =

   4.470431363471468

>>
```

So, the reprojection error is reduced by approximately 4 orders of magnitude after the optimization.