046746 – Computer Vision



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Homework Assignment: 4

Structure From Motion

# Part 1 – Sparse Reconstruction

## Section 1 – Eight Point Algorithm

In this section we calculated the F matrix from two sets of corresponding point. As instructed, we implemented the eight-point algorithm that we saw in the lectures:

Graphical user interface, text, application, chat or text message

Description automatically generated

Text

Description automatically generated with low confidenceWe got the following f matrix:

And the visualization of the corresponding epipolar lines:

A picture containing text, building, square

Description automatically generated

## Section 2 – Epipolar Correspondences

In this section we found the corresponding point in the epipolar line to a selected point in image 1. We found the matching point using comparison of windows of size 70, around sampled points from the epipolar line, to a window of the same size around the selected point in the first image. The comparison was made with Euclidean distance on the 3 colors matrixes of the windows.

Most of the matches were good:

A picture containing text, decorated, colorful

Description automatically generated

But for some of the points we got an offset in the corresponding point location:

A picture containing text, building, square, colonnade

Description automatically generated

This offset occurs because of the resembles in intensity values of some faulty point to the intensity values of the correct point. In order to get more robust solution, we need to use a better similarity method.

## Section 5 – Putting it all together

In this section we did 3d reconstruction using all the functions from previous sections. We set the extrinsic parameters of camera 1 to be:

The extrinsic parameters of camera 2 are:

Text

Description automatically generated

Graphical user interface, chart, scatter chart

Description automatically generatedChart, scatter chart

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Chart

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