Exercise 4
3D Computer Vision

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1 Theory

1.0.1 Question 1:

What is the advantage of a rectified image pair regarding correspondence search?

Solution:
By rotating the original cameras, one can think of the rectified images as acquired by a new stereo rig.Correcting images has the important benefit that stereo correspondences can be computed by using the horizontal raster lines of rectified images instead of 3D coordinates.

1.0.2 Question 2:

What is the advantage of a rectified image pair regarding triangulation?

Solution:
This method of determining depth from disparity d is called triangulation.Each pixel's match in another image can only be found on a line called the epipolar line. If two images are coplanar, i.e. they were taken such that the right camera is only offset horizontally compared to the left camera (not being moved towards the object or rotated), then each pixel's epipolar line is horizontal and at the same vertical position as that pixel.Thus the pixel position can be easily determined on epipolar line.

1.0.3 Question 3:

Is image rectification also a good approach in case of multi-view dense reconstruction? Why?

Solution:
The goal of multi-view 3D reconstruction is to infer geometrical structure of a scene captured by a collection of images. Usually the camera position of many of the cameras used and internal parameters are assumed to be known or they can be estimated from the set of images.Image rectification converts the 3D image to be easily computed on a lower Dimension thus greatly reduces the computation.