

3D CV 4 Exercise

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1 Introduction

This report provides answers to theoretical questions in the first exercise and the result of the developed program.

2 Theory

2.1 A

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

The advantage of using the correspondence search algorithm with rectified image pair is that it's necessary to search only along horizontal lines.

2.2 B

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

The advantage of triangulating that the algebraic formulation of the coordinates of a three-dimensional point x can be calculated in a variety of ways. And the fact that there are many methods on how to determine the optimality and how to find the optimal 3D point. Since they are based on different criteria of optimality, different methods give different estimates of the three-dimensional point x in the presence of noise.

2.3 C

Is image rectification also a good approach in case of multi-view dense reconstruction? Why? (Hint: Consider a scenario where several images were taken around a statue.)

The image rectification is a good approach in case of multi-view dense reconstruction. For instance, we have five cameras around the statue (cam1, cam2, cam3, cam4, cam5). Due to the rectification process, we combine cameras into five stereo pairs (cam1 and cam2, cam2 and cam3, cam3 and cam4, cam4 and

cam5, cam5 and cam1). Because of rectification we have some advantages:
Firstly, this approach solves the problem of complexity because everything is align and matching is much more easier;
Secondly, this solves strong perspective distortion problem because using image rectification perspective distortion becomes lower;
Thirdly, this solves the problem of calibration uncertainties because using perfect stereo pairs assuming calibrated stereo cameras.

3 Practical Part

The code of the developed program is in the "main.py" file.

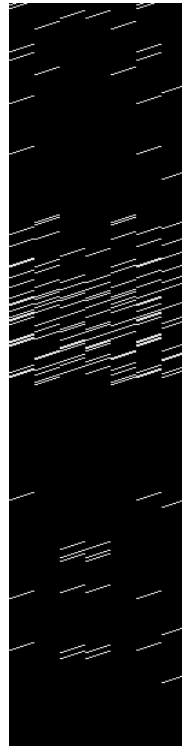


Figure 1: Disparity in the left image

References

[1] Prof. Didier Stricker, Dense 3D Reconstruction , 3D Computer Vision, Kaiserslautern University.