SYDE 671 Advanced Image Processing

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Assignment 5 - Questions Part

Instructions

- 4 questions
- Write code where appropriate; feel free to include images or equations.
- Answers must be included in a jupyter notebook or a pdf file(as long as you don't have runnable code blocks).

Questions

Q1: Given a stereo pair of cameras:

(a) Briefly describe triangulation (using images might be helpful).

(b) Why is it not possible to find an absolute depth for each point when we don't have calibration information for our cameras?

Q2: In two-view camera geometry and depth estimation:

(a) Why does rectification simplify matching features across our stereo image pair?

(b) What information do we need to know to rectify our image pair?

Q3: In two-view camera geometry, what does it mean when the epipolar lines:

(a) radiate out of a point on the image plane,

(b) converge to a point outside of the image plane, and

(c) intersect at more than one point?

Q4: Suppose that we have the following three datasets of an object of unknown geometry:

(a) A video circling the object;

(b) An stereo pair of calibrated cameras capturing two images of the object; and

(c) Two images we take of the object at two different camera poses (position and orientation) using the same camera but with different lens zoom settings.

For each scenario:

1. Explain if we can calculate the essential matrix, fundamental matrix, or both;
2. State an advantage and disadvantage of using each setup for depth reconstruction; and
3. Name an application scenario for each of the different setups.

Credit

This assignment is adapted from CSCI1430 course