

COMPUTER VISION

ASSIGNMENT 3

Antonio J. Rodriguez-Sanchez, 16-May-2023

Deadline: 02-June-2023

Important note: This assignment can be done in groups of two people

1. (5 points) Make a very short video with your camera.
 - a. Compute and show the disparity map using OpenCV for two nearby frames.
https://docs.opencv.org/4.x/dd/d53/tutorial_py_depthmap.html
 - b. Use now two far frames and compute and show the new disparity map.
 - c. Comment on how the results relate to the “distance” (i.e. near vs far frames) between cameras.
 - d. Extend the code for stereo rectification.
Note: You can use OpenCV’s `cvStereoRectifyUncalibrated()` function.
2. (10 points) Work with Epipolar geometry and multi view geometry. Use the frames you generated in the previous exercise:
 - a. Analyze and test the code from https://docs.opencv.org/4.x/da/de9/tutorial_py_epipolar_geometry.html
 - b. Change SIFT with two different descriptors of your choice and compare the results with SIFT.
 - c. Change the computation of the fundamental matrix and compare the results of RANSAC and LMEDS. What is LMEDS?
 - d. Apply the best setup you have so far to different images of your choice from the PhotoTourism challenge dataset <https://www.cs.ubc.ca/research/image-matching-challenge/2021/data/>

Deliverable: PDF Document with the following:

Pages 1-2 (Disparity):

Report on how your solution was implemented (including equations) and the algorithms you followed to solve the assignment. Include snippets (only interesting parts of the code), disparity maps and rectification results. Comment on the results and how disparity for near and far frames compare.

Pages 3-5 (Epipolar geometry)

Report on how your solution was implemented (including equations) and the algorithm you followed to solve the assignment. Include snippets (only interesting parts of the code) and images including the epipolar lines. Comment on the results and how the methods compare to each other.

Page 6 (Discussion)

What you learnt about this assignment? and how the method can be improved or extended? What problems did you run into?.

Deliverable: code (Python, C++) - along the PDF – that you used to solve the assignment.