

1 Few Essential Rules

- The assignments should be done in a group of two students.
- At least one of the team members must submit the assignment.
- All submissions will be checked for plagiarism.
- Discussions are allowed and encouraged.
- While working in groups, try using a version control system like GitHub.

2 Assignment Statement

2.1 Part 1 (Synthetic Data)

- Go through the video lectures 1-5 in the following playlist [SIFT Algorithm \(Optional\)](#).
- Check the two images (named `im2.png` and `im6.png`) inside the ‘data’ folder. These two images are taken using purely horizontal motion of the camera along the x -axis.
- Apply the SIFT algorithm to find the correspondence points between these two images. You may use the built-in OpenCV implementation or any other open source implementation (Do give reference and acknowledgment in that case).
- Use the Gold Standard Method (Algorithm 11.3) from the book “Multiple View Geometry in Computer Vision” to estimate the 3D structure of the scene. Note that to run the Gold Standard Method, you first need to implement the normalized 8-point algorithm for the fundamental matrix (Algorithm 11.1). Plot the final 3D scene as a dense point cloud.

2.2 Part 2 (Real Data)

- In this exercise, you will work with real data. Both group members should take out their phones and stand about 1 to 2 feet apart. Hold your phones at roughly the same height, with the camera lenses facing forward. Make sure the scene contains plenty of details and a variety of colors. Then, simultaneously capture the same scene using both devices.
- The captured images will be of high resolution and large sizes. Scale them down to a much lower resolution and smaller sizes.
- Use the algorithm you have developed in Part 1 on these two images and reconstruct the 3D scene with point clouds.

3 Submission Details

Each submission must include a report containing the details of all the team members, the working principle of your codebase, and important tables of the output results. Additionally, it is recommended that you briefly explain your code and implementation details in the report.