Assignment 3: Reconstruction

Albert Einstein; Isaac Newton; Thomas Edison

Introduction *[preferably less than 150 words]*

Describe the objectives of the assignment, an overview of your method, result, and conclusion. Present a reading guide of your report.

The report is suggested to be as concise as possible *[preferably less than 4 pages]*. There is no lower bound, as long as everything is made clear. We are always happy to look at extra pictures/diagrams, and we appreciate such efforts. All figures, tables, and diagrams do not count towards the page length of the report.

Problem Statement *[preferably less than 200 words]*

Describe how you interpreted and formulated the problem.

Methodology *[preferably less than 300 words]*

Describe the methods you used to come to the result. You can choose to represent your methods using equations, block-diagrams (work-packages), flowcharts (components), procedures (verbal description), and pseudocodes (similar to code, as mathematical as necessary). Adding pictorial explanations when dealing with geometric algorithms is often necessary. Do not provide a step-by-step guideline of which buttons you clicked in software, but explain the methodology (i.e., mathematics & algorithms).

Implementation Details *[preferably less than 300 words]*

Provide details on how you implemented your method, e.g., which programming language and third-party libraries did you use? What are the obstacles and how did you tackle them?

Provide hints and links to the methods you have used, datasets, guidelines on how to build and run your program to reproduce your results.

Results & Discussion *[preferably less than 300 words]*

Provide screenshots of your results, and discuss them. Topics of discussion are (for instance): differences between methods, the effects of the parameters, what could have been done to improve your results, where you think it went wrong (if your results seem incorrect).

Contributions *[preferably less than 200 words]*

Give a brief description of who did what in doing the assignment. This must include an estimated percentage of individual contributions *[numbers must sum up to 100%]*. In case more than one person worked on the same subtask, please elaborate on how you collaborated on it.

This is an example

Albert Einstein (30 %)

- Prepared and pre-processed the point clouds, i.e., taking photos, run SfM and MVS, cropping the buildings from the messy point clouds, and normal estimation;
- Ran the code written by Thomas Edison and wrote the "Results" section of the report.

Thomas Edison (50 %)

- Implemented an invariant of the 3D reconstruction algorithm introduced in the lecture.
- Wrote the "Abstract", "Introduction", "Methodology", and "Conclusion" sections of the report.

Isaac Newton (20 %)

I created some helper functions and was also present when discussing the code, but in total, I wrote less code than my groupmates did. To compensate for this, I put in some extra work on the report. Nevertheless, others deserve more credit for this assignment.

(a) Input point cloud.   (b) Smooth reconstruction result

Figure 1. Surface reconstruction.

References *[does not count page length, preferably on a separate page]*

[1] Edelsbrunner and J. Harer, Computational Topology, an Introduction. 2010.
[2] C. Tremblay, "Mathematics for game developers," 2004.