

High-Performance and Tunable Stereo Reconstruction

3D Vision Project Proposal

Supervised by: Enter your project supervisor here

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GROUP MEMBERS

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I. DESCRIPTION OF THE PROJECT

A high level description of the project, mentioning the main goal, the input and planned output data. Typically 4-5 sentences, also citing immediately related literature [1].

II. WORK PACKAGES AND TIMELINE

Since some needed packages request a Linux distribution, we decided to work on personal computers running Linux. Further, the project will be written in C++, using - among others - the OpenCV¹ package.

The workload of this project will be divided in packages as following:

- Literature review
- Prototype of the pipeline containing:
 - Sparse Stereo Matching
 - Disparity Interpolation
 - Cost Evaluation
 - Disparity Refinement
 - Support Resampling
 - Iterative Reconstruction
- Testing the pipeline with different datasets
- Optimization in terms of runtime
- Evaluation by comparing with available methods (runtime) and with ground truth (accuracy)
- Presentation and Report

Using git as a collaboration and version control tool, it is possible to distribute the different coding parts among the team members. As soon as the different parts of the pipeline were built, we reserve some time for the assemblage and debugging of the code.

III. OUTCOMES AND DEMONSTRATION

The goal of the project is to obtain an algorithm that computes the disparity image for a stereo camera pair at a considerable high frame rate on a single processor. If the dataset provides the ground truth poses, it will also be possible to create a point cloud of the scene from the disparity images. In order to value the outcome of this project, we want to compare the performance against other methods, such as SGBM² or ELAS³. Therefore we

¹www.opencv.org, accessed 03/10/17.

²H. Hirschmiller, "Accurate and efficient stereo processing by semi-global matching and mutual information", IEEE, 2005

³A. Geiger, J. Ziegler and C. Stiller, "Stereoscan, Dense 3D reconstruction in real-time", IEEE, 2011

will set up an experiment to run our implementation against other methods on the same dataset and on the same machine, to be able to compare the run times.

Other than that, we want to estimate the accuracy of our implementation. Thus, we will compare the disparity images computed by our implementation with the ground truth disparity images of the dataset, if given.

At the final presentation, we would like to present a live demo (or a recorded video) of our implementation.

Instructions:

- The document should not exceed two pages including the references.
- Please name the document **3DVision_Proposal_Group_#.pdf** and send it to Federico Camposeco in an email titled **[3D Vision] Project Proposal - Group #**, filling in your group number.

REFERENCES

- [1] John Doe and Jane Doe. A closely related paper. In *an awesome conference*, 2014.