



Examination and Comparison of Strengths and Weaknesses of Common Dense Stereo Matching Approaches

Proposal for a Bachelor thesis topic (DE/EN)

The reconstruction of depth information from one image pair is a classical task in photogrammetry as well as in computer vision and the minimal case of the well-known structure from motion problem. It refers to the concept that 3D structures can be recovered from the projected 2D motion field of a scene acquired with a moving sensor. A special case of this task is dense stereo matching. It not only determines depth for significant feature points, but for every or at least a majority of pixels within a stereo image pair. However, these correspondences cannot always be determined unambiguously, leading to incorrect assignments in the resulting depth map.

The reasons for such incorrect matches are manifold, including noise, varying illumination, low texture, etc. In order to gain a better understanding of the different conditions having a negative impact on the performance of dense stereo matching, a comprehensive evaluation of different methods is to be carried out in the scope of this work. In this context, the conditions with the greatest impact have to be identified and a reasonable examination protocol as well as a suitable evaluation method have to be defined. The objective of this work is to compare well-known and commonly employed methods for dense image matching, focusing on their strengths and weaknesses.

The implementations of the methods to be compared as well as the datasets to be used are provided. Besides stereo image pairs, the datasets contain ground truth depth information allowing a quantitative evaluation of the performance of the different methods.

This thesis will be supervised by Max Mehlretter, M.Sc.