Institut für Photogrammetrie und GeoInformation

Leibniz Universität Hannover

Institut für Photogrammetrie und GeoInformation,
Nienburger Straße 1, 30167 Hannover

Self-Supervised Multi-View Surround Scene Flow Estimation

Proposal for a Master thesis topic (EN/DE)

Nienburger Straße 1, 30167 Hannover
Fakultät für Bauingenieurwesen und Geodäsie

Institut für Photogrammetrie und GeoInformation

Prof. Dr.-habil. Christian Heipke

Samer Abualhanud, M.Sc.

Tel. +49 511 762-2488
Fax +49 511 762-2483
E-Mail: abualhanud@ipi.uni-hannover.de

In surround camera setups, the captured images typically exhibit minimal spatial overlap, posing a significant challenge for accurate depth reasoning. While leveraging temporal context can help enhance this overlap by assuming a static scene, the presence of dynamic objects often disrupts this assumption. Accurate 3D reconstruction of moving objects demands the consideration of their motion, which can be achieved through the scene flow. Existing state-of-the-art approaches predominantly focus on monocular or stereo setups, leaving the minimal overlap issue in surround camera configurations less explored. A key challenge in this domain is enforcing multi-view consistency to predict a coherent and unified scene flow field. Furthermore, to mitigate the high costs associated with acquiring ground truth labels, self-supervised learning offers a promising solution by enabling the network to be optimized without requiring manual annotations.

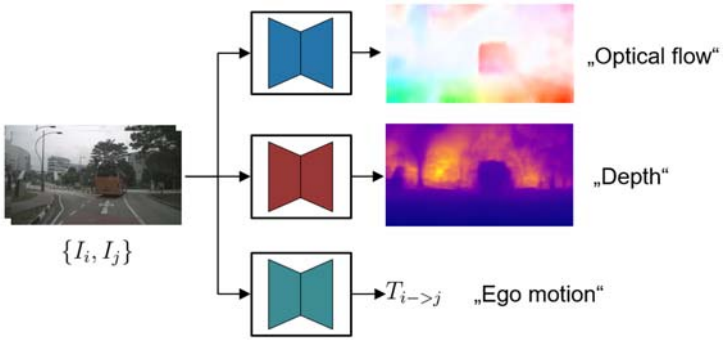

Figure 1: A potential architecture for predicting scene flow.

Scene flow estimation can be predicted directly in 3D or approached by dividing it into two sub-tasks (see Figure 1): optical flow prediction and depth estimation. Optical flow represents the 2D projection of the scene flow onto the image plane, while depth provides the necessary information to back-project this 2D motion into the 3D world.

The objective of this thesis is to compare existing state-of-the-art methods for monocular and multi-view setups on surround camera configurations and potentially extend and adapt these methods to better suit the unique challenges of surround camera setups.

Python and strong foundation in photogrammetry/computer vision are required.

This thesis will be supervised by Samer Abualhanud, M.Sc.

Besucheradresse:
Nienburger Straße 1
30167 Hannover
www.ipi.uni-hannover.de