KIT
Karlsruhe Institute of Technology

mrt

Bachelor Thesis / Master Thesis
Real-Time Capable Learned Surround View from Camera Data for Automated Driving

In automated driving cameras are one of most important sensors alongside lidar and radar. In comparison to the latter, they can provide a dense environmental representation. In order to cover the full surroundings of the ego-vehicle, multiple cameras are needed. To improve following perception tasks like object detection, sensor data can be fused together in image space. Combining several images taken from different positions and angles to a surround view is called image stitching.
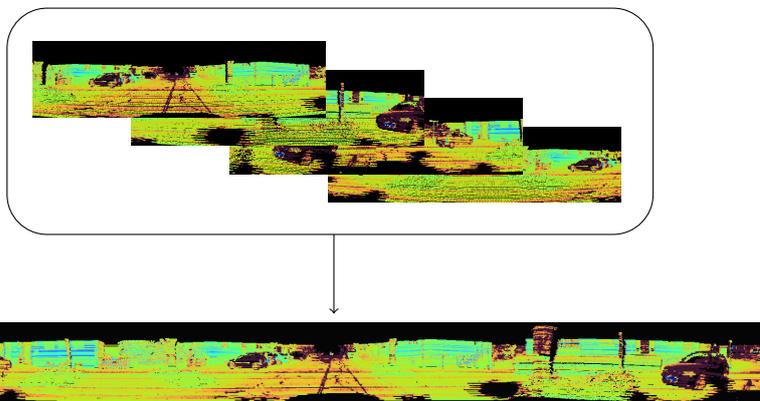

Figure 1: Surround view created from multiple camera images. The images in the schematic are simulated and derived from a lidar point cloud.

The topic of this thesis is the development of an image stitching framework using machine learning. For this purpose, the input data consists out of synchronized camera images and its calibration. The output of the network results in a 360° surround view. In order to archieve this, a convolutional neural network architecture should be implemented using TensorFlow2. Afterwards, the network architecture needs to be evaluated on state-of-the-art datasets. Finally, a qualitative evaluation is also possible on data, which was recorded by our experimental vehicles at MRT.

The proposed thesis consists of the following parts:

+ Literature research about image stitching and different machine learning approaches
+ Implementation in TensorFlow 2
+ Training and Evaluation on pre-existing datasets

I am happy to answer any questions you might have. Feel free to ask for an appointment or directly ask at my office!

Institute of Measurement and Control Systems (MRT)
Prof. Dr.-Ing. Christoph Stiller

Advisor:
Christian Kinzig, M.Sc.

Programming language(s)[1]:
C++   beginner
Python   advanced

System, Framework(s):
Linux, TensorFlow 2, ROS

Required skills:
- Prior knowledge of image processing and machine learning
- Attendance to the lecture machine vision or automotive vision
- Independent and structured method of working

Language(s):
German, English

For more information please contact:

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Or directly send in your application including your current grades as well as our questionnaire!

[1] **skill levels:**
beginner   < 500 lines of code (LOC)
advanced   500 – 5000 LOC
proficient   > 5000 LOC