

Master Thesis/Master Project

Improving distance estimation network DisNet using Deep Learning

Background Distance estimation is one of the most important fields of research in autonomous driving. As soon as objects in the vicinity of the means of transport are detected, distance estimation must be carried out in order to analyse the situation. In many cases, this distance estimation is based on an artificial neural network, which receives the detected information of an object detection network as input.

In the SMART2 project, obstacles for trains are to be detected and an accurate distance estimation is to be used to determine a hazard rate. The aim of this work is to achieve an improved and more reliable distance estimation by providing additional features as input (such as bounding box coordinates) to an existing artificial neural network with three hidden layers. For this purpose, a data set is to be created and extended for object classes that have been insufficiently trained up to now, which leads to a significant performance improvement of the neural network through subsequent training processes.

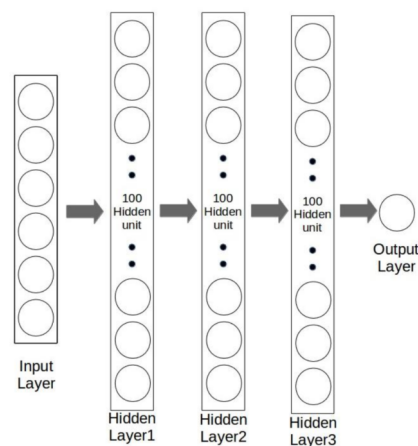


Figure 1: General structure of existing DisNet network [Has+18]

Tasks

- Literature search
- Adding new input features to neural network
- Creating and augmenting data for several object classes
- Simplification of the external parameter structure
- Training of neural network
- Evaluation of trained neural network in comparison to existing model

Marten Franke, NW1 N1330, franke@iat.uni-bremen.de

Requirements

- Very good programming skills in python
- General knowledge about artificial neural networks
- Self-motivated, passionate about innovative applications comprising computer vision and machine learning

Literature Sample

- [Has+18] Muhammad Abdul Haseeb et al. “Disnet: A novel method for distance estimation from monocular camera.” In: *10th Planning, Perception and Navigation for Intelligent Vehicles (PPNIV18), IROS* (2018).
- [HRG18] Muhammad Abdul Haseeb, Danijela Ristić-Durrant, and Axel Gräser. “Long-range obstacle detection from a monocular camera.” In: *ACM Computer Science in Cars Symposium (CSCS 2018), ECCV*. Ed. by German Chapter of the ACM. 2018.
- [Qi+19] SH Qi et al. “Distance estimation of monocular based on vehicle pose information.” In: *J. Phys., Conf. Ser.* Vol. 1168. 2019.
- [ZF19] Jing Zhu and Yi Fang. “Learning object-specific distance from a monocular image.” In: *Proceedings of the IEEE International Conference on Computer Vision*. Ed. by IEEE. 2019, pp. 3839–3848.