

# Evaluation of an object detection model adding recurrency



Technical University of Munich



Faculty of Informatics

Chair of Robotics, Artificial Intelligence and Embedded Systems

## Background

The object detection problem has gained big importance in autonomous driving context, since identifying objects and localizing them in the environment are crucial to plan future navigation of a car. The recent models utilize deep learning methods, which requires huge datasets, as well as multiple data modalities some of which are video streams, Lidar point clouds, radar, GPS [1]. Even though researchers have proposed many methods to fuse different modalities and to utilize data streams for the object detection problem, these remain to be open problems.

## Description

One of the recent successful models on the KITTI dataset [2] is MV3D [3] model, which predicts 3D object bounding boxes using point clouds and images. The deep fusion method and the end-to-end training make the model appealing for further investigation. The aim in this project is to investigate the temporal features of the model by extending the model using recurrent layers and removing the real-time constraint.

We are looking for a student with background in computer vision and deep learning whom can implement the MV3D model and add recurrent layers to evaluate the accuracy change.

## Tasks

This student project consists of the following tasks:

- Literature review to get familiar with the models (2-4 weeks)
- Implementing the MV3D model (6-8 weeks)
- Comparing the results with the original paper (2 weeks)
- Observing the effects of increasing number of proposals (2 weeks)
- Extending model with the recurrent layers (4 weeks)
- Reporting effects of recurrency to the accuracy and documentation (4 weeks)

## References

1. Janai, J., Güney, F., Behl, A., & Geiger, A. (2017). Computer vision for autonomous vehicles: Problems, datasets and state-of-the-art. arXiv preprint arXiv:1704.05519.
2. Geiger, A., Lenz, P., & Urtasun, R. (2012, June). Are we ready for autonomous driving? the kitti vision benchmark suite. In Computer Vision and Pattern Recognition (CVPR), 2012 IEEE Conference on (pp. 3354-3361). IEEE.
3. Chen, X., Ma, H., Wan, J., Li, B., & Xia, T. (2017, July). Multi-view 3d object detection network for autonomous driving. In IEEE CVPR (Vol. 1, No. 2, p. 3).

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**Supervisor:**

Prof. Dr.-Ing. Alois Knoll

**Advisor:**

M.Sc. Emec Ercelik

**Research project:**

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**Type:**

Master Thesis

**Research area:**

Object Detection, Autonomous Driving, Deep Learning

**Programming language:**

Python

**Required skills:**

Neural networks

**Language:**

English

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**For more information please contact us:**

Phone: +49.89.289.18130

E-Mail: [emec.ercelik@tum.de](mailto:emec.ercelik@tum.de)

Internet:

[www6.in.tum.de/en/people/emec-ercelik-msc/](http://www6.in.tum.de/en/people/emec-ercelik-msc/)