Karlsruhe Institute of Technology (KIT)
Institute of Measurement and Control
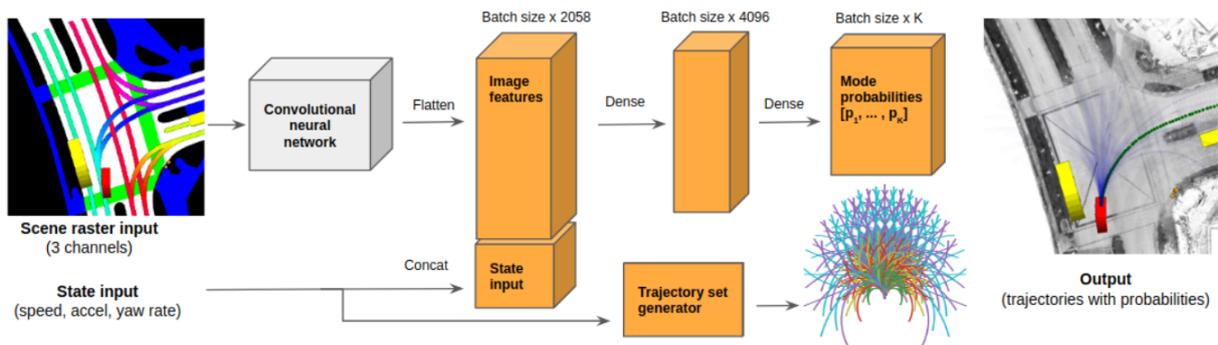Prof. Dr.-Ing. C. Stiller

Master Thesis (June 2020)

Extending CoverNet:
CNN-based method for Trajectory Prediction

This thesis aims to extend the existing CoverNet [1] approach with different road users and try different multi-layer maps. The project can be divided in 3 main parts:

1. **Make the existing CoverNet run:** CoverNet was designed to run in NuScenes dataset. The first step is to understand how the dataset is organized and make the prediction software run in the dataset [2-4].

2. **Extend motion models to other road participants:** Current state of CoverNet only has a motion model for cars. However, we would like to consider also bicycles and pedestrians. Therefore, the motion model should be extended for each road participant.

3. **Change how map information is encoded:** CoverNet [1] and Rules of the Road [5] have different representations of map information. As described in the prediction tutorial [4] and the map expansion tutorial [6], CoverNet supports different representation of the environment. The goal of this chapter is to evaluate the influence of the map encoding in the results. In order to see the influence of the map encoding, the original map encoding should be changed following the style described in Rules of the Road paper.

[1] CoverNet: Multimodal Behavior Prediction using Trajectory Sets (https://arxiv.org/pdf/1911.10298.pdf)
[2] NuScenes Dataset (https://github.com/nutonomy/nuscenes-devkit)
[3] NuScenes Tutorial (∼/nuscenes_basics_tutorial.ipynb)
[4] CoverNet tutorial (∼/prediction_tutorial.ipynb)
[5] Rules of the Road: (https://arxiv.org/pdf/1906.08945.pdf)
[6] NuScenes Map Tutorial (∼/map_expansion_tutorial.ipynb)
∼=https://github.com/nutonomy/nuscenes-devkit/blob/master/python-sdk/tutorials

This master thesis should be finished before the end of 2020. If this deadline fits to your plans and you are interested on trajectory prediction, please contact me.

Requirements: Knowledge of Python
                Knowledge of Machine Learning methods
                Independent, diligent and structured way of working
Keywords: Deep Learning
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