

MA/ IDP/ SA

Context-Aware Motion Prediction with VLMs

Motion prediction of surrounding objects is a key requirement for autonomous driving. Current state-of-the-art algorithms typically rely on past trajectories and map data to forecast future movements of vehicles, cyclists, and pedestrians. While this setup provides strong performance, it neglects critical contextual cues from the scene and objects — such as turning signals, brake lights, or dynamic interactions — which human drivers naturally incorporate into their decision-making. As a result, prediction models fail in such complex urban scenarios.

In this thesis, we aim to improve motion prediction performance by introducing context-awareness to the model. Specifically, vision-language models (VLMs) should be used to extract context attributes from image data, which are then input to our motion prediction algorithm. The idea is depicted in Figure 1. Possibility for publication in case of excellent work.

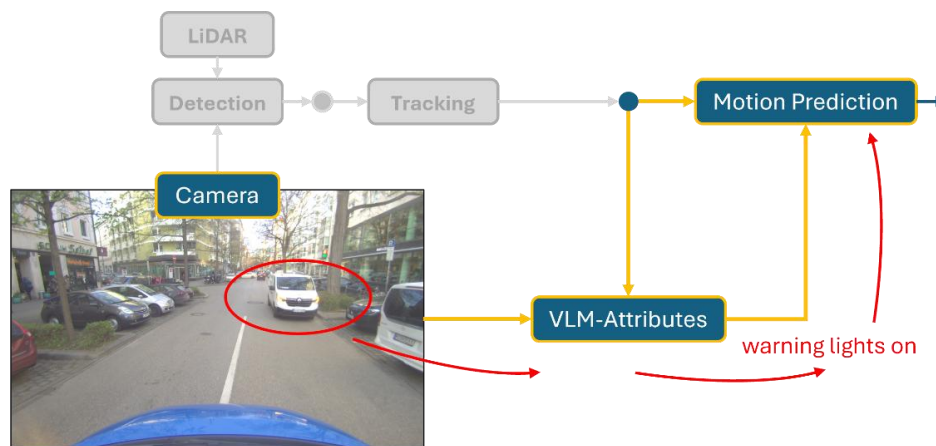


Figure 1: Project sketch

Work packages:

- Literature review: context-aware motion prediction and VLMs
- Design and implementation of the context-aware motion prediction model.
- In-depth evaluation, comparison and iterative improvement.

Requirements:

- Very good programming skills in Python.
- High personal motivation and independent working style.
- Very good language proficiency in German, English or French.

The thesis should clearly document the individual work steps. The candidate undertakes to complete the term paper independently and to indicate all scientific aids used. The submitted work remains the property of the chair as an examination document.

Prof. Dr.-Ing. M. Lienkamp

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