Learning vehicle dynamics using Neural Networks

Project Summary

The first main goal of this project is a systematic study of existing vehicle models, based on first principles from classical mechanics (single and dual track models, tire models, etc.). The second main goal is to learn the dynamics of a vehicle using a Neural Network (NN), and to compare the quality of this model with classic vehicle models.

Project Type

- BA Thesis (3-6 months)
- MA Thesis (6 months)
- Praktikum (3 months)

Required Qualifications

- Interest in mechanics / vehicle dynamics
- Prior experience with Neural Networks

Contact

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Detailed Description

Obtaining good models for the dynamics of vehicles is important for automated driving functions. However, modeling is difficult because several aspects are hard to obtain using first principles. Parameters like the total mass of the vehicle or the tire-road friction change dynamically or with every use of the car.

Hence it is of great interest to adapt a model (or some of its parameters) to measured driving data. In this project, this shall be accomplished based on a
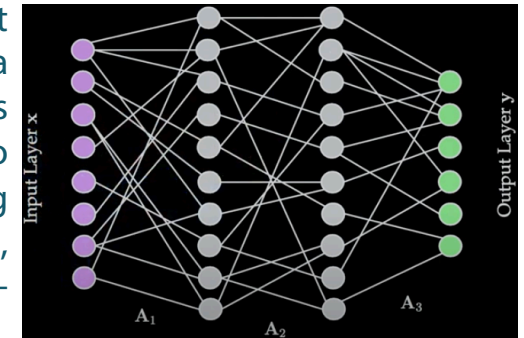
NN. The learned model shall be compared with classic vehicle models and and error quantification between the models needs to be developed.

References

- A. Szanto and S. Hajdu, "Vehicle Modelling and Simulation in Simulink," International Journal of Engineering and Management Sciences, 2019.