Master Thesis

TimeGAN model for car brake data-set augmentation

The Dynamics Group is happy to announce that we are currently looking for a highly motivated, independently working and ambitious student for a project/master thesis. Within a new research project we develop an AI-driven brake system control strategy for electrified vehicles. Using deep learning, we aim at predicting the friction sounds and brake particle emissions of real braking systems in collaboration with automotive manufacturers and suppliers, such as AUDI AG, VW AG and Hitachi Astemo.

This thesis encompasses the implementation of a **TimeGAN** model in order to model and synthesize **multivariate time series** data. Exclusive car brake data sets from our cooperation partners are available, encompassing pin-on-disc, dynamometer and real world EV-brake test runs. This relatively new generative model architecture for time-series data was developed to preserve temporal dynamics, in the sense that new

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sequences respect original relationships between variables across time. Thus TimeGANs are able to generate realistic times series data which helps us in reaching the end goal of finding a control strategy reducing the overall particle emissions.

Project milestones:

- Detailed literature survey on TimeGANs
- Implementation of a TimeGAN for one or several data-sets and integration into the project Python module
- Conduction of hyperparameter studies in order to identify important algorithm parameters for the generation of synthetic data
- Documentation, description and interpretation of the results, writing a thesis report

Your profile and skills:

- Demonstrated programming skills in Python, tensorflow, and related libraries
- Knowledge of neural networks, non-linear dynamics, system identification
- Structured way of thinking, working, and communicating

Interested? Please contact: Nathanael Winter (Nathanael.winter@tuhh.de)