



Abschlussvortrag Masterarbeit Narendra Bhikhabhai Bavishiya

„Optimizing Deep Learning Models for Automotive Fault Localization: A Reinforcement Learning-based Hyperparameter Tuning Framework“

One of the major challenges in the development of advanced functions-based automotive systems is the verification and validation process. The reason behind this is the high complexity of system architecture and the high level of interdependencies between functions. Among the different test phases, hardware-in-the-loop simulation has proven to be a reliable, realistic and safe test platform.

However, as a result of the real-time validation process of the system under test, a non-linear, multi-mode, dynamic system behaviour is captured. Conventional approaches to analyse the recordings, which contain huge amounts of data, are time-consuming, tedious and costly. Therefore, automated fault analysis can serve as an efficient means for overcoming the aforementioned challenges.

Recently, employing historical datasets, hybrid deep-learning architecture-based methods have shown remarkable success in the field of fault detection and classification. However, the larger the training data, the more complex the model and the higher the time required for development. Especially tuning the hyperparameters during model optimisation.

To address this problem, this study proposes a reinforcement learning-based optimisation technique to automatically tune the hyperparameters of the DL model based on the performance. In addition, the impact of the proposed technique on performance and feature learning compared to conventional methods is demonstrated. As a case study, a dataset of digital test drives, including healthy and faulty data, is used to develop the target model.

Betreuer der Arbeit: apl. Prof. Dr. Christoph Knieke, Dr. Stefan Wittek

Datum: Freitag, 15. August 2025, 15:00 Uhr

Ort: Online-Meeting über BBB

Link: <https://webconf.tu-clausthal.de/rooms/moh-ygp-whn/join>