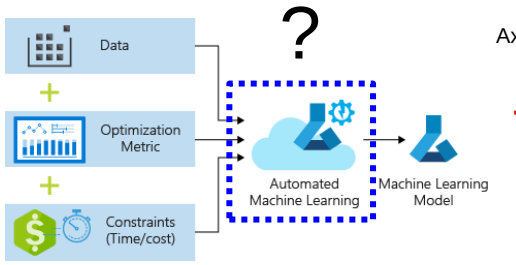
Masterarbeit zu vergeben

Exploration on Optimal Neural Network Architecture and Hyperparameter for Vibration-Based Wheel Flat Detection in a Downscaled Railway Test Rig

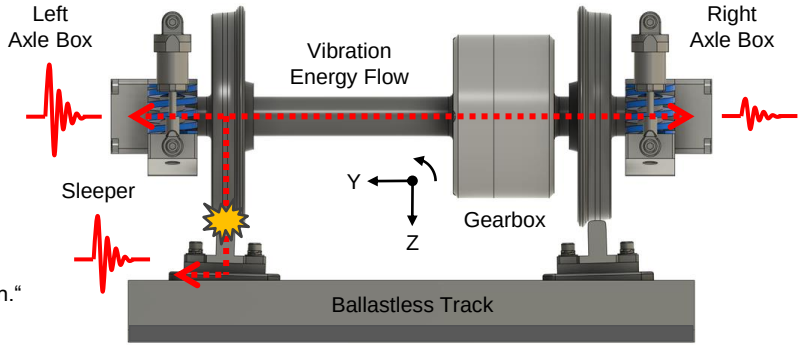
Erforschung über optimale neuronale Netzwerkarchitektur und Hyperparameter für schwingungsbasierte Flachstellenerkennung in einem verkleinerten Eisenbahnprüfstand

Various fault diagnosis methodologies have been developed to improve railway operations in terms of safety, efficiency, and cost. Recently, machine learning-based fault defection approaches have been gained prominence in academia and industry. As a multitude of neural network architectures evolving rapidly and becoming readily accessible as tools, the task of efficiently selecting the optimal structure for a given application purpose and dataset remains challenging. In response to demand, Automated Machine Learning (AutoML) has emerged and is actively researched, with its progress openly shared as open-source contributions.

This study aims to detect wheel flats using simple machine learning-based algorithms and onboard or wayside vibration signals measured from a downscaled railway test rig. The main task is to automate the process of exploring which neural network structures, as well as optimizing their hyperparameters, are suitable for a given dataset while balancing accuracy and computational load. After the comparative analysis, a selected neural network should be lightweight and simple enough to run on a low-cost Linux-based embedded system.



"Train a Regression Model with AutoML and Python."
Source: Microsoft



Source: CDFEB e.V.

Knowledge of lectures with the following keywords is advantageous:
„Vehicle Dynamics“, „Signal Processing“, „Machine Learning“

If you are interested, please contact:
Euiyoul Kim, M.Sc.
Institute of Railway and Transportation Engineering, Pfaffenwaldring 7, 70569 Stuttgart
Email: euiyoul.kim@cdfeb.de