Bachelor/Master Thesis

Tyre-Road Noise Prediction Using Multi-Sensor Data: Exploring ML, Neural Networks, and CNNs

Background:

Road traffic noise, particularly generated by the interaction between tyres and road surfaces, significantly impacts public quality of life. Accurately predicting tyre-road noise is essential for optimizing tyre design, improving traffic environments, and implementing noise control measures. However, traditional physical and numerical models have limitations in accuracy and adaptability due to the complexity of the noise generation process.

Recent advances in multi-sensor data acquisition, combined with machine learning and deep learning methods, offer new opportunities to address this issue. As part of the "Tyre-Road Noise" research project, we will leverage large datasets from various sensors and apply advanced machine learning techniques to identify key factors influencing noise generation. This study will focus on using machine learning (ML), artificial neural networks (ANN), convolutional neural networks (CNN), and other technologies to improve noise prediction accuracy, providing valuable support for tyre design optimization and noise control measures.

Your Tasks:

- Conduct a literature review on tyre-road noise prediction techniques to support model development.
- Process and analyze multi-sensor data to extract key features.
- Develop and optimize noise prediction models using machine learning (ML), artificial neural networks (ANN), convolutional neural networks (CNN), and other methods.
- Tune model parameters, perform sensitivity analysis, and evaluate the model's accuracy and reliability.

Your Profile:

- Strong knowledge of machine learning, data analysis, and time-series processing.
- Experience in multi-sensor data processing and feature extraction.
- Proficiency in Python and familiarity with deep learning frameworks, such as PyTorch and TensorFlow.
- Ability to work independently and tackle complex, open-ended research problems.

Start date: Immediately   **Duration: As per the applicable examination regulations**

If you are interested, please send your application documents by email, or feel free to visit me in person at Room 5A-04.2 (Building 05.20) for further discussion.

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