Lehrstuhl für Nachhaltige Mobile Antriebssysteme
School of Engineering and Design
Technische Universität München

Prof. Dr. Malte Jaensch

Semester's / Master's Thesis / Research Internship

Developing Large Language Model Search Agent for Test Data using Reinforcement Learning

Description of the Topic

In testing of electrical drives emerge large amount of data. The value of those data other than measurements are always underestimated and overlooked in the mountain of unstructured data. Retrieval-Augmented Generation (RAG) powered by Large Language Models (LLMs) arises as a solution for accessing static knowledge sources with the capability in searching for and integrating data chunks valuable for joint analysis. Nevertheless, the classical RAG framework is suffering from missing important data that are distributed in multiple documents.

To improve the search accuracy in PDF files and measurement data, the RAG needs to be implemented in an agentic framework. The LLM is supposed to be trained to decide the following search actions and the stop of search round. Different Reinforcement Learning optimization policies are supposed to be applied for training of the LLM. The training process will be conducted on open-sourced dataset and the validation of the agentic RAG with the tuned LLM is supposed to be performed on the own specific test dataset.

Tasks

- Literature research and adaptation of RAG projects and datasets
- Design and implementation of reward functions
- Training of the LLM
- Experiment design and validation

Qualifications

- Experience with Python
- Basic knowledge of Deep Learning / Reinforcement Learning
- Experience with Reinforcement Learning is welcome
- Curiosity, willingness to learn and a good general technical understanding

Period of the Topic / Others

- 6 Months, start immediately
- The tasks can be divided and worked out as research internship
- Further connection to a master's thesis is possible

Contact

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We look forward to receiving your application, including your CV and transcript of records.