Bachelor's/Semester/Master's Thesis, Guided Research, Interdisciplinary Project (IDP)

Explainable AI for automotive Software Generation

Keywords: Artificial Intelligence – Large Language Models – Automotive

Background

As part of the research project CeCaS, a group has come up to build a new System Architecture for future vehicles with a focus on autonomous driving. The development of new autonomous vehicles requires a rethinking of the systems and software engineering to keep up with the growing complexity and the Implementation of the latest technologies such as AI-based functions in automotive engineering. For this purpose, our developed software is first integrated on an HPC system and then tested on real vehicles.

Description

A key challenge in developing automotive software is the increasing complexity of the automotive industry. Due to the enormous variety of requirements, such as safety requirements like ISO 26262, tools such as automated code generation will have to be used in the future. The emergence of large language models provides an opportunity to implement this theory. General-purpose models such as GPT4 or Llama 3 are not yet able to implement the requirements reliable. As a result, there are still many open research questions before these approaches can be used in industry. These include, but are not limited to:

- Adapting Explainable AI concepts for automated software generation
- Applying large language models to automotive software development, considering safety standards
- **Your ideas:** If you have any other ideas for research in this area you are welcome to suggest your own topic.

Your Tasks

- Familiarization with automated code generation and automotive safety requirements
- Research the problem (study state-of-the-art explainable AI concepts)
- Development of a novel approach
- Realization of the approach at hardware and software level
- Integration of your approach into our system

Requirements

- You are currently studying Computer Science, Robotics, automotive engineering, …
- High motivation and ability to work independently on your research topic as well as contributing to our teamwork.
- Interest in AI and Large Language Models
- High motivation in the fields of software development, automotive, large language models
- Basic knowledge in programming languages: Python, …
- First experience with PyTorch
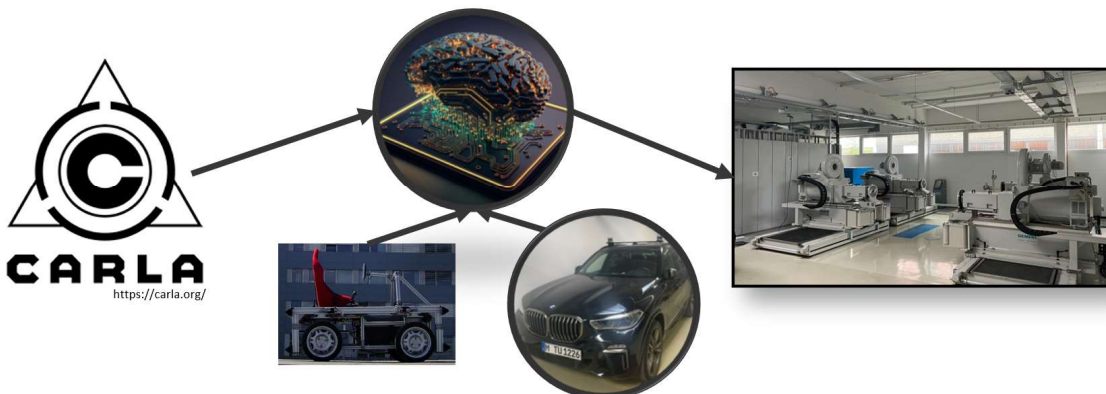
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