

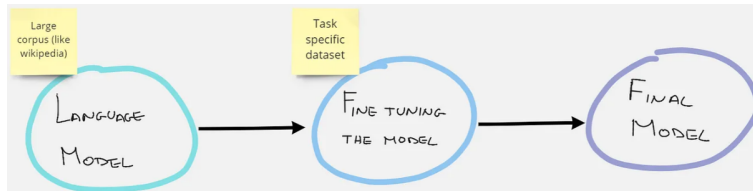
From Natural language to Formal Automotive Architectural Requirements and Vice Versa

Description

In the automotive domain, the development of complex systems and software demands a comprehensive and unambiguous specification of architectural requirements. With requirements expressed in formal languages, automated checking and design space exploration technique can be leveraged to accelerate automotive design process [2]. However, stakeholders often communicate their intentions and expectations using natural language, which can be ambiguous and subject to interpretation. This project aims at establishing a bidirectional bridge between natural language expressions and formal architectural requirements within the automotive industry.

Tasks

Your main task is to apply NLP technology to develop the transformation from NL to formal requirements and vice versa. You will select a suitable LLM for NLP processing. In contrast to traditional translation jobs, this unique transformation process requires the incorporation of automotive system information, such as UML models, as background knowledge for individual NLP tasks [1]. Your responsibility includes designing a robust procedure to read and integrate this background information into the NLP-based transformation pipeline. Furthermore, you will gather or design an automotive-related dataset for fine-tuning.



References

- [1] Seif Abukhalaf, Mohammad Hamdaqa, and Foutse Khomh. On codex prompt engineering for ocl generation: An empirical study. 2023.
- [2] Fengjunjie Pan, Jianjie Lin, Markus Rickert, and Alois Knoll. Resource allocation in software-defined vehicles: ILP model formulation and solver evaluation. In *Proceedings of the International Conference on Intelligent Transportation Systems (ITSC)*, pages 2577–2584, 2022.

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Advisor:

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Research project:

MANNHEIM-CeCaS

Type:

MA

Research area:

Natural Language Processing

Programming language:

Python

Required skills:

Experience with NLP, GPU, fine-tuning

Language:

English/German

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