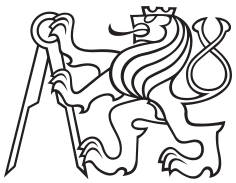
Bachelor Project



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F3

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Methods of Evolutionary Optimization of Prompts for Large Language Models

Enhancing task-solving capabilities of general models by prepending an optimal prefix

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Field of study: Artificial Intelligence
Subfield: Natural Language Processing
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Acknowledgements

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Declaration

Prohlašuji, že jsem předloženou práci vypracoval samostatně, a že jsem uvedl veškerou použitou literaturu.

V Praze, 10. May 2025

Abstract

TODO

Keywords: language model, evolutionary algorithm

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Abstrakt

TODO

Klíčová slova: jazykový model, evoluční algoritmus

Překlad názvu: Metody evoluční optimalizace vstupních řetězců pro velké jazykové modely — Vylepšení řešících schopností obecných modelů připojením optimálního prefixu

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Introduction

This is all very important

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Literature Review

2.1 Large Language Models

Since the Transformer architecture Cite attention is all you need brought us the first GPT and BERT models, LLMs have changed the NLP field. Now there are many powerful proprietary (OpenAI, Anthropic) and open-source (Llama, Qwen) models. cite

2.1.1 Word2Vec, tokenization

abcd

2.1.2 Transformer architecture

abcd

2.2 Prompts

Prompts are instructions we give to the LLM to get the output we want. It has been shown experimentally that small changes in prompt design, like simple paraphrasing, can influence the accuracy of the model's output. cite Naturally this inspired research into optimizing LLM performance by changing its prompts.

2.2.1 Prompting techniques

In solving challenging reasoning tasks, it is beneficial to get the model to show its reasoning steps. As LLMs just predict the next token, building on its previous thoughts improves performance on tasks like the GSM8k benchmark. This technique, called Chain-of-Thought has been built upon which resulted in methods such as Tree-of-Thought, ReAct and Reflexion. cite prompt survey

2.2.2 Prompt optimization methods

There has been work of optimizing soft and discrete prompts. As proprietary models usually do not allow access to its internal states, soft prompt optimization is not and option there. Several search and optimization methods have been employed in this task, like beam search and evolutionary algorithms. **sota rewrite here**

Appendix A

Bibliography