Proposal 1 - Advanced Topics in Software Engineering

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January 2024

1 Introduction

I am keen to investigate strategies for reducing hallucinations and enhancing reasoning in large language models (LLMs) in a resource-efficient manner. This interest is driven by my project - an educational tool aimed at teaching math to primary school students. The current limitations of LLMs, like GPT 3.5 Turbo, in accurately performing basic arithmetic, could render my application ineffective.

My approach will involve three main strategies: fine-tuning existing models, employing prompt engineering, and integrating LLMs with other tools. I plan to extensively review academic literature on these topics and devise a pipeline that balances resource efficiency with effective performance in arithmetic reasoning tasks.

2 Reading List

Paper List:

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9. Liu, Z., Wang, J., Dao, T., Zhou, T., Yuan, B., Song, Z., Shrivastava, A., Zhang, C., Tian, Y., Re, C. & Chen, B.. (2023). Deja Vu: Contextual Sparsity for Efficient LLMs at Inference Time. ¡i¿Proceedings of the 40th International Conference on Machine Learning¡/i¿, in ¡i¿Proceedings of Machine Learning Research¡/i¿ 202:22137-22176 Available from https://proceedings.mlr.press/v202/liu23am.html.

10. Xu, D., Yin, W., Jin, X., Zhang, Y., Wei, S., Xu, M., & Liu, X. (2023). LLMCad: Fast and Scalable On-device Large Language Model Inference. arXiv. Retrieved from https://arxiv.org/abs/2309.04255