Progress Project Report

Members
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Date
July 28, 2024
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1 Introduction

This report serves to document the ongoing progress and developments of the Chatbot project designed specifically for the Computer Science (CS) students at VinUniversity. The primary aim of this report is to provide a comprehensive update to stakeholders on the current status of the project, aligning with the final goals and demonstrating adherence to the outlined academic and practical objectives.

2 Analyzing Problem

Our project faces two primary challenges. The first challenge involves the implementing of large language models (LLMs) for powering the chatbot. This requires the fine-tuning of the model with a specialized dataset that encapsulates expert knowledge in Computer Science to ensure the chatbot's responses are accurate and contextually relevant. The second challenge concerns the development of a user interface (UI) that is intuitive and user-friendly, facilitating seamless interaction between the students and the chatbot.

3 Solution Design and Implementation

Our implementation strategy encompasses several key components to address the challenges identified. We employ the `LlamaIndex` configurations as a foundational bridge that facilitates the integration of our fine-tuning dataset with the selected language models.

- **Language Model Configuration:** By default, our system utilizes OpenAI's `GPT-3.5 Turbo` for text generation and `Text-Embedding-Ada-002` for fetching and embedding tasks. For those preferring alternatives to OpenAI, our system is capable of switching to `LlamaCPP` paired with the `Llama2-Chat-13B` model for text generation, and `BAAI/bge-small-en` for fetching and embedding functions.
- **Dataset for Fine-Tuning:** Our dataset, which is meticulously hand-designed, serves as the basis for fine-tuning the language models. This ensures that the chatbot is equipped with specialized knowledge pertinent to Computer Science.
- **User Interface Development:** The user interface of the chatbot is developed using `Streamlit`. This choice was made to ensure that the interface is not only intuitive and user-friendly but also capable of supporting the dynamic requirements of interactive chatbot functionalities.

The implementation in details can be found here [https://github.com/bang274/Vinuni_CS_chatbot]

4 Teamwork

- Truong Gia Bao (Project Manager - Software Engineer):
  - Led the project planning and coordination efforts.
  - Oversaw the overall project timeline and ensured timely delivery.
  - Managed the team and allocated tasks to team members.
- Tran Khanh Bang (Software Engineer):
  - Contributed to project development by implementing features and fixing bugs.

- Collaborated with the team to ensure successful app delivery.
- Demonstrated technical expertise in connecting the UI components.

5 Improvements

In the forthcoming phases of our project, we aim to undertake several strategic enhancements to augment the functionality and efficiency of our chatbot. These improvements are designed to refine the chatbot's performance and user experience.

- **Integration of a More Comprehensive Dataset:** We plan to expand our current dataset by integrating a larger and more diverse dataset that includes various formats such as PDFs, pictures,.etc. This enhancement will replace the exclusively hand-designed dataset currently in use, thereby enriching the training material available for fine-tuning the language models.
- **Evaluation and Selection of Optimal Models:** We intend to experiment with multiple language models to ascertain the most suitable one in terms of size effectiveness and coherence. This step will ensure that the chosen model aligns perfectly with the operational needs and efficiency requirements of the chatbot.
- **Deployment of a Dedicated Server and Website Publication:** To make the chatbot easily accessible to all VinUni students, we will host it on a dedicated server and publish it as a website. This move will facilitate wider usage and provide a stable platform for continuous interaction with the chatbot.

6 Conclusion

In conclusion, this project represents a significant step forward in enhancing the educational resources available to VinUni students through the deployment of a sophisticated chatbot. By leveraging advanced language models and a meticulously designed user interface, the chatbot is positioned to provide timely and contextually relevant assistance, thus enriching the learning environment.

7 Appendices

1. NanoNets. (n.d.). *LlamaIndex: An Open Source Framework*. Retrieved from https://nanonets.com/blog/llamaindex/
2. LlamaIndex Documentation. (n.d.). *LlamaIndex Official Documentation*. Retrieved from https://docs.llamaindex.ai/en/stable/
3. Karan, N. (n.d.). *LlamaIndex Guide*. GitHub repository. Retrieved from https://github.com/karan-nanonets/llamaindex-guide
4. Streamlit. (n.d.). *Streamlit Official Website*. Retrieved from https://streamlit.io/