Mohamed Nuskhan Mohamed Niyas
Progress Report Number: 2

Work Date/Hours Logs

Date	Number of Hours	Description of Work Done
February 25, 2025	10	Tested and fine-tuned DeepSeek R1 for sentiment analysis. Faced convergence issues, explored hyperparameter tuning.
March 02, 2025	6	Evaluated FLAN-T5 and Phi-3 models for sentiment classification and summarization. Documented performance comparisons.
March 05, 2025	8	Ran experiments with Mistral 7B for chatbot interactions. Integrated basic conversational logic and tested response quality.
March 10, 2025	3.5	Researched and implemented LangChain for chatbot framework. Set up initial pipeline with sample queries.
March 13, 2025	4	Integrated OpenAI's GPT-4o-mini with LangChain. Optimized prompt engineering for sentiment analysis and predictive analytics.
March 17, 2025	5	Developed query classification logic to detect sentiment, analytics, and predictive queries within Asklytics.
March 22, 2025	3.5	Refined response generation pipeline using OpenAI's API. Improved accuracy of sentiment classification.
March 25, 2025	4	Conducted end-to-end testing of chatbot responses. Debugged inconsistencies in analytical insights.
March 28, 2025	3	Set up data preprocessing workflows for structured query responses. Ensured dataset compatibility with GPT-4o-mini.
April 2, 2025	3.5	Implemented interactive visualization for chatbot analytics. Used LangChain tools to generate insights dynamically.
April 5, 2025	4	Tested Asklytics on multiple datasets. Evaluated chatbot usability and refined model prompts for better interpretability.
April 10, 2025	3	Finalized chatbot integration in Streamlit. Conducted UI/UX testing to ensure smooth user interaction.

Description of Work Done

In this phase of the Asklytics project, I focused on refining the chatbot's AI capabilities by testing multiple models for sentiment analysis, chatbot interaction, and predictive analytics. The key areas of improvement included:

- **Model Evaluation:** Compared DeepSeek R1, FLAN-T5, Phi-3, Mistral 7B, and OpenAI GPT-4o-mini. Ultimately, GPT-4o-mini was selected due to its superior accuracy and efficiency.
- **LangChain Integration:** Implemented LangChain to structure queries effectively, allowing for intelligent sentiment classification and trend prediction.
- **Optimization of Response Generation:** Fine-tuned prompt engineering to improve chatbot responses, ensuring clarity and relevance.
- **Testing and Debugging:** Conducted extensive tests on different datasets to validate the chatbot's ability to provide actionable insights.
- **Deployment Preparation:** Developed an interactive UI in Streamlit to enable seamless user interaction with Asklytics.

Challenges and Solutions

1. **DeepSeek R1 Installation Issues** – Encountered module recognition errors due to limited online support.
   Solution: Shifted focus to more stable alternatives like GPT-4o-mini.
2. **Computational Constraints** – Training large models required extensive GPU resources.
   Solution: Used OpenAI's API-based model to minimize dependency on local hardware.
3. **Fine-tuning Complexity** – Customizing models for sentiment analysis required significant dataset preparation.
   Solution: Focused on optimizing LangChain's prompt engineering instead of extensive fine-tuning.

Next Steps (Before April 15, 2025)

Finalize Asklytics Streamlit Deployment – Ensure chatbot usability and performance stability.
Enhance Model Responses – Refine sentiment classification and predictive insights accuracy.
Optimize Query Interpretation – Improve LangChain's ability to detect diverse user questions.
Comprehensive Testing – Validate chatbot performance on real-world datasets before deployment.

Conclusion

The second phase of Asklytics involved extensive model experimentation, testing various architectures before selecting GPT-4o-mini with LangChain. The chatbot is now optimized for sentiment analysis, predictive analytics, and interactive data exploration. Moving forward, the focus will be on fine-tuning its accuracy, user experience, and real-world deployment.