Internship Report: Sentiment-Aware Chatbot

Introduction

This project focuses on developing an advanced Sentiment-Aware Chatbot with natural language understanding and sentiment analysis capabilities. The chatbot integrates pre-trained AI models for sentiment classification and response generation while maintaining an interactive and user-friendly interface. The goal is to create a chatbot that dynamically adapts its responses based on user sentiment, enhancing user experience through contextual awareness.

Background

The Sentiment-Aware Chatbot combines sentiment analysis with generative AI to provide personalized and context-aware responses. The project utilizes CardiffNLP's RoBERTa-based sentiment analysis model for detecting sentiment and Groq's Mixtral-8x7b for response generation. The interactive interface is built using Streamlit, offering users a seamless chat experience with real-time sentiment detection.

By analyzing user input and understanding its sentiment (Positive, Neutral, or Negative), the chatbot generates tailored responses with a customized introductory tone, ensuring empathetic and appropriate communication.

Learning Objectives

1. Develop a chatbot capable of understanding user sentiment and generating appropriate responses.
2. Integrate sentiment analysis and language model generation in a single pipeline.
3. Learn to build interactive user interfaces using Streamlit.
4. Enhance skills in using pre-trained models like CardiffNLP RoBERTa and APIs like Groq LLM.

5. Manage session-based chat histories and implement memory for user interactions.

Activities and Tasks

1. Streamlit Interface Design:

Designed an interactive chat interface using Streamlit for seamless user interaction.

2. Sentiment Analysis Integration:

Integrated CardiffNLP's Twitter-RoBERTa model to analyze the sentiment of user input in real-time and classify it as Positive, Neutral, or Negative.

3. Dynamic Response Generation:

Used Groq's Mixtral-8x7b model for generating sentiment-aware responses. The chatbot dynamically incorporates recent chat history and sentiment analysis into its prompt for context-aware replies.

4. Session Management:

Implemented session states to maintain a chat history of up to 10 recent messages, allowing continuity in conversations.

5. Sentiment-Aware Templates:

Created sentiment-based introductory phrases to enhance the chatbot's empathy and contextual engagement.

6. Error Handling:

Ensured robust error handling for LLM responses and sentiment model predictions, improving

chatbot reliability.

Challenges and Solutions

Challenge 1: Dynamic Integration of Sentiment Analysis and Chat Responses

Solution: Combined sentiment detection results as contextual inputs for Groq LLM prompt generation, ensuring coherent and empathetic responses.

Challenge 2: Managing Chat History Efficiently

Solution: Implemented Streamlit session states to store and display the last 10 messages, optimizing performance and memory.

Challenge 3: Sentiment Detection Confidence and Accuracy

Solution: Fine-tuned the confidence thresholds for displaying sentiment scores to improve transparency and reliability for end-users.

Outcomes and Impact

The Sentiment-Aware Chatbot successfully demonstrates the integration of advanced sentiment analysis and generative language models within an interactive application. The chatbot dynamically adapts its tone and responses based on user sentiment, improving user satisfaction and engagement. Key achievements include:

- Accurate Sentiment Detection: Real-time sentiment analysis of user inputs.
- Contextual Responses: Tailored chatbot replies using Groq's LLM with sentiment-aware prompts.
- User-Friendly Interface: A clean, interactive chat platform using Streamlit.

This project serves as a prototype for future AI applications requiring empathy-driven and contextual interactions, making it suitable for customer service, mental health assistance, and interactive knowledge systems.

Conclusion

The Sentiment-Aware Chatbot project highlights the importance of combining AI-driven sentiment analysis and context-aware response generation to create user-centric applications. By integrating advanced models with an intuitive interface, the project showcases the potential of empathy-driven AI in enhancing human-machine interactions.

This work lays a strong foundation for further improvements, such as multi-lingual support, real-time deployment, and expanded conversation history management.