**Project Summary**

This project focuses on building a specialized chatbot for specific subjects using Transformer architecture, utilizing the Topical Chat dataset. It aims to improve user engagement and knowledge within a dedicated domain through preprocessing, training, and evaluation stages.

**Project Title: Design and Development of Topical Chatbot**

**Abstract**

In this project, I have successfully designed and developed a topical chatbot using a Transformer-based encoder-decoder architecture. The chatbot is specialized in engaging in conversations on a specific topic, and it has been trained and evaluated using the Topical Chat dataset from Amazon. My primary objectives included gaining a deep understanding of the Transformer architecture, utilizing popular deep learning frameworks (TensorFlow/Pytorch/Huggingface), and assessing the chatbot's performance through a range of metrics.

**Project Details**

**1. Overview of the Problem and Potential Application Areas**

- My project addressed the creation of a topical chatbot tailored to specific subjects, such as medicine or finance.

- The potential applications of this chatbot encompass providing accurate and insightful information within a specialized domain, thereby enhancing user engagement and knowledge in that particular subject.

**2. Literature Review**

- For a comprehensive understanding of similar chatbot projects, I incorporated insights from four key articles published between 2022-2023. These articles were selected to offer a comprehensive understanding of methodologies, data utilization, reported accuracy, as well as strengths and weaknesses.

**3. Model Used**

- I employed a Transformer-based encoder-decoder architecture as the foundational model.

- A visual diagram of the model's architecture was provided, along with a detailed explanation of its core components.

- I also discussed the hyperparameter tuning process, highlighting any adjustments made to enhance model performance.

**4. Dataset Used**

- The project utilized the Topical Chat dataset, consisting of over 8000 conversations and 184,000 messages.

- The dataset was divided into training, validation, and test sets to facilitate model training and evaluation.

**5. Results and Evaluations**

- I presented a comprehensive set of objective metrics, including response accuracy, precision, recall, F1 score, user satisfaction, engagement metrics, completion rate, fallback rate, churn rate, human handoff rate, sentiment analysis, and task completion rate.

- My analysis included discussions on what constitutes good and bad results, and I provided example conversations to illustrate the chatbot's performance.

**6. Further Improvement**

- I offered suggestions for future enhancements, such as fine-tuning the model, collecting more domain-specific data, and implementing mechanisms for gathering and incorporating user feedback.

**In conclusion**, this project has allowed me to successfully deliver a functional topical chatbot, demonstrating its ability to engage in specialized conversations and provide valuable information within its designated domain. The project has also laid the groundwork for potential improvements and refinements to further enhance chatbot performance.

*The End*