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

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**Project Summary**

With the help of the Topical Chat dataset, this project focuses on employing Transformer architecture to create specialized chatbots for particular topics. Through preprocessing, training, and evaluation phases, it seeks to increase user involvement and expertise within a focused subject.

**Abstract**

Using a Transformer-based encoder-decoder architecture, I have successfully built and created a topical chatbot for this project. The Topical Chat dataset from Amazon was used to train and assess the chatbot, which is adept at conversing about a certain subject. My main goals were to thoroughly grasp the Transformer architecture, make use of well-known deep learning frameworks (TensorFlow, Pytorch, and Huggingface), and evaluate the chatbot's performance using a variety of metrics..

**Project Details**

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

My project focused on building a thematic chatbot that was specialized to particular topics, like finance or medicine. The potential uses of this chatbot include delivering precise and informative information within a specialized domain, improving user engagement and subject understanding.

**2. Literature Review**

- To have a thorough grasp of comparable chatbot initiatives, I incorporated information from four important publications that were released between 2022 and 2023. The purpose of choosing these publications was to provide a thorough overview of methodology, data use, reported accuracy, and strengths and shortcomings..

**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**, My ability to successfully produce a relevant chatbot that can engage in specialized conversations and provide useful information within its target domain is made possible by this project. The initiative has also created the foundation for future tweaks and changes that could further improve chatbot functionality.

*The End*