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

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Code file link: https://github.com/meahmadkarim/Topical\_Chatbot/blob/main/Topical\_Chatbot\_ipynb.ipynb

**Project Summary**

This project focuses on using Transformer architecture to build specialized chatbots for specific themes using the Topical Chat dataset. It aims to improve user involvement and competence within a targeted topic through the preprocessing, training, and evaluation phases.

**Abstract**

For this project, I have successfully designed and created a topical chatbot using a Transformer-based encoder-decoder architecture. The chatbot was trained and evaluated using the Topical Chat dataset from Amazon, which is skilled at speaking on a certain topic. My main objectives were to fully comprehend the Transformer architecture, leverage well-known deep learning frameworks (TensorFlow, Pytorch, and Huggingface), and assess the chatbot's effectiveness using a range of metrics.

**Project Details**

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

Building a chatbot with a specific concentration on a theme, like finance or medicine, was the goal of my project. This chatbot's potential applications include enhancing user engagement and subject learning, as well as providing precise and educational information within a specific domain.

**2. Literature Review**

- I incorporated data from four significant articles that were published between 2022 and 2023 to obtain a complete understanding of comparable chatbot initiatives. These papers were chosen in order to give a comprehensive review of technique, data utilization, reported accuracy, and 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 enables me to successfully develop a relevant chatbot that can interact in specialized discussions and deliver meaningful information inside its target domain. The program has also laid the groundwork for upcoming adjustments and modifications that may further enhance chatbot functioning.

*The End*