Landlord Tenant Board ChatBot using FAISS-RAG application

Group 23: Debanjan Saha

Description

The Landlord Tenant Board of Ontario is faced with the problem of huge number of requests from homeowners as well as tenants regarding various issues related to housing in Ontario. This project aims to develop a chatbot to assist users with housing-related queries in Ontario using Retrieval Augmented Generation (RAG). The chatbot will provide timely and accurate responses by leveraging a combination of document retrieval, natural language understanding, and generation techniques.

Dataset

- I will scrape the entire data from the Ontario Tribunals Landlord Tenant Board (LTB) website, ensuring that it covers a wide range of housing-related topics.
- The data would contain labels such as context and text for each rule or regulation, which are necessary for indexing and response generation.
- The domain of the data is highly relevant to this project, as it directly addresses the housing crisis problems in Ontario and the rules and regulations governing housing in Ontario.

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Project Plan:

1. **Data Acquisition and Preprocessing:**
    - Scraping data from the LTB website, ensuring data integrity and cleanliness.
    - Preprocessing the data to extract relevant information such as context and text for each rule or regulation.
2. **Indexing with FAISS:**
    - Indexing the preprocessed data using FAISS to enable efficient retrieval of relevant documents.
3. **Augmentation of User Queries:**
    - Generation of meta-data such as context and augmenting it to user queries to enhance relevance and contextuality.
4. **RAG Pipeline Implementation:**
    - Implementing the RAG pipeline, incorporating a retriever module (using FAISS for efficient document retrieval), a reader module, and a generator module.
    - Fine-tuning language models (like LLaMA v2, GPT) for response generation using augmented queries.
5. **Evaluation and Optimization:**
    - Evaluation of the performance of the chatbot using appropriate metrics.
    - Optimization of the data indexing using Voronoi cells as well as the models and parameters based on the evaluation results to improve accuracy and efficiency.

Tools and Models:

- Tools: Python, PyTorch, Hugging Face Transformers, FAISS
- Models: Language Models (e.g., LLaMA, GPT), FAISS for indexing

- Implementation: I will implement the RAG pipeline and data collection and preprocessing myself, while utilizing pre-trained models from libraries like Hugging Face Transformers for language understanding and generation.

Timeline/Working Plan:

- **Week 5-7:** Data acquisition and preprocessing
- **Week 8:** Indexing with FAISS
- **Week 9:** Augmentation of user queries
- **Week 10-11:** RAG pipeline implementation
- **Week 12:** Evaluation and optimization
- **Week 13:** Deployment and final testing

Responsibilities:

This project is being undertaken by Debanjan Saha as an Individual Contribution and is solely responsible for the overall project execution including data acquisition, preprocessing, and RAG pipeline implementation.

Visualizations/Results:

- Visualization of performance metrics such as accuracy, response time, and user satisfaction.
- Sample interactions with the chatbot to demonstrate its capabilities.

By Week 13:

- Completed RAG pipeline with FAISS integration for efficient document retrieval.
- Optimized models and parameters for improved performance.
- Deployed chatbot for user testing and feedback collection.