Advanced Generative AI

Capstone Problem Statement

Enabling AI-Powered Business Intelligence for Organizations

Problem scenario:

In today's data-centric business environment, organizations across various industries accumulate vast amounts of information. However, many struggle to transform this data into actionable insights, especially small to medium-sized enterprises that lack the resources for advanced business intelligence tools.

Recent advancements in artificial intelligence, especially in Large Language Models (LLMs) and Retrieval-Augmented Generation (RAG) systems, offer immense potential for data analysis and insight generation.

Project objective:

InsightForge, an innovative Business Intelligence Assistant, aims to address these challenges by developing an automated AI model using advanced technologies, including LangChain, Retrieval-Augmented Generation (RAG), and Large Language Models (LLMs).

This model aims to:

- **Analyze business data:** Perform comprehensive analysis to identify key trends and patterns
- **Generate insights and recommendations:** Utilize natural language processing to deliver actionable business insights
- **Visualize data insights:** Present insights through visualizations for easier interpretation

Steps to follow:

The project is divided into the following steps, each focusing on a critical aspect of the system:

Part 1: AI-Powered Business Intelligence Assistant

1. Data preparation

- Focus on analyzing and extracting insights from pre-prepared data, rather than on data cleaning

2. Knowledge base creation

- Load and explore the dataset
- Organize the data into a structured format suitable for retrieval and analysis

3. LLM application development

- **Advanced data summary:** Analyze the data to identify key metrics and trends, including:

1. Sales performance by time period
2. Product and regional analysis
3. Customer segmentation by demographics
4. Statistical measures (e.g., median, standard deviation)

- **Integration with RAG System:**

1. Utilize pandas for data processing
2. Develop a custom retriever to extract relevant statistics
3. Implement prompt engineering to guide the LLM in generating accurate responses

4. Chain prompts

- Design prompts to ensure the LLM produces coherent and contextually relevant responses

5. RAG system setup

- Implement the RAG system to enhance the LLM's ability to generate detailed and accurate responses based on retrieved data

6. Memory integration

- Integrate memory systems to enable the model to retain and use contextual information from previous interactions, thereby improving the relevance of responses

Part 2: LLMOps (Model Evaluation, Monitoring, and User Interface Creation Using Streamlit)

7. External tool integration

- **Model evaluation:** Apply QAEvalChain to assess the model's performance and accuracy
- **Data visualization:** Create various plots and visualizations to present insights, including:

1. Sales trends over time
2. Product performance comparisons
3. Regional analysis
4. Customer demographics and segmentation

- **Streamlit UI:** Develop an intuitive user interface using Streamlit, allowing users to interact with the AI assistant and access visualizations and insights