**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