**GenAI practitioner Coding Assignment: Design of Multimodal grounded RAG**

**Task Definition:**

Our client, a technology firm, intends to develop an internal assistant designed to manage complex inquiries pertaining to their various policy documents. These documents may include tables, graphs, and images. The assistant is expected to operate in a manner akin to systems that parse and respond based on specific policy documents. The task involves creating a Retrieval-Augmented Generation (RAG) model. This model must efficiently retrieve and apply relevant policy data to deliver accurate and contextually appropriate responses. A critical performance metric for the system is its reliability; providing no response is more acceptable than offering an incorrect one, as the latter could mislead the user regarding their query.

**Initial Project Phase and Data Considerations:**

Given that we are in the initial phase of this imaginary project, you have received an initial dataset comprising examples of the company's policies. However, to enhance your analysis and the eventual utility of the RAG model, you should also consider what additional data might be beneficial.

**Assignment Details:**

**Dataset**: You will be provided with a dataset containing exemplary policy documents. These documents represent the type of content the internal assistant will need to understand and retrieve.

**Task Requirements:**

1. **Framework Development**: Construct a comprehensive roadmap to guide the development of the Retrieval-Augmented Generation (RAG) model. This roadmap should clearly indicate each phase of development, from exploratory data analysis (EDA) to high-level design and technology stack selection. Specify what additional data could enhance your analysis and detail the specific concepts and tools to be employed at each stage, with justifications for each decision. The framework should outline various methodologies for constructing the RAG, ensuring flexibility in approach and adaptability in implementation. Insights gained should directly contribute to the design of the specific RAG model. In the coding phase, prioritize methods that offer the most immediate and relevant benefits for the project, using exemplary data as a basis.
2. **Implementing RAG**: Develop the RAG model by applying the methods identified in the framework. This involves setting up the necessary infrastructure, selecting the appropriate algorithms, and integrating different data sources. Detail the steps for implementing the model, including data preprocessing, model training, and the integration of retrieval mechanisms. Utilize open-source libraries where applicable and document the process for replicating the setup and results.
3. **Implementing Evaluation**: Establish robust evaluation criteria and methods to assess the performance of the RAG model. This includes defining metrics such as accuracy, relevancy, and response time. Implement a testing protocol that covers various scenarios and edge cases to ensure the model’s efficacy across different types of policy queries. Outline the tools and techniques for continuous monitoring and evaluation of the model’s performance post-deployment.
4. **Considerations and Recommendations**: Discuss potential challenges and limitations in the development and deployment of the RAG model. Offer recommendations for mitigating risks associated with data quality, model bias, and system scalability. Consider future enhancements, such as incorporating additional data sources or advanced machine learning techniques. Recommend strategies for ongoing improvement and adaptation of the model to meet evolving needs and to incorporate new technological advancements.

**Deliverables**:

* A Jupyter Notebook consistent with the RAG and evaluation.
* A presentation including the framework for RAG of the imaginary project (walking through code), results, recommendations, and conclusion.

**Submission Guidelines:**

* Submit all components as a ZIP file.
* Ensure your code is well-commented, and your report is clear and professionally structured.