**Automatic Email Reply System for Film Equipment Rental Service**

The Automatic Email Reply System is designed to classify and handle various types of incoming emails for a film equipment rental service. This system integrates multiple components, including a RAG (Retrieval-Augmented Generation) pipeline using Pinecone and Langchain, a MySQL database for managing equipment information, and advanced email classification capabilities leveraging state-of-the-art language models.

***Components used:-***

1. RAG Pipeline

2. Database Management

3. Email Classification

4. Inquiry Handling

5. Review Handling

6. Assistance Request Handling

**1. RAG Pipeline:** The RAG pipeline in this project is designed as a hybrid system, integrating both retrieval and generation components to handle complex queries effectively. This hybrid approach combines the strengths of vector-based retrieval with keyword-based search to provide comprehensive and accurate responses.

- Pinecone: Used for efficient vector search and similarity retrieval.

- Langchain: Provides the framework for managing retrieval-augmented generation processes and interfacing with language models.

- HuggingFace Embeddings: Utilized for generating dense vector representations of text.

Pipeline Flow

1. Initialization: Pinecone is initialized with an API key and configured to create an index for vector searches. Langchain's retrieval capabilities are integrated to perform hybrid searches using both vector and keyword-based approaches.

2. Index Creation: An index named `email-classification` is created with dimensions suited for dense vector representations (384 dimensions) and configured to use dot product as the metric.

3. Embedding and Indexing: Texts are embedded using HuggingFace embeddings and indexed in Pinecone for efficient retrieval.

4. Hybrid Search: The system employs PineconeHybridSearchRetriever to perform searches that leverage both dense vector representations and traditional keyword-based approaches.

\**Hybrid RAG Pipeline Benefits*:- By combining vector search with keyword search, it ensures that responses are both contextually relevant and directly aligned with user queries. This approach is particularly effective for managing diverse email content related to equipment availability, similar items, and customer feedback.

**2. Database Management:**  MySQL Database: Manages information about equipment and similar items.

Schema:

- equipment: Stores details of equipment including id, name, category, price, and availability.

- similar\_items: Stores relationships between items to suggest alternatives.

Database Functions:

- check\_availability(item\_name): Checks if a specific item is available and retrieves its price.

- get\_similar\_items(item\_name): Retrieves items similar to a given item from the database.

**3. Email Classification:** The system classifies incoming emails into categories: inquiry, review, assistance, or other. This classification helps in directing emails to appropriate handling functions.

- Groq LLM: Used for classifying emails based on their content.

- Classification Prompt: A prompt template guides the LLM to categorize emails accurately.

**4. Inquiry Handling:** Handles emails related to equipment inquiries by checking availability and suggesting similar items if the requested item is unavailable.

- handle\_inquiry(email\_content): Extracts item names from the email and provides availability and pricing information or suggests alternatives.

**5. Review Handling:** Manages customer reviews by analyzing sentiment and generating appropriate responses.

- analyze\_sentiment(review): Determines if a review is positive or negative.

- handle\_positive\_review(review): Generates a thank you response for positive reviews.

- handle\_negative\_review(review): Generates an apologetic response for negative reviews and issues a gift voucher.

**6. Assistance Request Handling:** Handles requests for assistance by generating responses based on the content of the email.

- response generation: Uses Groq LLM to generate relevant responses based on the assistance request.