**Answer 1: Create a Knowledge Repository from Sentiments dataset.**

Using LLM models (ChatGPT), and with the help of prompt engineering, we were able to create a knowledge repository from the airlines review dataset. The final data frame included the following columns:

* **Risk:** This column likely provides an assessment of the level of risk associated with each review, offering insights into potential issues or concerns mentioned by reviewers.
* **From location and To location:** These columns specify the departure and destination locations mentioned in the reviews, providing geographical context to the travel experiences shared by the reviewers.
* **Sentiment Category and Sentiment Score:** These columns are vital for understanding the sentiment expressed in each review. The sentiment category helps categorize reviews as positive, negative, or neutral, while the sentiment score provides a numerical representation of the sentiment intensity.
* **Airline Name:** This column identifies the airline being reviewed, allowing for the segmentation of feedback by airline, which can be essential for airlines to track their performance.
* **Review Custom Category:** This column potentially captures custom categories or labels assigned to the reviews, enabling more granular analysis and categorization beyond standard sentiment analysis.
* **Urgency:** The urgency column likely indicates whether the reviews highlight urgent or critical issues, offering valuable insights into immediate concerns expressed by travelers.

The following key insights can be derived from the created knowledge repository.

1. Urgency Lacking in Reviews: It's notable that nearly 80% of the reviews in your dataset lack any associated sense of urgency. This suggests that most travelers did not emphasize any immediate or critical issues in their feedback.
2. British Airways Dominates Reviews: Among the airlines mentioned in the dataset, British Airways stands out as the most frequently reviewed airline. Interestingly, a significant portion of these reviews falls into the very negative sentiment category. This may indicate that British Airways has faced substantial criticism in the past.
3. Heathrow Airport's Prominence: London's Heathrow Airport appears to be a popular departure location for a majority of the reviewers. This suggests that many travelers initiate their journeys from this bustling airport hub.
4. London as a Common Destination: Similarly, London seems to be a common destination for many travelers. This could be due to London's status as a major international travel hub and a popular tourist destination.
5. Pervasive Negative Sentiment: The knowledge repository reveals that a significant majority of the reviews fall into the very negative sentiment category. This implies that travelers have had predominantly negative experiences with the airlines and airports under consideration.
6. Flight-Related Issues Predominate: Within the negative reviews, flight-related issues such as delays and departures appear to be the most frequent concerns. This suggests that travelers often encounter challenges related to punctuality and timeliness during their journeys. Interestingly, there are relatively fewer mentions of safety risks, which could indicate that safety concerns are generally well-managed by the airlines and airports in question.
7. Service Quality and Comfort Issues: More than 50% of the reviews center around topics related to seat comfort, crew behavior, and staff service. This indicates that passengers frequently prioritize the quality of their in-flight experience, highlighting areas where improvements may be needed. Conversely, there are fewer reviews discussing topics like baggage handling, airport facilities, and food and beverage services. This suggests that passengers may be generally satisfied with these aspects of their travel experience, but there is a clear need for airlines to focus on enhancing comfort and service quality to improve overall customer satisfaction.

In summary, the knowledge repository offers valuable insights into the travel experiences of passengers, with a focus on British Airways, London Heathrow Airport, and common issues like flight delays and service quality. These insights can serve as a basis for airlines and airports to make targeted improvements and enhance customer satisfaction.

**Answer 2: Talking to your data: Building an RAG system.**

The document selected for this task is the "Quarterly Consolidated Results of Reliance Industries Limited". This document is a publicly available media release and provides financial insights, key performance indicators, and strategic directions of the company for the first quarter of Financial Year 2023-24. It serves as a comprehensive source of information for investors, analysts, and other stakeholders.

Source - <https://www.ril.com/getattachment/c438566c-596d-49f8-af48-02c5b5476028/Financial%20performance%20for%20the%20quarter%20ended%2030%20Jun,%202023.aspx>

The purpose of this report is to detail the process and outcomes of building a Retrieval-Augmented Generation (RAG) system to generate value from an in-house data retrieval and content generation capabilities from and evaluate it to already established generative models like BERTScore and GPT-3.5 or 4.

In our evaluation process, we will be using text-davinci-003 model from OpenAI for Retrieval Augmented Generation. The temperature is set at 0 so that the responses are less creative and more deterministic. Also, we will be setting the maximum tokens to be generated to 500 as we will also be generating detailed text passages.

Following are the eight questions that have been prompted to the model, followed by their base line answers(as manually extracted from the document). We have tried to increase the complexity of the questions as they progress.

Q1. For which year is this quarterly report relating to?

A1. 2023

Q2. Is this a Media Release document?

A2. Yes

Q3. Who is the signing authority for Reliance Industries Limited??

A3. Mukesh D Ambani

Q4. What is the date of the document being published?

A4. 21st July, 2023

Q5. What is the Record Quarterly Consolidated EBIDTA of Reliance Industries Limited?

A5. ₹ 41,982 CRORE

Q6. What did Mukesh Ambani comment on the results ?

A6. Reliance’s strong operating and financial performance this quarter demonstrates the resilience of our diversified portfolio of businesses that cater to demand across industrial and consumer segments. Jio’s wide range of quality offerings at affordable price points has enabled strong growth in subscriber base, which reflects in the financial performance of the digital services business. Accelerated roll-out of Jio’s True 5G services is propelling the nation’s digital transformation at an unprecedented pace. In another step towards democratizing internet in India, Jio launched the “JioBharat” Phone Platform, making internet technology accessible and affordable to every Indian. Retail business delivered robust growth, with fast-paced store additions and steady growth in footfalls. The contribution of Digital and New Commerce initiatives is scaling up, delivering value to consumers and providing synergistic benefits to merchant partners. O2C business delivered a resilient performance despite continuing global macro headwinds. Commencement of MJ field operations during the quarter will enhance India’s energy security, with total production from KGD6 block rising to ~30 MMSCMD in the coming months. The process of demerger of the financial services business – Jio Financial Services Limited – is on track with key approvals in place. I firmly believe that Jio Financial Services is uniquely positioned to foster financial inclusion in India.

Q7. Looking at the Financial Results of the Consolidated Jio Platforms("JPL"), what is their Gross Revenue for 1Q FY23 ?

A7. ₹ 27,527 crores

Q8. What is the Quarterly Revenue of Consolidated Oil To Chemicals(O2C) ?

A8. ₹ 133,031 CRORE

We have created a RAG system by employing a combination of chunking, embedding, and vector storage techniques.

In brief, the following steps are involved in creating the RAG system –

1. Chunking: The document is divided into smaller, manageable chunks. Each chunk represents a coherent piece of information from the document.
2. Embedding: Each chunk is then transformed into a vector representation using our chosen embedding model (text-ada-embedding-002). These embeddings capture the semantic content of each chunk.
3. Storing: The embeddings are stored in our FaissVectorStore, making them ready for efficient retrieval during the querying phase.

Now we prompt the above discussed questions to the model and compare it with our base line responses.

Upon evaluating the responses generated by our Retrieval-Augmented Generation (RAG) system, it is found that the system demonstrates a commendable alignment with the baseline answers for a all of the queries. This is indicative of the RAG system's ability to accurately retrieve and generate relevant content from the indexed document. Such precision is particularly evident in responses to questions that solicit straightforward and concise information.

However, challenges arise when the system is presented with queries demanding more extensive textual context from the document (Response 6). Instead of reproducing the detailed content verbatim, the RAG system occasionally opts for a condensed and simplified interpretation of the text.

To counteract these tendencies and obtain richer, more faithful reproductions of the document's content, it becomes imperative to craft our prompts meticulously. Incorporating strategies that reduce hallucination is crucial. As seen in Response 6a, we implemented guardrails in our prompts ensuring that the model understands the exact requirements of the query. For instance, instructing the model to provide "verbatim excerpts" or "detailed explanations" can push it towards more detailed and accurate responses

In Comparing the responses from GPT 4 after providing it with the same document and asking the same exact questions we encountered a notable discrepancy in performance. The GPT-4's responses were benchmarked against a set of 8 questions, and the results were mixed. Out of the 8 inquiries, GPT-4 accurately answered only half.

GPT4 responses - <https://chat.openai.com/share/958cb2ba-9e83-4938-9f0b-6e65d6a0aa84>

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