

# Management

## FORM FOR THE SUBMISSION OF ASSESSED GROUP COURSEWORK

THIS FORM MUST BE COMPLETED AND ATTACHED TO ALL ASSESSED WORK.

Please include all group members' student numbers below.

Student Number	2	6	3	8	7	9	5
Student Number	2	3	5	9	0	8	4
Student Number	2	5	2	0	0	5	4
Student Number	2	5	5	0	5	1	4
Student Number	2	5	4	3	1	1	0
Student Number	2	5	4	6	7	7	9

**We agree that equal and fair contributions were made to the final report by all members of our group.**

\* Please delete as appropriate. In the event that all members of the group do not agree that they have worked together effectively, shared the workload equitably and are therefore happy to receive the same individual mark for the project, they will be required to provide written evidence as to why this occurred.

**Please list brief details of how tasks were divided up among the group members in the box below. (Please refer to chapters of final report etc.)**

2638795: Effective Teamwork  
2543110: Technical Development  
2546779: Analysis Tools  
2359084: Chatbot, PowerPoint  
2520054: Analytics Problem  
2550514: Web Portal

By submitting this work online using my unique log-in and password, I confirm that I am submitting the work on behalf of my group and that it is all our own work.

We understand that all marks are provisional until ratified by the Faculty Examination Board.

Please remember to save **your work** either as a **Word document (.doc)** or as a **PDF (.pdf)** unless it is a presentation or recording where it should be saved in an appropriate format for the work with the filename [Unit Code\_Group Number or Name] e.g. **MGRCM0000\_Group 1.docx**.

**Please start writing your coursework on the next page.**

DEVELOPING A BUSINESS ANALYTICS SOLUTION  
FOR A WEB PORTAL THAT SUPPORTS  
INVESTMENT/ PARTNERSHIP DECISIONS

by IBM Portal 1

EFIMM0144 - Business Analytics Consulting Project

Dr. Akinyo Ola, Dr. Sunil Tiwari, Dr. Ting Zhang and Dr. Qixiu Cheng

University of Bristol

Bristol, United Kingdom

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## 1. Analytics Problem

In today's rapidly evolving business landscape, effective decision-making is crucial for investors and business leaders to evaluate companies' strategic positioning, operational strengths, and market potential. Business analysis frameworks such as MOST (Mission, Objectives, Strategy, Tactics), SWOT (Strengths, Weaknesses, Opportunities, Threats), and PESTLE (Political, Economic, Social, Technological, Legal, Environmental) are widely used to assess internal and external factors influencing a company's performance (Huong Dau et al., 2024). Although these frameworks provide valuable insights, manually applying these frameworks requires substantial time and expertise in data interpretation, posing challenges for investors and analysts (Shinydocs, 2024). Annual reports, in particular, are critical sources of detailed qualitative and quantitative data that indicate a company's financial health, strategic direction, and competitive positioning (James and Christopher, 2025). However, extracting meaningful information from these reports for structured analysis presents difficulties due to the complexity of unstructured text, financial jargon, and the time-consuming nature of manual review. In addition, the processes are often error-prone and inefficient, which limits the speed, accuracy, and depth of analysis, ultimately impeding strategic decision-making and timely investment choices.

IBM currently offers AI capabilities, including the Watsonx platform and Granite models, which provide robust tools for various artificial intelligence applications. However, IBM lacks a dedicated, integrated, web-based AI analytics solution specifically designed to automate comprehensive business analysis and insight generation from annual reports. AI analytics companies, such as AMPLYFI's DeepInsight and Jeda.ai's AI-powered whiteboard, have demonstrated the effectiveness and market demand for web-based, generative AI-driven analytics platforms that automate data extraction, interpretation, and visualization from complex business reports (Amplifyfi, 2024; Jeda.ai, 2025). This gap limits IBM's potential to offer scalable, cost-effective, and user-friendly analytics solutions to investors, business leaders, and analysts seeking deeper strategic insights from corporate financial documents.

To address this analytics problem, this project proposes developing a web-based AI-driven analytics platform by integrating IBM's existing AI technologies. The proposed solution leverages Retrieval-Augmented Generation (RAG) techniques, Vector Databases, and a local Large Language Model (LLM) to systematically extract, interpret, and structure data from company annual reports. Additionally, the integration of IBM Watson Assistant enables intuitive conversational interactions, facilitating easier access and interpretation of analytical insights (IBM, 2025). This platform would generate automated visual

representations of key strategic insights for quantitative analysis visualization. This solution streamlines decision-making, reduces manual effort, and enhances IBM's ability to make data-driven investment decisions, ensuring scalability and cost-effectiveness while strengthening its competitive edge in an increasingly complex financial landscape.

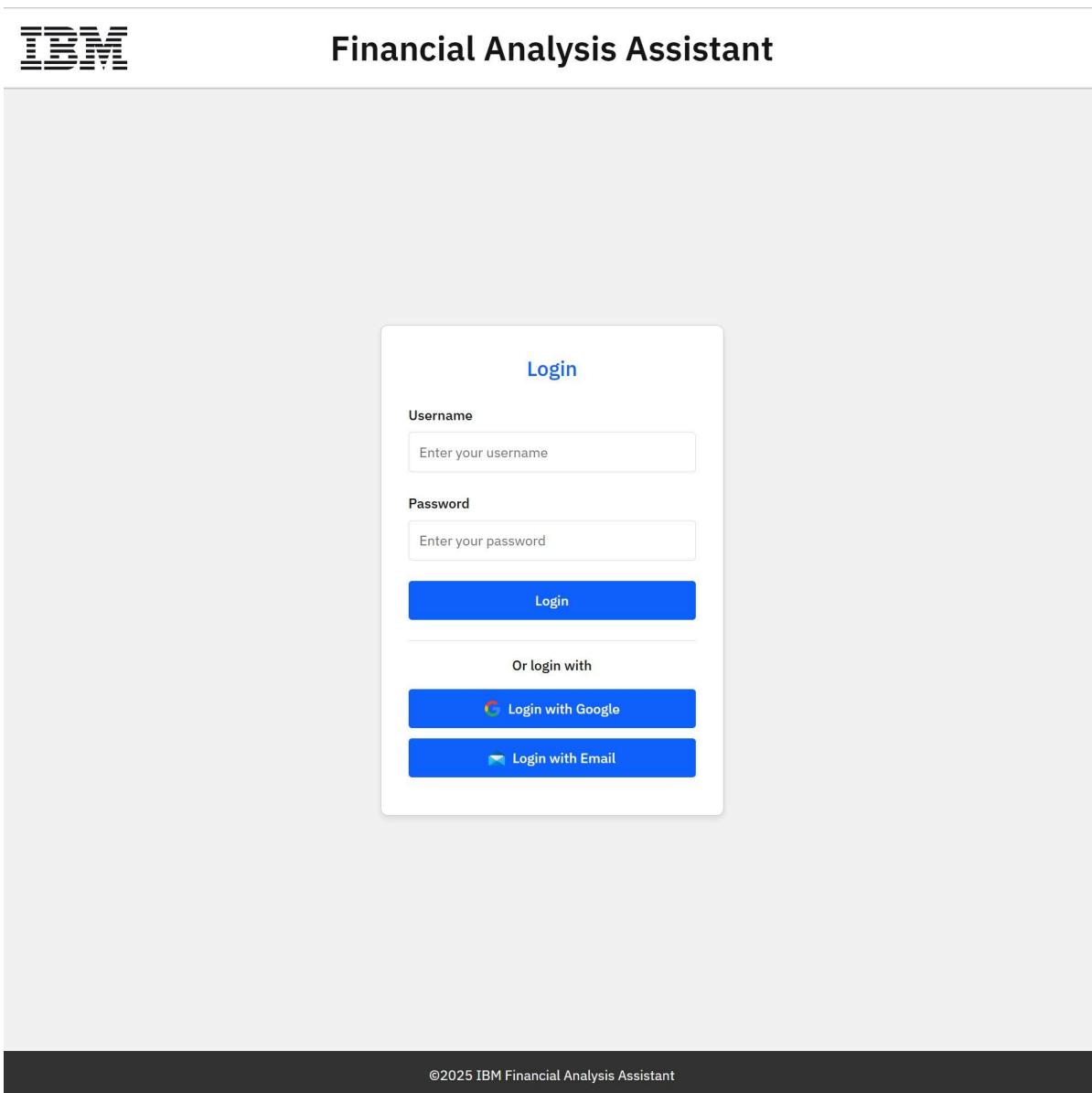
## **2. Analytics Solution**

### **2.1 Web Portal**

In order to provide solutions to customers' business problems as efficiently as possible with limited time and resource investment. The team chose to integrate open-source AI tools and IBM's mature models into a unified business intelligence system to maximize IBM's investment efficiency in AI, reduce costs and speed up implementation. Through the integration of IBM's AI-driven chatbot Watsonx Assistant with local LLM to achieve deep text understanding, various business analysis tools provide users with instant and accurate insights into corporate annual reports (Kumar, 2024; Soule & Bergmann, 2025; IBM, 2025). The portal solution is designed to provide fair, data-driven, structured reports to help users more effectively assess opportunities and risks.

#### **2.1.1 User Interface**

The Portal was designed to provide investors with more comprehensive company information in a faster time frame, hence facilitating improved investment decisions. A login page ensures security, authentication, and personalised user access to sensitive information. It enables role-based control, protects data, and enhances convenience with multiple login options (such as "Login with Google" or "Login with Email"). A well-designed system prevents cyber threats, ensures compliance, and reinforces brand credibility. It also supports user management by tracking activity and detecting suspicious behaviour, ensuring data integrity and a seamless experience (see Figure 1).



**Figure 1.** Web Portal Login Page

To improve user experience and minimise erroneous clicks, this portal interface is straightforward, as illustrated in Figure 2. Besides, the introductory text at the top of the portal familiarises the user with its features and usage process, hence enhancing operational efficiency. Additionally, to furnish users with more extensive information for improved investment decisions, the portal offers an extensive array of business analytics tools. Moreover, to enable users to swiftly comprehend the portal's functionalities, each analytical instrument is designated by module, with a comprehensive description of its use and the insights that may be derived within the module. The aforementioned portal interface was designed to fulfil client requirements for faster delivery of standardized AI-generated insights reports.

## IBM Financial Analysis Assistant

Our platform provides AI-powered analysis of company annual reports, offering insights through SWOT, MOST, PESTLE, sentiment analysis, and word cloud visualizations. To begin, please interact with our chatbot in the lower right corner to upload your PDF. The chatbot will guide you through the process and answer any specific questions you may have.

### MOST Analysis

Waiting for input

*MOST analysis is a strategic planning framework used to align an organization's goals and actions. It consists of four elements: Mission (the overall purpose), Objectives (specific goals to achieve the mission), Strategy (high-level approaches to reach the objectives), and Tactics (detailed actions to implement the strategy). This method ensures that all activities contribute to the organization's long-term vision, improving efficiency and decision-making. MOST analysis is particularly useful for businesses undergoing transformation, as it helps define clear priorities and maintain strategic alignment across different levels of the organization.*

### SWOT Analysis

Waiting for input

*SWOT analysis is a strategic tool used to assess an organization's Strengths, Weaknesses, Opportunities, and Threats. Strengths and weaknesses are internal factors, such as resources, expertise, or inefficiencies, while opportunities and threats arise from external competition. By systematically analyzing these aspects, businesses can identify competitive advantages, mitigate risks, and develop informed strategies. SWOT analysis is widely used in business planning, marketing, and project management to help organizations c vulnerabilities effectively.*

### PESTLE Analysis

*PESTLE analysis is a framework used to evaluate external macro-environmental factors that can impact an organization. It examines six dimensions: Political, Economic, Social, Technological, Legal, and Environmental factors. By assessing these influences, businesses can opportunities, and adapt their strategies accordingly. PESTLE analysis is especially useful for market research, strategic planning, and risk management, helping organizations navigate complex external conditions and stay competitive in an evolving landscape.*

### Sentiment Analysis

*Sentiment analysis, also known as opinion mining, is a natural language processing (NLP) technique that determines the emotional tone of text. It categorizes opinions as positive, negative, or neutral, providing insights into customer sentiment, brand perception, and market trends. Businesses use sentiment analysis to monitor social media, product reviews, and customer feedback to enhance decision-making and improve customer experience. Advanced sentiment analysis techniques leverage machine learning and deep learning models to capture nuanced emotions and contextual meanings, making it a powerful tool for reputation management and business intelligence.*

*Word clouds can visually highlight key themes in an annual report by identifying them based on frequency and importance. These visualizations often include the CEO's letter, management discussion, and risk factors.*

*Sentiment level helps quantify the tone of an annual report, providing insights into the overall mood and public perception of the organization's performance and outlook.*

IBM Financial Analysis Assistant

Hi! I'm your virtual Financial Analysis assistant.  
In addition to MOST, SWOT, PESTLE, and Sentiment Analysis, I am equipped to assist you with various other analytical methods. Simply specify the type of analysis you require, and I will guide you through the process. How may I assist you today?

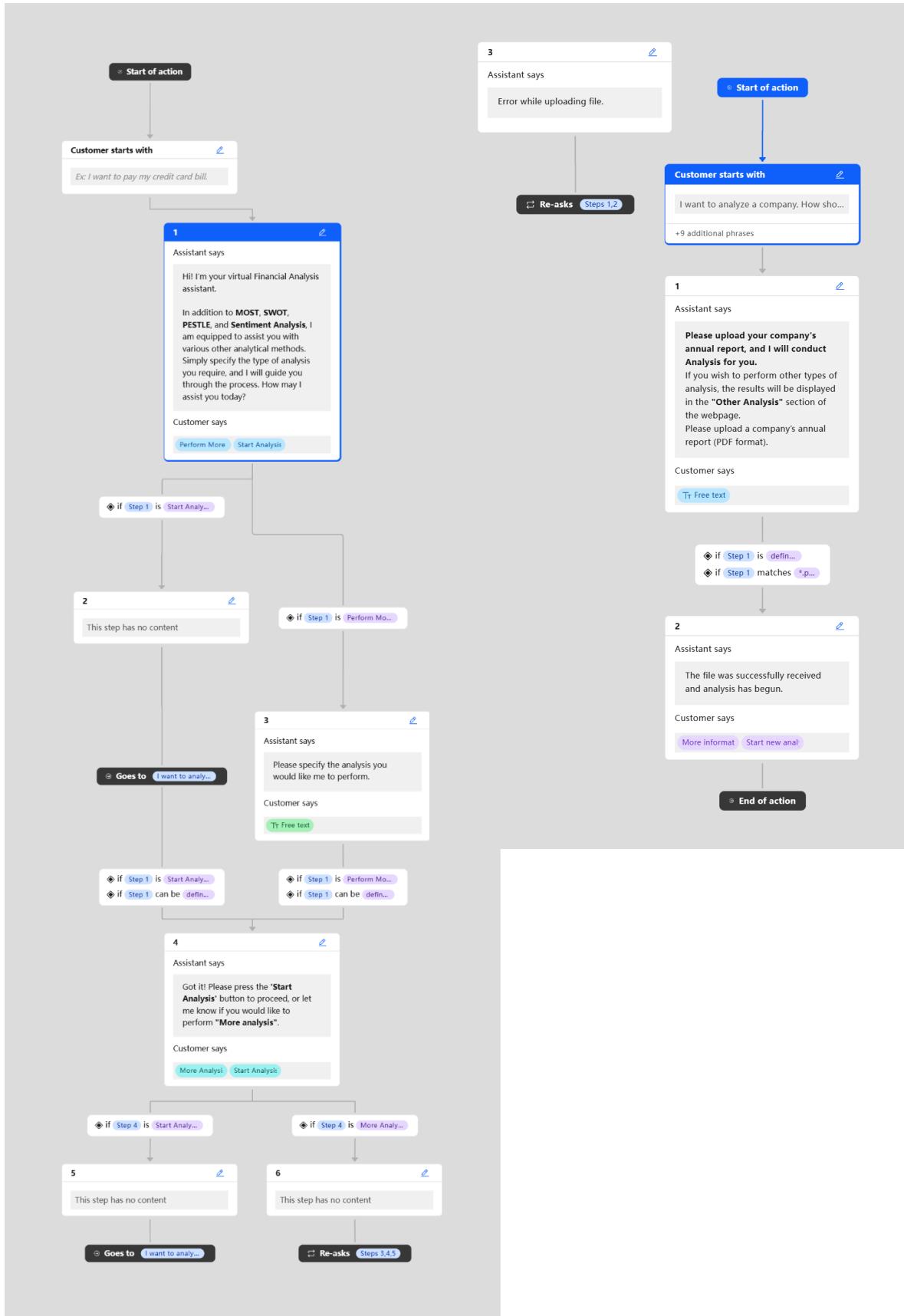
Start Analysis | Perform More Analysis

Type something...  
Built with IBM Watson

**Figure 2.** Web Portal Interface

### 2.1.2 Chatbot

A chatbot powered by IBM Watsonx has been integrated into the portal to analyze the annual report uploaded by the user, offering textual and visual assessments of the company's strategic direction and enabling swift acquisition of insights. It allows users to choose from the provided analytical alternatives or engage directly with the chatbot for tailored assistance, offering customers greater flexibility compared to single-mode portals (see Figure 3). Moreover, the entire conversation between the chatbot and the user is recorded in the cloud, retrievable upon request, and further utilized by the LLM to generate ideal texts based on the given information. Key points summarized by the LLM can then be conveyed to the web UI through direct rendering templates.



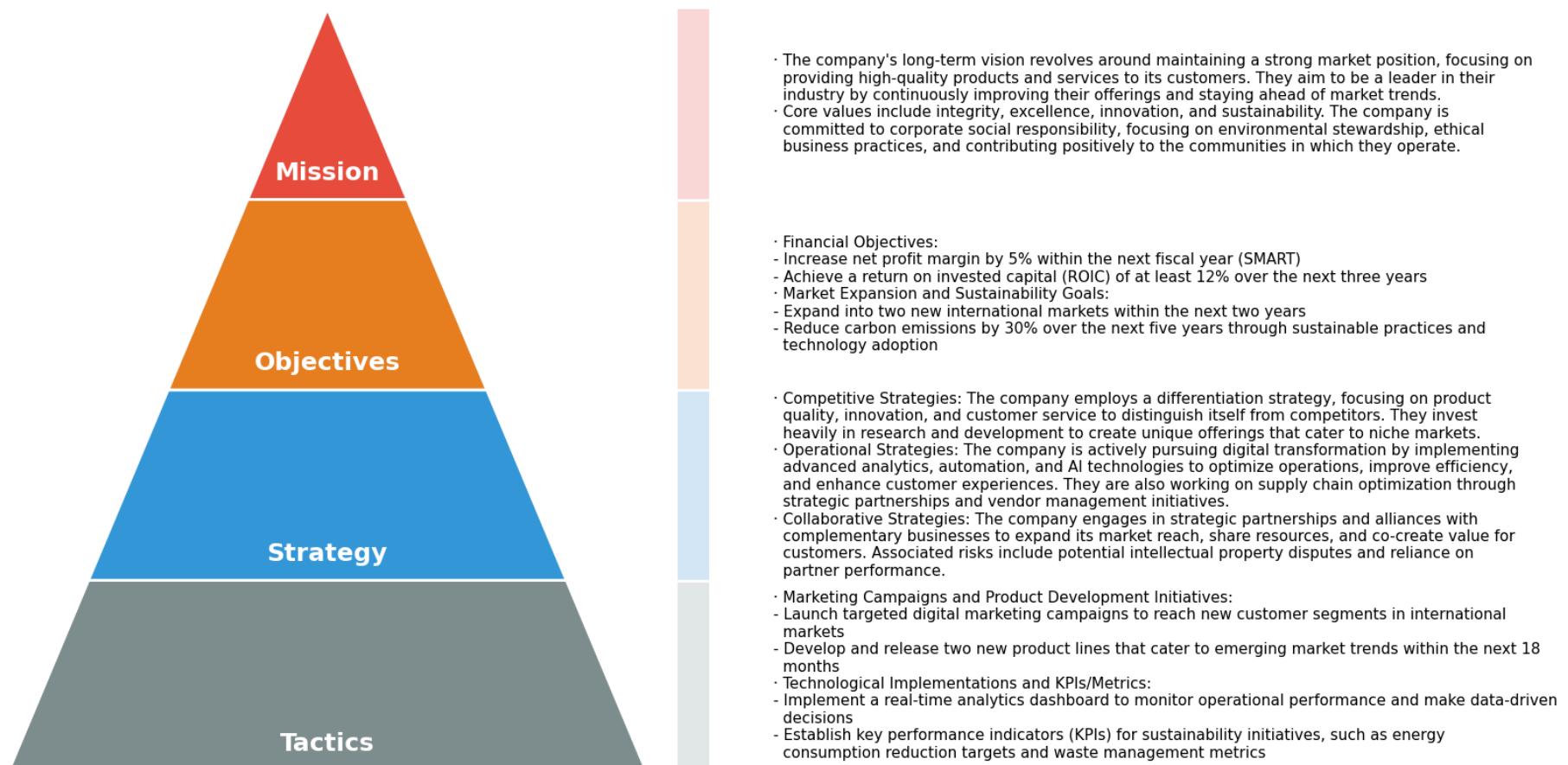
**Figure 3.** Chatbot Flow Chart

## 2.2 Analysis Tools

To improve the reliability and actionable value of insights gained from annual reports and ensure the clarity, consistency and depth of analytical results, this portal uses structured analytical frameworks to evaluate the company's annual reports. These frameworks ensure that key factors such as internal capabilities, external market dynamics, strategic positioning, and environmental impacts are thoroughly evaluated, allowing stakeholders to gain comprehensive insights. By applying these structured methods, users can identify strengths and weaknesses, predict opportunities and threats, and better understand macro-environmental trends, thereby making more informed strategic decisions and risk management.

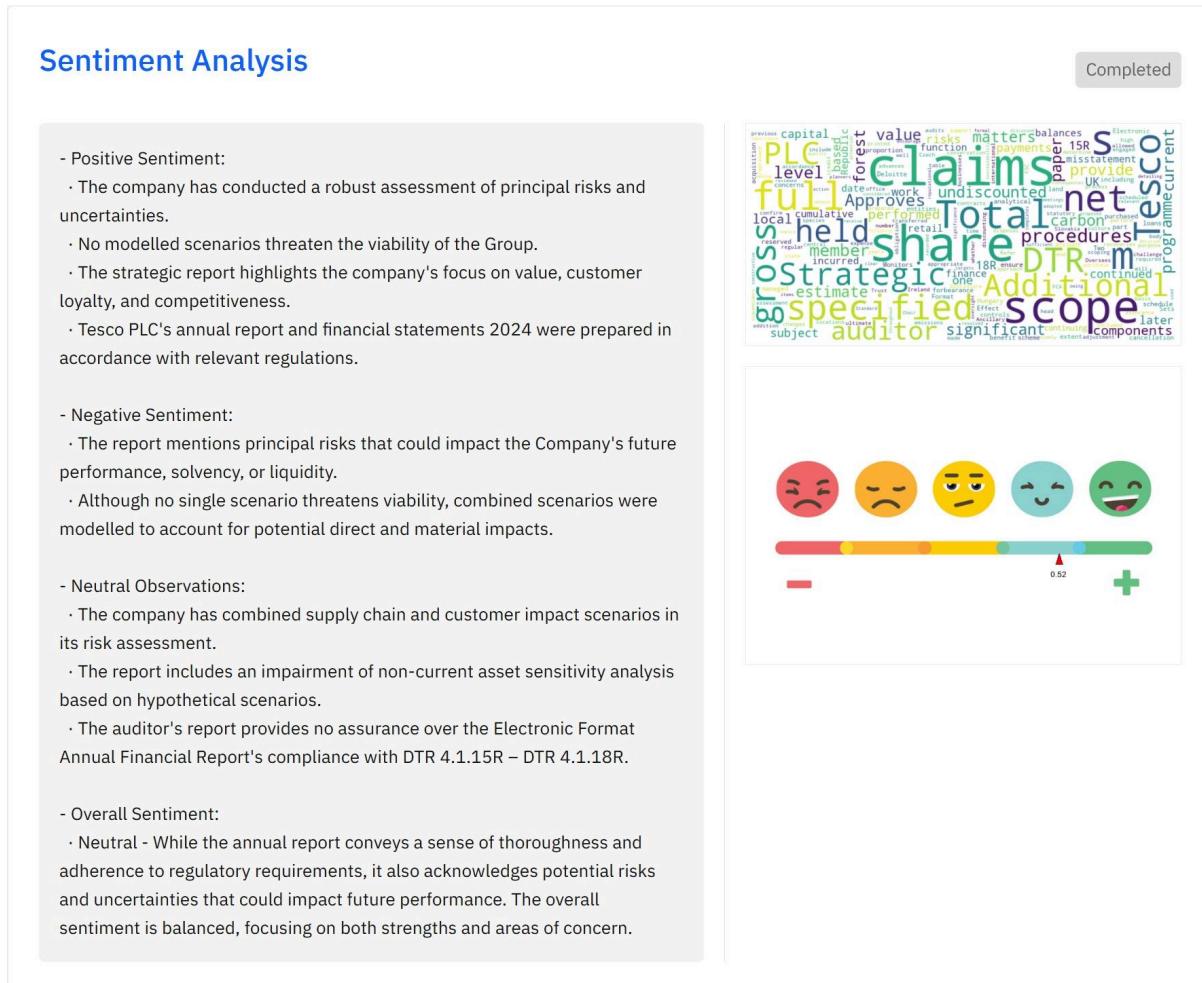
### 2.2.1 Internal Analysis

A strong strategy of a company is a crucial factor in investment evaluation. MOST analysis, as a strategic planning tool, combines a company's goals with internal capabilities. It consists of four key elements: mission, goals, strategy and tactics. The results of the analysis are visualised using a pyramid structure diagram, which allows users to quickly identify potential "gaps" in the strategic planning and execution process (Figure 4). The hierarchical relationship between the company's goals and internal capabilities is clearly presented, ensuring logical coherence from the top-level vision to specific execution, and improving the operability and effectiveness of the strategy. If goals and strategies aren't effectively connected, the chart reveals execution gaps, prompting tactical adjustments to ensure actions support company objectives. On the other hand, if strategic direction is unclear or goals aren't met, the chart helps decision-makers quickly identify issues and optimise strategy.



**Figure 4.** Results of MOST Analysis Using Tesco's 2024 Company Annual Report

In some scenarios, investors also need a consistent assessment of annual reports to mitigate the impact of management's statements that deliberately exaggerate sentiment to attract investors. Using sentiment analysis can help investors more accurately predict the company's future fundamentals and strategies (Azimi and Agrawal, 2021). Positive sentiment indicates that management is optimistic about the outlook, prompting its strategic intentions such as expansion plans. Conversely, negative sentiment reacts to possible threats to the company, such as industry recession. To this end, the portal also visualizes sentiment analysis more intuitively by generating sentiment scales and word clouds (see Figure 5). By analyzing the language, sentiment, and common terms in the annual report, stakeholders can better understand the attitudes, priorities, and underlying information within the company.



**Figure 5.** Result of Sentiment Analysis with Word Cloud and Emotional Scale Using Tesco's 2024 Company Annual Report

## 2.2.2 External Analysis

PESTLE analysis is a key tool for identifying factors that influence business decisions. To enhance the readability of the information, the portal uses a matrix diagram to present the results of the PESTLE analysis, which clearly categorizes the six external factors (Figure 6). The graphs visualize the risk structure of the external environment, helping to identify potential challenges such as policy instability, high technical barriers, or market volatility, and enabling companies to develop more targeted responses. The design not only enhances the structured presentation of information, but also supports users to make horizontal comparisons and vertical in-depth analysis. For example, users can see side-by-side how different factors interact to influence business decisions, such as how economic trends are driving social consumption changes or how legal requirements are driving environmental compliance strategies.

<b>P</b> Political	<ul style="list-style-type: none"> <li>The company operates in various countries, making it subject to diverse political environments. Stable governments and international relations generally support business operations. However, changes in trade policies or tariffs can impact supply chains and costs.</li> <li>Regulatory compliance is crucial for the company, with food safety, labeling, and environmental standards varying by region. Adherence to these regulations ensures market access and consumer trust.</li> </ul>
<b>E</b> Economic	<ul style="list-style-type: none"> <li>Economic trends, such as GDP growth and inflation, directly affect consumer purchasing power and shopping behaviors. In times of economic uncertainty or high inflation, customers may prioritize value over luxury, potentially impacting profit margins.</li> <li>Market cycles influence demand for certain products, with seasonal fluctuations requiring flexible inventory management strategies.</li> </ul>
<b>S</b> Social	<ul style="list-style-type: none"> <li>Demographic shifts and changing consumer preferences significantly impact the retail landscape. Growing urbanization, aging populations, and increasing health consciousness drive demand for convenient, healthy, and sustainable products.</li> <li>Cultural influences shape purchasing decisions, with diverse communities seeking products that align with their values and traditions.</li> </ul>
<b>T</b> Technological	<ul style="list-style-type: none"> <li>The company leverages technology to enhance customer experiences, streamline operations, and drive innovation. Digital transformation initiatives include e-commerce platforms, mobile apps, and data analytics for personalized marketing.</li> <li>R&amp;D investments focus on developing sustainable packaging solutions, improving supply chain visibility, and exploring alternative protein sources to meet evolving consumer demands.</li> </ul>
<b>L</b> Legal	<ul style="list-style-type: none"> <li>The company must comply with a complex web of legal requirements, including data protection regulations (e.g., GDPR), employment laws, and intellectual property rights. Non-compliance can lead to financial penalties and reputational damage.</li> <li>Food safety standards and labeling regulations vary by region, necessitating robust quality control processes and accurate product information management.</li> </ul>
<b>E</b> Environmental	<ul style="list-style-type: none"> <li>The company faces increasing pressure to adopt sustainable practices due to environmental concerns and regulatory requirements. This includes reducing waste, optimizing energy usage, and sourcing responsibly produced ingredients.</li> <li>Climate change poses risks to agricultural supply chains, potentially affecting product availability and pricing. The company must adapt to these challenges through resilient sourcing strategies and innovative product development.</li> </ul>

**Figure 6.** Results of PESTLE Analysis Using Tesco's 2024 Company Annual Report

SWOT analysis is an analytical tool used to evaluate a company's market position in both internal and external environments (Karim et al., 2020). To enhance the readability of information, the portal uses a four-quadrant chart to present the results of the SWOT analysis, clearly classifying strengths, weaknesses, opportunities and threats, so that users can quickly identify key factors (Figure 7). Users can judge whether the company has the potential to "strengthen the weak" by looking at the internal weaknesses and external opportunities of the company. The chart also intuitively reveals whether there are strategic risks such as "imbalance between strength and weakness" or "opportunity-power conflict", helping investors or decision makers make more accurate judgments.

	Helpful to achieving the objective	Harmful to achieving the objective
Internal origin (attributes of the organization)	<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>Brand Equity: Tesco is a well-established and recognized brand in the UK retail sector.</li> <li>Financial Stability: The company maintains a strong financial position, as indicated by its ability to invest in analytics for understanding inflationary dynamics and cost pressures.</li> <li>Market Dominance: Tesco holds a significant market share in the UK grocery sector, enabling it to influence industry trends and negotiate favorable terms with suppliers.</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>Dependence on the UK Market: Tesco's operations are primarily focused on the UK, making it vulnerable to economic fluctuations and competition within this market.</li> <li>Operational Inefficiencies: The report does not explicitly mention operational efficiency, but potential areas for improvement could include supply chain management or store-level operations.</li> </ul>
External origin (attributes of the environment)	<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>Expanding Online Presence: The increasing demand for online grocery shopping presents an opportunity for Tesco to grow its e-commerce offerings and reach new customer segments.</li> <li>International Growth: Tesco could explore expansion into international markets, leveraging its brand equity and retail expertise to compete in new regions.</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>Intense Competition: The UK grocery market is highly competitive, with established players like Sainsbury's, Asda, and discount retailers such as Aldi and Lidl posing significant threats.</li> <li>Economic Uncertainty: Macroeconomic factors, such as inflationary pressures and currency fluctuations, could negatively impact consumer spending and Tesco's profitability.</li> </ul>

**Figure 7.** Results of SWOT Analysis Using Tesco's 2024 Company Annual Report

Furthermore, users can interact with the chatbot to obtain personalized specifications for the content analysis of annual reports. For instance, customers may request the chatbot to employ the BCG matrix to evaluate the performance of the business's product lines, thereby assisting in the assessment of the company's growth potential (see Figure 8). Customized analytics improve the adaptability and generalizability of the portal, augmenting its appeal to investors.

## Additional Analysis

Completed

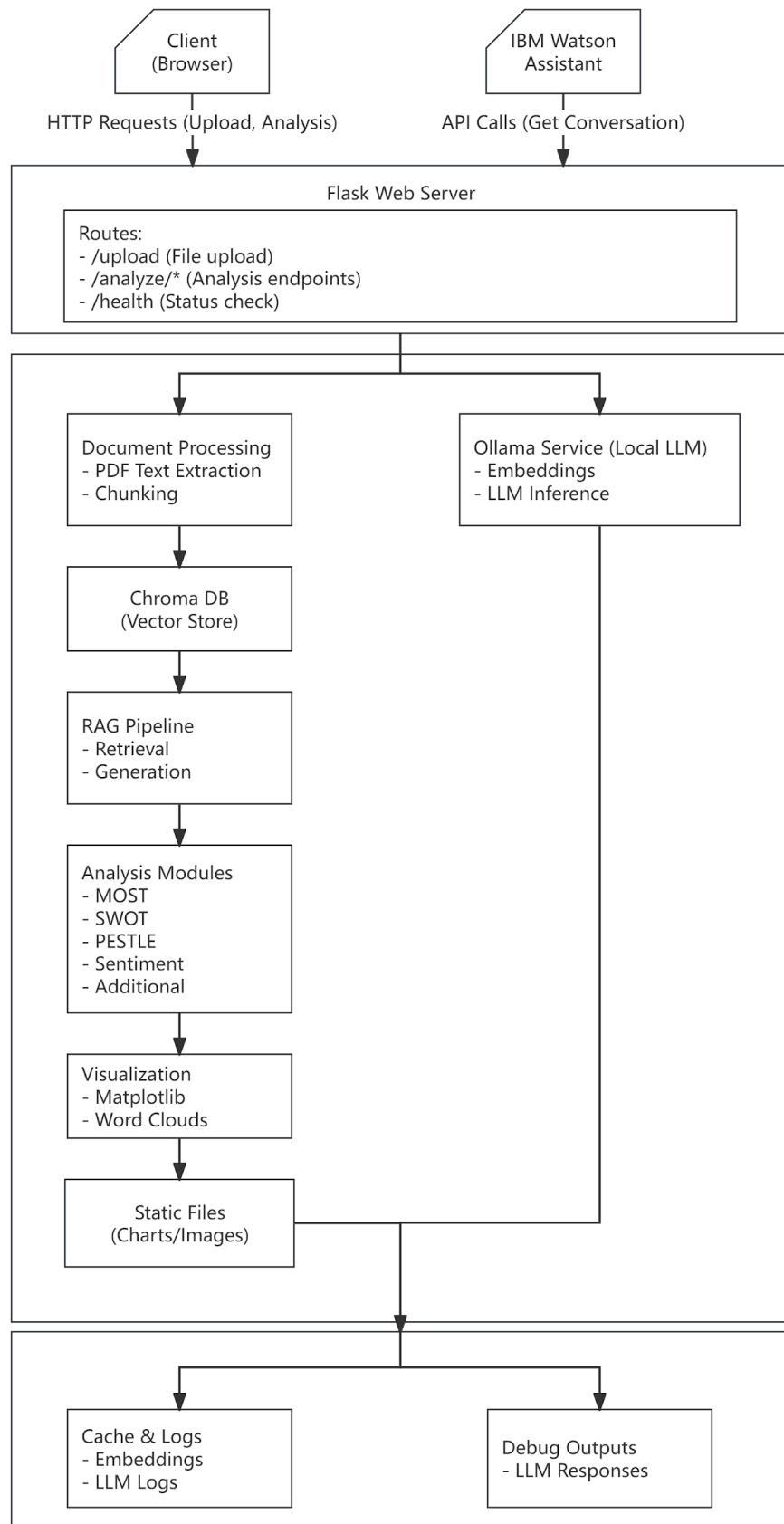
- Request: Custom analysis
- Analysis:
  - The company, Tesco, exercises significant judgement in determining lease terms and discount rates for accounting purposes. Break and extension options are included in lease agreements to provide operational flexibility, unless there is a valid business reason to consider them reasonably certain at commencement (Note 1 Accounting policies, judgements and estimates).
  - The discount rate used to calculate the lease liability depends on whether it can be readily determined or not. If the lessor is a related party (such as leases from joint ventures), Tesco uses the rate implicit in the lease. For all other leases, Tesco determines the incremental borrowing rate based on various inputs like risk-free rates, country-specific risk adjustments, credit risk adjustments, and entity-specific adjustments (Note 1 Accounting policies, judgements and estimates).
  - Tesco has assessed its joint arrangements under IFRS 11 'Joint arrangements' and determined them to be joint ventures, requiring the exercise of judgement in this assessment (Note 13).
  - Adjusting items are certain costs or incomes that derive from normal activities but are excluded from Alternative Performance Measures (APMs) for a more comparable view of year-on-year trends and performance. These adjustments cover the nature, cause, scale of impact, and consistency with prior periods. Examples include litigation costs, impairment charges, restructuring costs, profits or losses on disposal of businesses, net pension finance costs, and fair value remeasurements of financial instruments (Note 1 Accounting policies, judgements and estimates).
  - The Group's income statement is presented in a columnar format to show performance before adjusting items, the adjusting items, and the statutory total on a line-by-line basis. An analysis of adjusting items and their impact on the cash flow statement can be found in Note 4 (pages 220 to 225).



**Figure 8.** Result of Additional Analysis Using Tesco's 2024 Company Annual Report

### 3. Technical Development

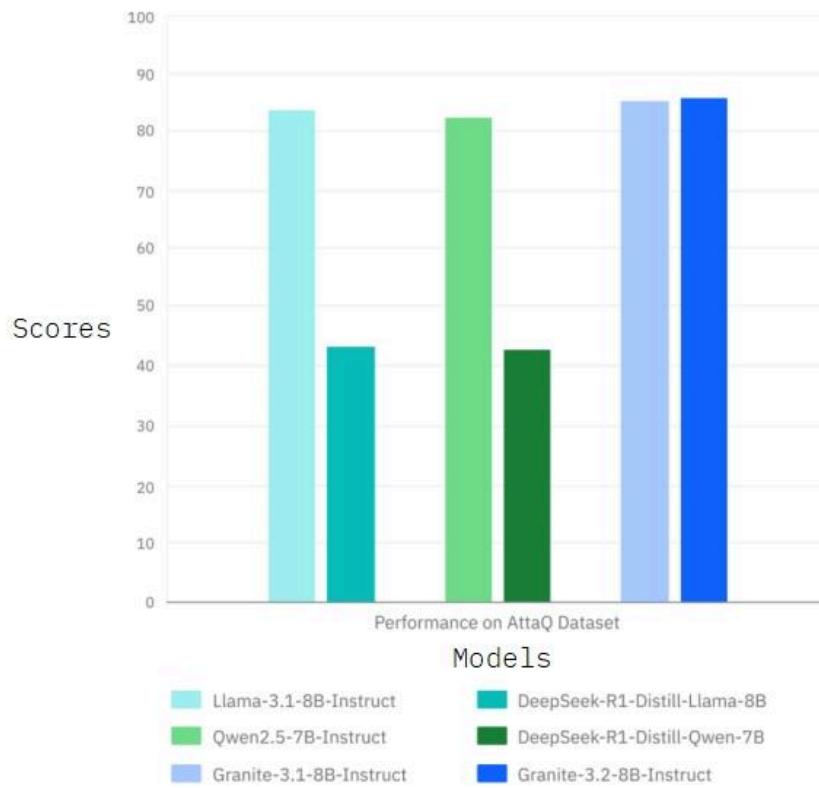
The whole analytical portal is based on Flask, which is a widely applied Python library in moderate-sized websites and has the advantage of user-friendliness and high compatibility. To be more specific, key backend features like the URL routing and the database are controlled by Flask, while the native HTML file and JavaScript function can still be used in the project. As a result, team members responsible for the front end can directly produce the ideal outcomes without learning new syntax, significantly accelerating the project's progress. The system's analysis workflow includes document processing tasks such as PDF text extraction, chunking, and analysis modules. It also leverages the Ollama service for local LLM inference, embedding generation, and visualization tools to enhance user interpretability through dynamic visual representations (Figure 9).



**Figure 9.** Architecture Diagram

### 3.1 Large Language Model

The LLM is the core of projects, and its responsibilities range from generating the main idea of input to returning structured data through summarization. Ollama is the first decided framework because it is the largest open-source platform to cater to and run LLM. Nearly all the popular open-source LLMs like DeepSeek or Llama are available on this platform, which produces more alternatives and potential in practice. And its simple interface promotes the involvement of members who are not so familiar with generative AI. After multiple experiments, Granite 3.2 was selected as the main LLM of the whole project because of its safety and high performance in the summarization of responses (see Figure 10). The LLM will bridge the front end and back end, producing expected data based on the PDF contexts delivered by users from the web portal.



**Figure 10.** Comparison of Pre-and Post-Reasoning Resilience to Adversarial Attacks

**Note.** Adapted from Soule and Bergmann (2025).

The adjustment of prompts is another effort to ensure the quality of analysis. The words normally used in human conversation can be easily understood by users, while it is harder for LLMs to comprehend. Therefore, the specialized prompts are designed and further applied towards the LLM as questions in every loop. Firstly, the application of uncommon symbols enables LLM to find the key points of the problem, and the repeated pattern of these signs like “<placeholder>” can indicate the whole structure of the response (White et al., 2023). Secondly, the requirement on formats mentioned in prompts, namely output indicators, can directly influence the outputs (Giray, 2023). For example, if the specific prompt requires the LLM to produce the summary in the format of a dictionary, the response will pair the contents with the corresponding keys, making the further appearance of contents in the front end more easily. Splitting the steps of prompts and providing relevant definitions gives clearer guidance for the LLMs and ensures more precise feedback (see Table 1 and Appendix A). Still using the example of SWOT analysis, if the whole question only mentions the word “SWOT”, the response can be much vaguer than the prompts including the definition and boundary of Strengths, Weaknesses, Opportunities, and Threats.

**Table 1.** Prompt to Perform MOST Analysis

Context: *The actual text is omitted here.*

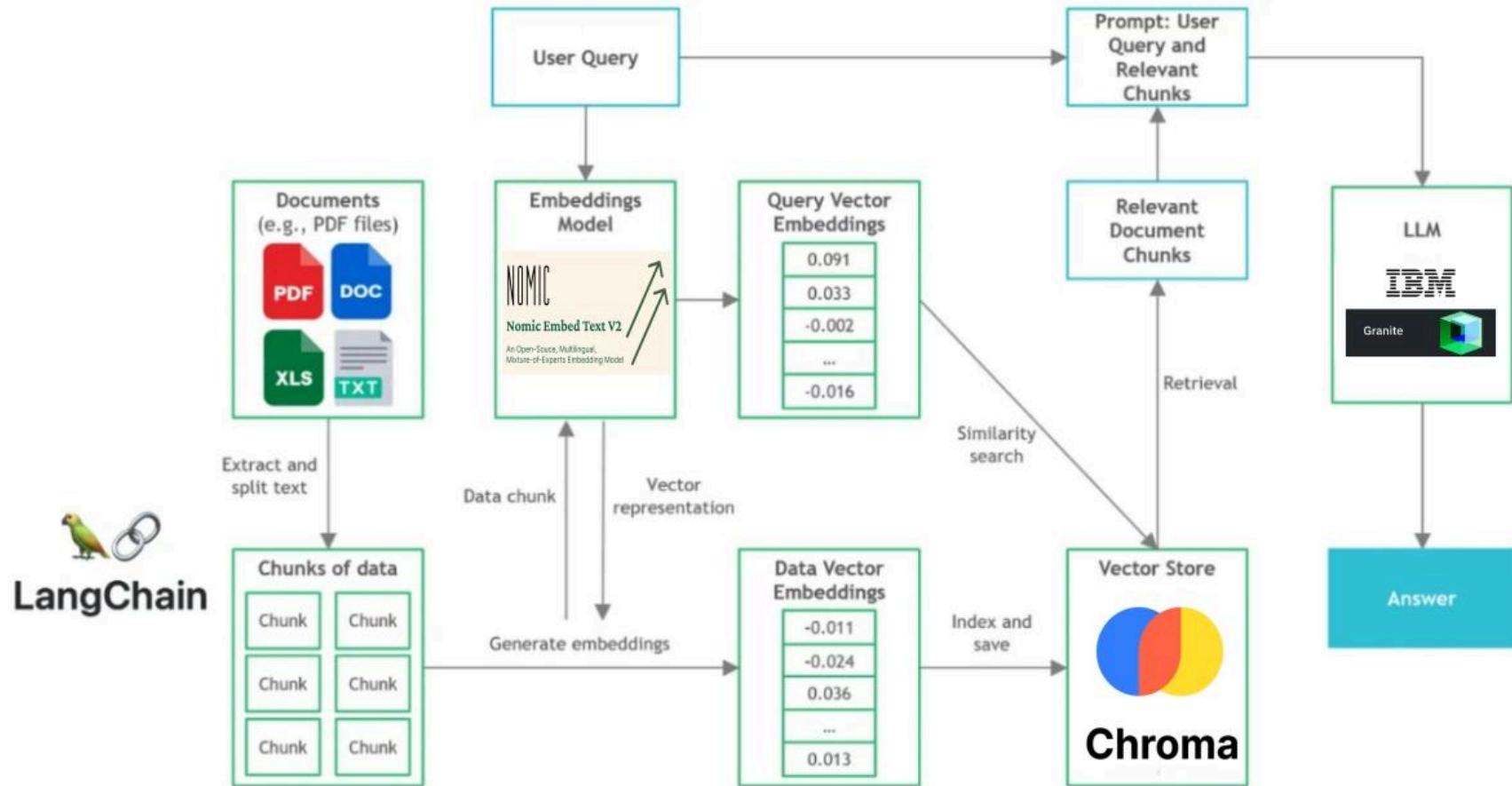
You are a senior business analyst. Based on the provided company's annual report, conduct a detailed MOST analysis strictly following this format:  
 - <MOST\_ANALYSIS>  
 Mission:  
 · [Analyze the company's long-term vision and market positioning.]  
 · [Describe core values and corporate social responsibility commitments.]  
 Objectives:  
 · [List financial objectives using SMART criteria.]  
 · [Evaluate market expansion and sustainability goals.]  
 Strategy:  
 · [Identify competitive strategies such as differentiation or cost leadership.]  
 · [Review operational strategies including digital transformation or supply chain optimization.]  
 · [Mention collaborative strategies, partnerships, and associated risks.]  
 Tactics:  
 · [Outline tactical measures like marketing campaigns or product development initiatives.]  
 · [Highlight technological implementations and relevant KPIs or metrics.]

### 3.2 Retrieval-Augmented Generation

Generally, the PDF file can be uploaded through the web portal powered by UI and backgrounded Flask into the database, waiting for the process of LLM into the utilizable data like JSON, and finally returning to the front end of HTML templates. However, throughout the whole process, the conveyance of information included in the PDF file is another

difficulty that needs to be overcome. Ideally, the words in the PDF will be extracted and further processed as tokens to function. In fact, the LLM at the current stage can only absorb limited tokens at the same time, namely the quite limited amount of provided information. If the user uploads the annual report, the LLM can only read the first hundred words in the documents, while the thousands of words following will be truncated. For example, the original LLM can only read the first several front pages of Tesco's annual report in 2024 and give back the summary of regulations on 10-K, ignoring the pages describing the financial indicators and managerial suggestions in the following hundred pages. As a result, delivering all information through prompts is unreliable, and limited absorption of prompts hinders accurate outputs.

Retrieval-Augmented Generation is the technique designed to solve such a problem. First, the PDF file needs to be preprocessed, also known as text embedding. This is a vital part of NLP and deep learning, and various models have been developed, such as BOW and BERT. These embedding models have different searching strategies and computational methods, which lead to their variation in performance (Asudani et al., 2023). The transformer-based embedding model named nomic-embed-text is chosen to convert and retrieve high dimensional vectors due to its convenience to receive and deploy, as well as the overall higher categorial performance than conventional models (Wang et al., 2019). Simply speaking, a local database will be created, where contexts in PDF files can be stored after being converted into vectors and will be retrieved under later prompts (Microsoft, 2025). Then, the RAG function in LangChain is used to separate the prompting and retrieval stages, overcoming the constraints of token length. LangChain is a widely used framework for applications based on LLMs, and it provides support ranging from context-aware abilities to reasoning abilities (Singh et al., 2024). The PDF files uploaded by users will be stored as searching resources at the priority for the LLM after the application of RAG rather than being processed as the text information included in prompts to activate the LLM, and the real prompts can be simplified like "Give the SWOT analysis of the given company". Also, the outcomes can be more accurate and straightforward than the traditional ways of providing prompts and materials simultaneously due to the retrieval of original text materials (see Figure 11).



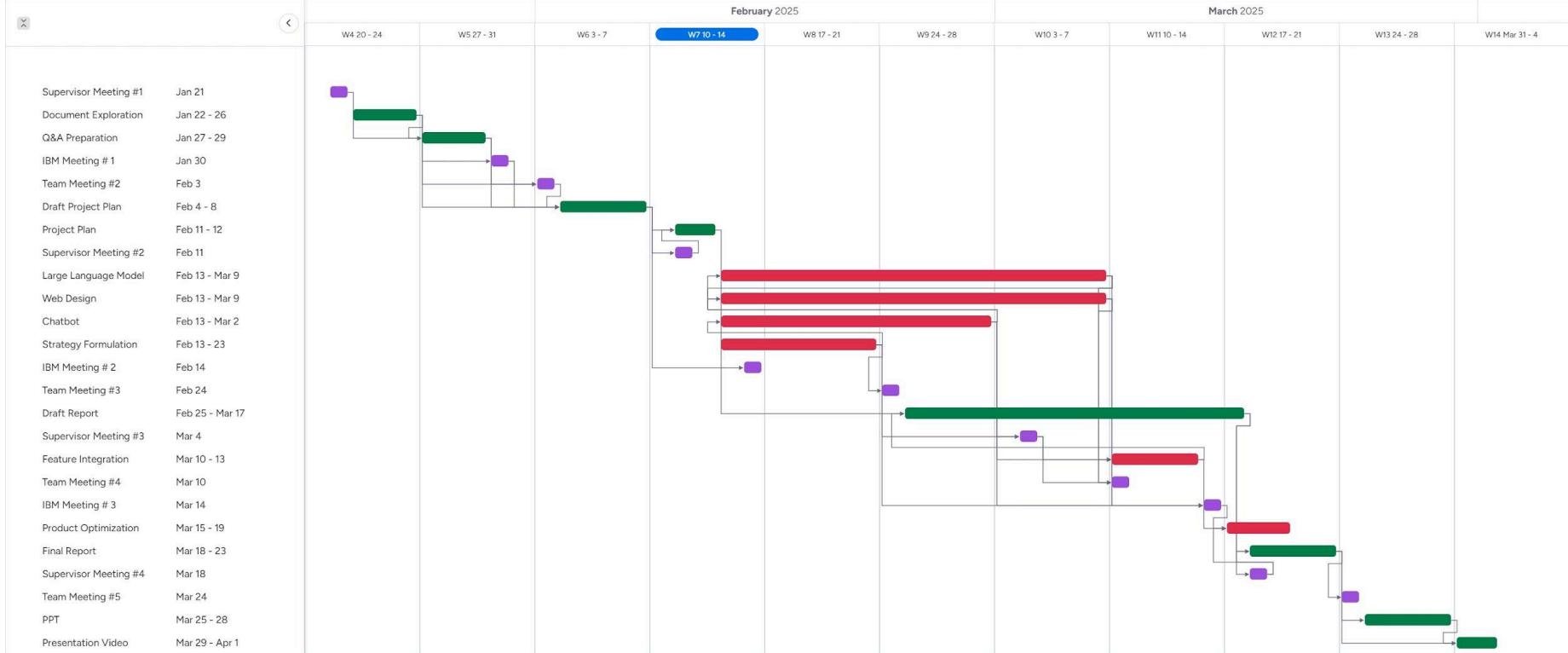
*Figure 11.* Retrieval-Augmented Generation Workflow

*Note.* Adapted from Belagatti (2024).

#### **4. Effective Teamwork**

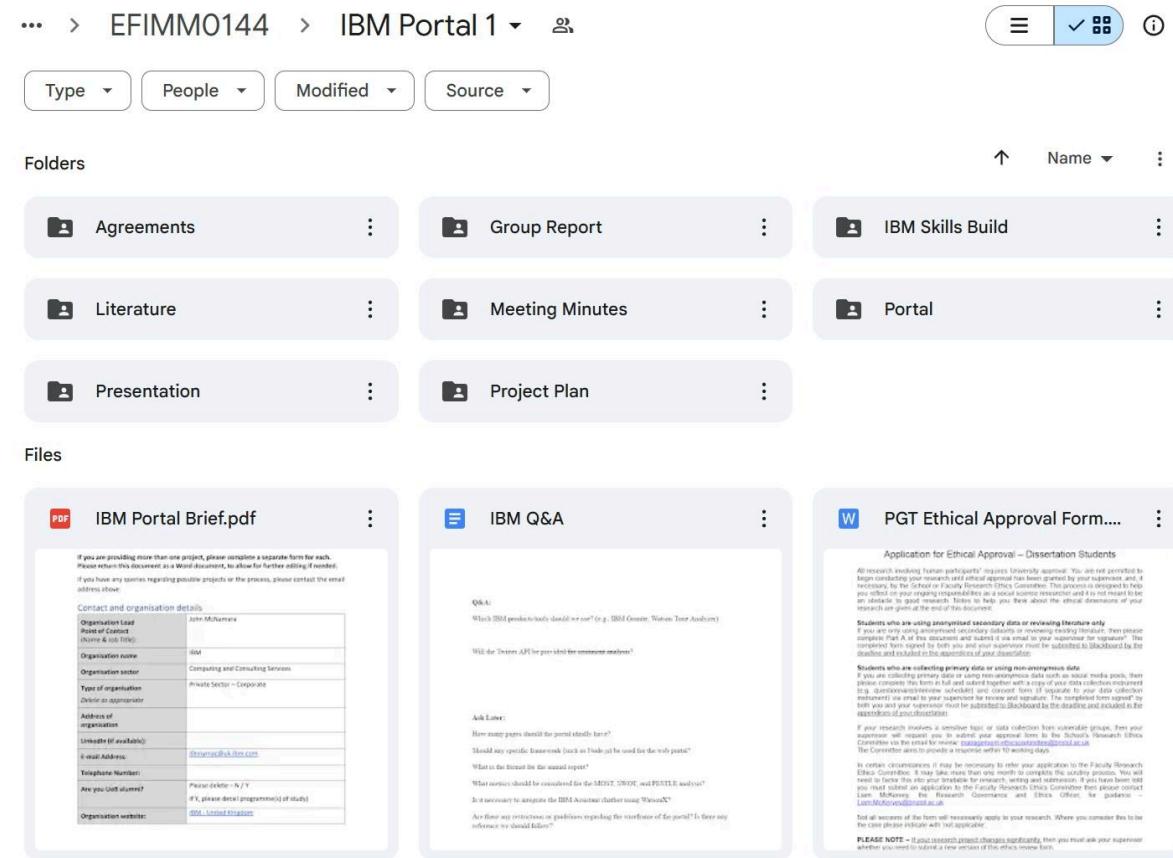
##### **4.1 Project Collaboration Management**

To create a comprehensive platform for analyzing the company's annual report and generating data-driven insights, a dynamic project management approach, collaboration between team members with different professional backgrounds, and a strong technology implementation strategy are required. Early in the process, the team recognized the importance of an adaptive project management strategy. To this end, an agile collaboration platform built with Monday Work Management as the core was adopted, with short iterative development cycles, supplemented by frequent progress reviews. The tool allows clear milestones and measurable results, improves the transparency of progress tracking and clarifies role allocation by breaking down tasks into manageable sprints (see Figure 12).



**Figure 12.** Project Gantt Chart

Effective communication emerged as another critical factor in the project's success. Teams Meeting was utilised in conjunction with regular offline planning and review meetings. This approach ensured continuous and dynamic communication, keeping all team members consistently informed and engaged. In addition, Google Drive served as a repository for the strategic outline, requirements documents, and prototype designs of the project, further facilitating seamless information sharing and collaboration (see Figure 13).

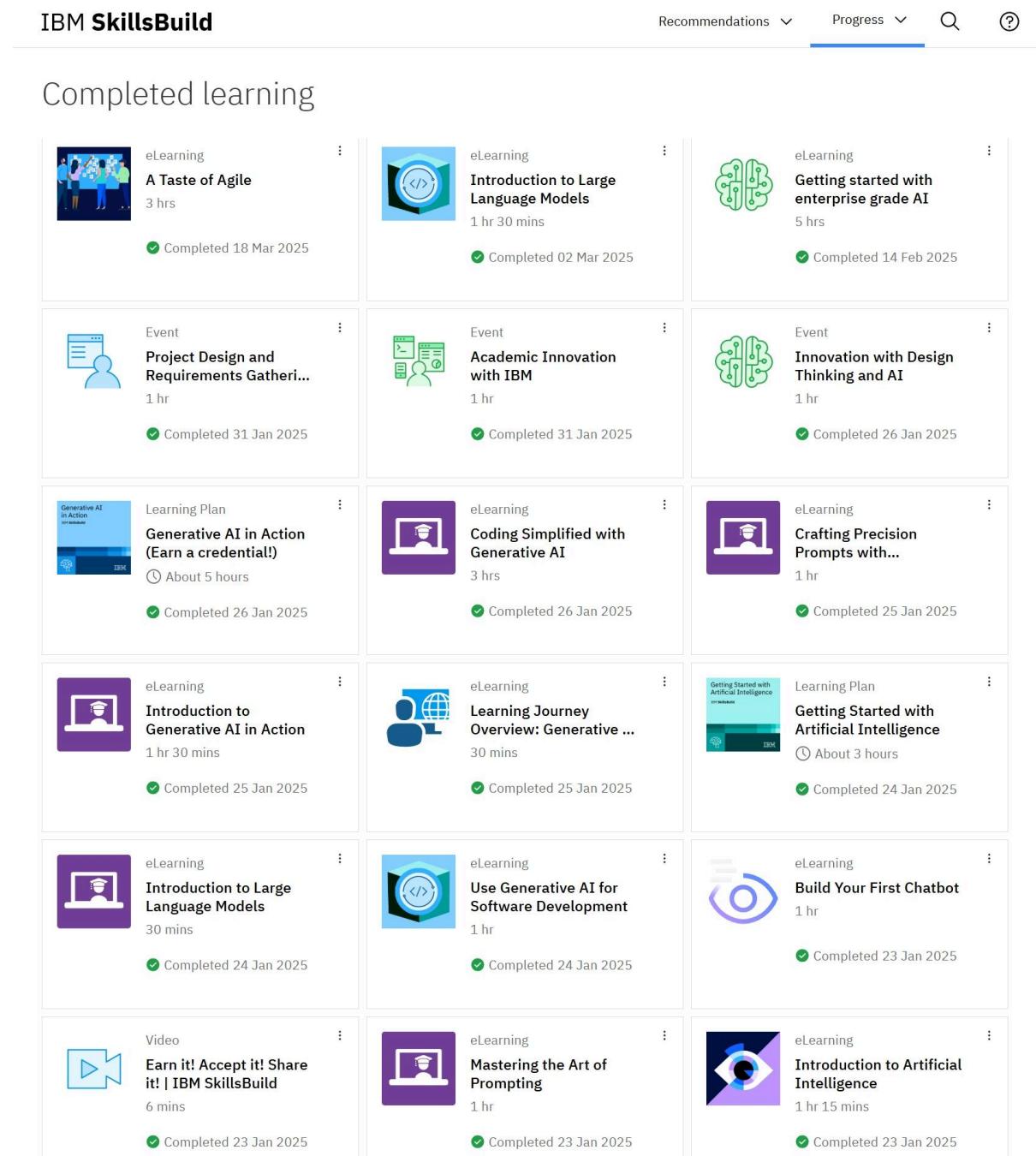


**Figure 13.** Project Files in Google Drive

## 4.2 Skills Gaps and Challenges

Despite establishing an effective collaboration infrastructure, the project encountered significant challenges stemming from the varied professional backgrounds and differing technical expertise within the team. None of the members had previous experience developing similar complex systems, which initially created considerable uncertainty in terms of task allocation and effective collaboration between technical and non-technical roles. To bridge this skills gap, members participated in targeted educational courses through IBM SkillsBuild, a learning website provided by IBM. Courses included agile methods for project leaders, user experience design for front-end developers, and ethical considerations in LLM

deployment for back-end developers (see Figure 14). Although this preparation requires a significant time investment, it provides foundational knowledge and unified team goals, ultimately promoting mutual understanding and effective cross-disciplinary collaboration.



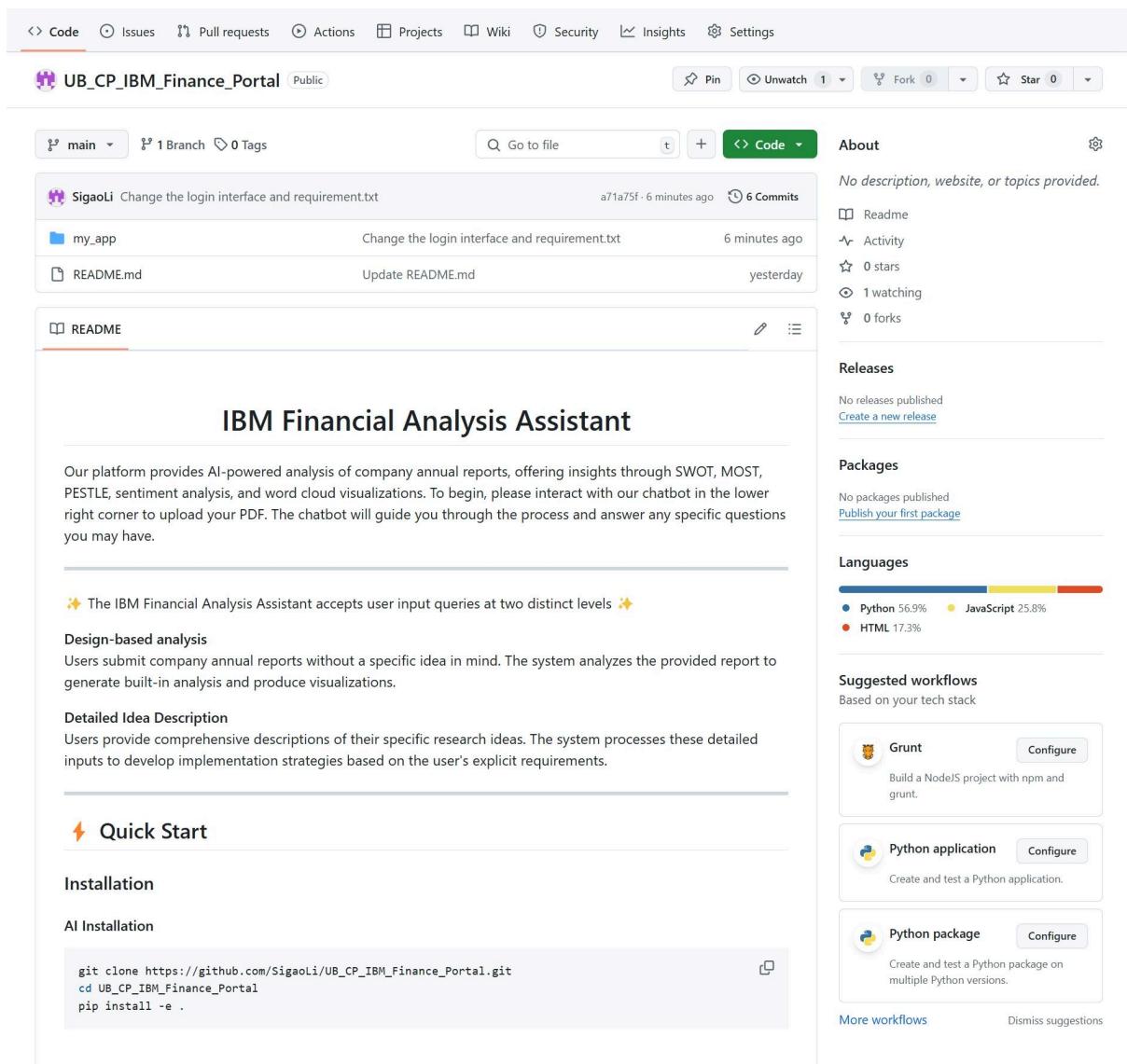
The screenshot shows the 'Completed learning' section of the IBM SkillsBuild interface. At the top, there are navigation links: 'Recommendations', 'Progress' (which is underlined), a search icon, and a help icon. Below this, the title 'Completed learning' is displayed. The main area consists of a grid of 15 items, each representing a completed learning activity. The items are organized into four rows and three columns. Each item includes a thumbnail image, the activity type (eLearning, Event, or Learning Plan), the title, duration, completion date, and a 'Completed' status indicator.

Activity Type	Title	Duration	Completion Date
eLearning	A Taste of Agile	3 hrs	Completed 18 Mar 2025
eLearning	Introduction to Large Language Models	1 hr 30 mins	Completed 02 Mar 2025
eLearning	Getting started with enterprise grade AI	5 hrs	Completed 14 Feb 2025
Event	Project Design and Requirements Gather...	1 hr	Completed 31 Jan 2025
Event	Academic Innovation with IBM	1 hr	Completed 31 Jan 2025
Event	Innovation with Design Thinking and AI	1 hr	Completed 26 Jan 2025
Learning Plan	Generative AI in Action (Earn a credential!)	About 5 hours	Completed 26 Jan 2025
eLearning	Coding Simplified with Generative AI	3 hrs	Completed 26 Jan 2025
eLearning	Crafting Precision Prompts with...	1 hr	Completed 25 Jan 2025
eLearning	Introduction to Generative AI in Action	1 hr 30 mins	Completed 25 Jan 2025
eLearning	Learning Journey Overview: Generative ...	30 mins	Completed 25 Jan 2025
Learning Plan	Getting Started with Artificial Intelligence	About 3 hours	Completed 24 Jan 2025
eLearning	Introduction to Large Language Models	30 mins	Completed 24 Jan 2025
eLearning	Use Generative AI for Software Development	1 hr	Completed 24 Jan 2025
eLearning	Build Your First Chatbot	1 hr	Completed 23 Jan 2025
Video	Earn it! Accept it! Share it!   IBM SkillsBuild	6 mins	Completed 23 Jan 2025
eLearning	Mastering the Art of Prompting	1 hr	Completed 23 Jan 2025
eLearning	Introduction to Artificial Intelligence	1 hr 15 mins	Completed 23 Jan 2025

**Figure 14.** Completed Learning Examples

Another challenge was the need to integrate multiple version control, data processing, and analysis tools into a cohesive project framework. To overcome the compatibility and stability issues inherent in multi-language and multi-tool settings, Google Colab was used to build an interactive sandbox environment. This approach enabled all team members,

including non-technical contributors, to participate actively in exploratory data analysis, model prototyping, and the development of proof-of-concept demonstrations in real time. However, technical difficulties were inevitable due to the complexity of running a local LLM and generating meaningful outputs. In the later stage of the project, Python scripts exhibited dependency conflicts and performance bottlenecks. These issues prompted the team to shift to GitHub, using it as a central repository for code and systematically logging and resolving errors through issue tracking (see Figure 15 and Appendix B). This open communication reduced redundant work and accelerated troubleshooting, relieving the burden on developers while allowing non-technical members to experiment in a controlled technical environment.



**Figure 15.** Coding Files in GitHub

Overall, the development of this project highlights the interplay of structured project management, interdisciplinary collaboration, and adaptive problem-solving in a technically

complex environment. By adopting iterative planning, encouraging cross-domain participation, and strictly documenting development cycles, the team transformed initial obstacles into catalysts for learning and innovation. Through careful coordination and common goals, and leveraging diverse expertise, the team achieved results beyond what any single contributor could achieve alone.

## 5. Contribution Statement

**Table 2.** Team Members Contribute, Rating and Comment

Student Number	Contribution (Report)	Contribution (Other)	Rating	Comments
2638795	Effective Teamwork	Backend and Large Language Model Design	<i>Excellent</i>	N/A
2543110	Technical Development	Large Language Model Design	<i>Excellent</i>	N/A
2546779	Analysis Tools	Prompt Word Engineering	<i>Excellent</i>	N/A
2359084	PowerPoint	Chatbot Design	<i>Excellent</i>	N/A
2520054	Analytics Problem	Front-end UI	<i>Excellent</i>	N/A
2550514	Web Portal	Prompt Word Engineering	<i>Excellent</i>	N/A

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## 7. Appendix A

### *Appendix A1.* Introduction of MOST Analysis

The MOST analysis is a strategic planning tool that aligns a company's goals with its internal capabilities. It consists of four key elements: Mission, Objectives, Strategy, and Tactics. Mission defines a company's core vision. Corporate Social Responsibility (CSR) aligns business strategy with social and environmental responsibility (Dupire and M'Zali, 2018), providing direction for market positioning. The "meta-goals" that guide business policies and processes (Fischer et al., 2020). Understanding the objectives of companies helps investors assess its direction and make informed decisions. Strategy outlines how a company leverages resources and capabilities to enhance competitiveness and achieve its goals (Farida and Setiawan, 2022). A strong strategy of a company is a crucial factor in investment evaluation. Tactics consist of micro-strategies that bridge the gap between strategy and operations, ensuring alignment between strategic objectives and execution (Okongwu et al., 2016). Understanding tactical planning allows investors to evaluate a company's ability to implement its strategy effectively.

### *Appendix A2.* Introduction of SWOT Analysis

SWOT analysis evaluates a company's market position with its internal and external environments (Karim et al., 2020). Strengths assist users in identifying a company's fundamental competencies, such as finance, technology, branding, and others. Firms with technological barriers or substantial brand equity can sustain enduring competitiveness and are seen as long-term investments for investors (Krishna and Kim, 2021). Weaknesses assist investors in recognizing potential investment risks, like significant financial vulnerability or excessive dependence on a specific business. According to Asghar et al. (2020), if the annual report omits discussion regarding the stability of the top management team or frequent alterations within the auditing organization, the firm may possess governance concerns that warrant investor scrutiny. Opportunities emphasize growth possibilities in the external environment, including industry trends dividends, and prospective alliances or acquisitions. For instance, sectors aligned with government policy support are suitable for thematic investments by investors (Gottfried et al., 2018). Threats highlight dangers to the firm from the external environment, such as policy risks and supply chain disruption threats. For instance, increased rivalry within the business and the onset of price wars can result in the contraction of corporate profit margins, necessitating investor vigilance (Wang, 2024).

### ***Appendix A3.*** Introduction of PESTLE Analysis

PESTLE analysis is a key tool for identifying factors influencing business decisions. Political factors such as government regulations and trade policies impact taxes and incentives (Zheng et al., 2025). Trade policy uncertainty (TPU) increases financing challenges leading to more cautious financial strategies. Economic factors like inflation and interest rates affect financial stability and market valuation (Denziana et al., 2014). Proper economic analysis helps optimize financial strategies and mitigate risks. Social factors such as consumer trends and globalization drive corporate strategy adjustments, with adaptability ensuring a competitive edge. Technological factors enhance efficiency and competitiveness (Koellinger, 2008). Therefore, understanding the technology situation is crucial for investors. Legal factors influence compliance costs, investor protection, and corporate governance (Cumming et al., 2017). Investors need to understand the legal context to scrutinize industry and company conditions.

Prompts serve as carefully constructed inputs designed to guide local LLM in generating specific, relevant, and accurate responses. They provide context, clarity, and focus, enabling the LLM to understand the intent and scope of each query. In this project, a distinct set of prompts will be created for each analysis to ensure that the LLM receives precise instructions tailored to the individual analytical objectives. By using separate prompts for each task, LLM can clearly define the questions being asked, control the direction of the responses, and ensure consistency and relevance in the insights derived from the LLM's outputs.

### ***Appendix A4.*** Prompt to Perform SWOT Analysis

Context: ***The actual text is omitted here.***

You are a senior business analysis expert. Using the provided company's annual report, deliver a comprehensive SWOT analysis. Respond strictly using the format below and include nothing else:  
 <SWOT\_ANALYSIS>  
 - Strengths: [Identify strengths such as brand equity, financial stability, or market dominance.]  
 - Weaknesses: [Identify resource gaps, operational inefficiencies, or financial vulnerabilities.]  
 - Opportunities: [Evaluate market trends offering growth potential.]  
 - Threats: [Assess competitive pressures and economic risks.]

### **Appendix A5.** Prompt to Perform PESTLE Analysis

Context: *The actual text is omitted here.*

You are a senior business analysis expert. Based on the company's annual report provided, deliver a detailed PESTLE analysis. Respond strictly following the format below, and include nothing else:  
 <PESTLE\_ANALYSIS>  
 - Political:  
   · [Analyze government policies and regulatory impacts.]  
   · [Assess political stability and international relations.]  
 - Economic:  
   · [Evaluate economic trends like GDP growth and inflation.]  
   · [Discuss market cycles and consumer spending habits.]  
 - Social:  
   · [Describe demographic shifts and consumer behavior trends.]  
   · [Address cultural influences and lifestyle changes.]  
 - Technological:  
   · [Analyze innovation trends and digital transformation initiatives.]  
   · [Assess R&D investments and technology adoption.]  
 - Legal:  
   · [Examine regulatory compliance and legal challenges.]  
   · [Discuss intellectual property and related legal matters.]  
 - Environmental:  
   · [Assess sustainability practices and environmental regulations.]  
   · [Evaluate impacts of climate change and resource availability.]

### **Appendix A6.** Prompt to Perform Sentiment Analysis

Context: *The actual text is omitted here.*

You are a senior business analysis expert. Using the provided company's annual report, deliver a clear SENTIMENT analysis. Respond strictly using the format below and include nothing else:  
 <SENTIMENT\_ANALYSIS>  
 - Positive Sentiment:  
   · [Summarize positive statements, optimistic views, and strengths.]  
   · [Highlight favorable results or achievements.]  
 - Negative Sentiment:  
   · [Summarize negative observations, criticisms, or concerns.]  
   · [Highlight financial, operational, or strategic issues.]  
 - Neutral Observations:  
   · [List neutral statements that convey facts or general information.]  
   · [Mention descriptive data without sentiment bias.]  
 - Overall Sentiment:  
   · [Clearly state if the overall sentiment is positive, negative, or neutral, with justification.]

### **Appendix A7.** Prompt to Perform Additional Analysis

Context: *The actual text is omitted here.*

You are a senior business analysis expert. Using the provided company's annual report, respond comprehensively to the following request: Custom analysis. Respond strictly using the format below and include nothing else:  
 <ADDITIONAL\_ANALYSIS>  
 Request:  
 Custom analysis  
 - Analysis:  
   · [Provide detailed analysis addressing the user's request clearly.]  
   · [Include specific insights or evidence relevant to the request.]

## 8. Appendix B

*Appendix B1.* GitHub Link

[https://github.com/SigaoLi/UB\\_CP\\_IBM\\_Finance\\_Portal](https://github.com/SigaoLi/UB_CP_IBM_Finance_Portal)