Company Brain: A Machine Learning and Time Series Analysis–Based AI Solution for Management Decision Support

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Abstract— **This paper presents the development and implementation of an intelligent system for automated analysis and decision feedback based on enterprise documents. Leveraging Large Language Models (LLMs) and state-of-the-art OCR technology, the system ingests a range of business documents (e.g., strategy papers, KPI reports, compliance guidelines), extracts key information, and provides structured decision support tailored to stakeholder queries. The proposed solution aims to bridge the gap between unstructured enterprise knowledge and actionable, explainable recommendations, enabling faster and more transparent decision processes at the management level.**

Keywords: Intelligent decision support, enterprise documents, knowledge extraction, large language models, business analytics, OCR, AI systems.

I. Introduction

THE increasing complexity and scale of modern organizations require effective mechanisms to transform large volumes of unstructured business documents into actionable knowledge. Traditionally, decision-making at the executive level relies heavily on manual analysis of disparate reports and stakeholder communication. With recent advances in artificial intelligence—particularly in natural language processing (NLP) and large language models—there is significant potential to automate and augment enterprise decision processes. In this paper, I present "Company Brain," an intelligent analysis and decision-support application that enables organizations to upload internal documents and receive high-level, context-aware feedback on strategic questions. System is inspired by recent work on intelligent monitoring and decision systems in engineering domains [1], but targets the unique needs of business management and corporate governance.

II. System Architecture and Instrumentation

The core system consists of the following components:

- **Data Ingestion Module:** Accepts various enterprise documents (PDFs, images, reports) via a user-friendly interface.

- **OCR and Preprocessing:** Employs Azure Form Recognizer to extract textual content from scanned documents, ensuring high accuracy for both structured and unstructured formats.

- **Stakeholder Query Input:** Users enter free-text questions or scenarios (e.g., "What are the risks of merging two departments?"), which frame the scope of the analysis.

- **Knowledge Extraction & LLM Module:** Utilizes large language models (OpenAI GPT) to extract entities, relationships, KPIs, and strategic context from the uploaded documents and align them with the stakeholder's question.

- **Decision Feedback Generation:** The system synthesizes a structured, context-aware response, referencing relevant information from the provided documents and applying reasoning frameworks (KPIs, ROI, compliance, governance).

- **User Interface & Session Control:** Built with Streamlit for web-based access, supporting iterative analysis and resetting for new queries.
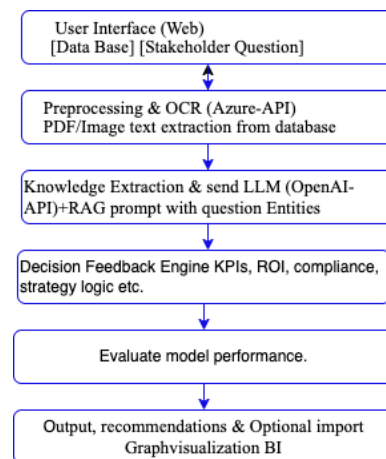
III. Data Processing and Analysis

A. Standardization and Preprocessing

Document ingestion begins from company database or in our

blueprint project with files uploaded to consider the decision and OCR processing. OCR API extracted text is standardized (removal of formatting artifacts, consolidation of multi-page content) to facilitate reliable analysis.

B. Knowledge Extraction and Modeling

The LLM module is prompted with the document content and the user's query. It performs:

- Entity extraction (e.g., departments, stakeholders, KPIs)
- Relationship mapping (linking data points across documents)
- Contextual reasoning (connecting document facts to the stakeholder's scenario)

C. Visualisation and User Interaction

Extracted information and generated feedback are displayed in a clear, sectioned interface. The user is presented with:

- The uploaded document text (for verification)
- Their query (separated for clarity)
- The system's structured feedback (recommendations, risks, relevant KPIs, potential conflicts)

IV.　Intelligent Decision Support

The core decision-support logic includes:

- Context-aware analysis: The system relates the stakeholder's question to relevant strategic, operational, and compliance information extracted from documents.
- Model-based recommendations: Responses reference KPIs, ROI, governance, and possible risk factors.
- Iterative exploration: Users can reset the session to explore additional scenarios or upload new documents.

V.　Case Study and Results

demonstrate the system with example business questions, such as evaluating the impact of a departmental reorganization or assessing investment proposals. The AI-generated feedback provides structured, explainable recommendations grounded in the uploaded documentation. This can also build individually according to enterprise visions, concepts, and references. For example, which chain management they are using e.g. six sigma, lean management, prince2, or any other management framework to be considered.

VI.　Discussion

prototype shows that integrating OCR, LLMs, and domain-driven prompts can deliver practical decision support for business users. The main challenges involve document heterogeneity, prompt design for accurate LLM behavior, and handling domain-specific language.

Potential future work includes:

- Integration of knowledge graph visualizations
- Extension to multiple simultaneous document analysis

- Enhanced compliance and audit trail features

VII.　Conclusion

The proposed "Company Brain" proposal demonstrates an individual effective approach to bridging unstructured business knowledge and actionable, explainable AI-driven decision support for each enterprise, started with consultation companies' values individually through building sustainable and flexible AI model to help managerial levels and stakeholder in daily basis or help to build long-term strategy by enabling them to interrogate internal documents with high-level queries, the system supports more informed, transparent, and agile management.

VIII.　Future Work

While the current implementation demonstrates the effectiveness of integrating LLM-based reasoning with document analysis for executive decision support, several directions for future work are envisioned:

First, the system can be extended to build individualized machine learning models tailored to an organization's unique data landscape. This includes developing statistical and time series analysis modules that align with both the company's IT infrastructure and its long-term vision and business concepts. Such models would enable the prediction of key performance indicators (KPIs), anomaly detection in operational processes, and the simulation of various strategic scenarios.

Second, an important area of development is the automated alignment of extracted business knowledge with enterprise ontologies and domain-specific taxonomies. By constructing an integrated knowledge graph, the system could offer more granular reasoning and cross-referencing capabilities, further supporting explainable and auditable decision-making. Additionally, future iterations could integrate real-time data streams from operational IT systems and external market sources, enabling the platform to offer dynamic, up-to-date insights. Incorporating advanced visualization tools and interactive dashboards would enhance user engagement and facilitate deeper analysis of trends and causal relationships. Finally, there is significant potential to introduce automated benchmarking and recommendation engines, which compare internal company performance against industry standards and best practices, providing executives with proactive, context-aware strategic guidance.

References

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