

# Project Report: Multi-Level AI Investment Report Generator

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## 1. Project Overview

This project aims to build a lightweight, modular AI-powered system that generates detailed investment reports for selected companies based on financial data and textual knowledge retrieval. The system leverages a multi-level agent architecture to organize data fetching, analysis, and report generation. The primary goal is to provide rich, structured, and insightful financial summaries, comparisons, and visualizations, accessible through a user-friendly Streamlit web interface.

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## 2. Tech Stack & Methodology

- **Programming Language:** Python 3.10+
- **AI Models:** Google Gemini API (Gemma 3 27B IT) for all natural language generation and summarization tasks, replacing Hugging Face models for improved performance and cost-efficiency.
- **Libraries & Tools:**
  - `streamlit` for the web UI
  - `yfinance` for fetching financial metrics
  - `plotly` for generating interactive financial charts
  - `requests` for API calls
  - `python-dotenv` for environment variable management
- **Architecture:** Modular agent-based design with dedicated components for planning, working, and executive control.

- **Data Retrieval:** Retrieval-Augmented Generation (RAG) pattern using custom knowledge retriever.
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### 3. How Exactly Is Your Input Processed

- **User Input:** Users select companies and financial metrics via dropdowns on the Streamlit app.
  - **Parsing:** Due to lightweight design constraints, NLP parsing of free-text input is removed; user selection drives report generation.
  - **Data Fetching:** The Planning Agent uses **yfinance** to fetch live financial metrics and retrieves company text data via RAG.
  - **AI Processing:** Textual summaries and detailed reports are generated via the Gemini API (Gemma model) through the Gemma client wrapper.
  - **Report Assembly:** The Worker Agent compiles generated content, including executive summaries, detailed company profiles, financial charts, and interpretations, into a cohesive HTML report.
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### 4. Structural Level

- **Frontend:** Streamlit UI providing multi-select dropdowns and report rendering.
- **Executive Agent:** Coordinates parsing, validation, and orchestrates planning and worker agents.
- **Planning Agent:** Handles financial data retrieval and textual summarization.
- **Worker Agent:** Performs language generation for detailed report sections and creates charts.
- **Utility Modules:** Encapsulate chart generation, API clients, and search fallback mechanisms.

- **Gemma Client:** Centralized wrapper managing all calls to the Gemini AI model.
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## 5. Role of AI (Gemma Model) in This Project

- Replaces previous Hugging Face models to handle all text generation tasks:
    - Summarizing raw financial and company data
    - Generating executive summaries
    - Producing detailed company profiles
    - Creating comparative financial interpretations
  - AI ensures natural, coherent, and comprehensive text outputs, enhancing report quality.
  - Offloads complex NLP processing from local resources, enabling lightweight app deployment.
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## 6. Development Tools

- **Python IDE:** VS Code / PyCharm
  - **API Clients:** `google-genai` Python SDK for Gemini API access
  - **Version Control:** Git / GitHub for source management
  - **Environment Management:** `python-dotenv` to securely manage API keys
  - **Testing:** Local Streamlit app for iterative UI and backend validation
  - **Logging:** Python `logging` for error monitoring and debugging
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## 7. Key Learnings

- Successfully integrated Google Gemini's Gemma model, improving generation quality and simplifying API usage.
  - Learned to architect AI workflows with modular agents to separate concerns clearly.
  - Discovered challenges in dependency conflicts, requiring removal of spaCy and simplification of NLP.
  - Understood the importance of balancing feature richness with app lightweighness for user experience.
  - Enhanced ability to dynamically generate and embed Plotly charts inside generated HTML reports.
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## 8. Reflections & Takeaways

- Removing heavy NLP dependencies like spaCy in favor of lightweight parsing preserves system simplicity without sacrificing core functionality.
  - Leveraging large AI models via cloud APIs reduces local compute needs but necessitates robust error handling and rate limiting.
  - Modular design allowed seamless swapping of underlying AI models (Hugging Face → Gemma) with minimal disruption.
  - Streamlit proves to be an excellent framework for rapid prototyping of interactive data-driven AI applications.
  - Future improvements could include reintroducing NLP parsing via lightweight models or GPT itself, improving UI/UX, and enabling PDF export functionality.
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## 9. Conclusion

This project demonstrates how to build a practical, modular AI system for financial report generation by combining live financial data, retrieval-augmented textual knowledge, and

## Snippets:

# Investment Report

## Executive Summary

**## Tata Motors: Comprehensive Executive Summary (as of 2025)**

**\*\*Introduction:\*\*** Tata Motors Limited is a global automobile manufacturer headquartered in Mumbai, India. It is a part of the Tata Group, one of India's largest conglomerates. The company's history is deeply intertwined with the industrial development of India, and it has evolved from a manufacturer of locomotives to a significant player in the global automotive landscape. This summary provides a detailed overview of Tata Motors, encompassing its historical trajectory, recent performance, market positioning, strategic initiatives, inherent risks, emerging opportunities, and a comprehensive future outlook as of 2025. The analysis will cover both its commercial vehicle (CV) and passenger vehicle (PV) segments, as well as its electric vehicle (EV) ambitions and international operations, particularly Jaguar Land Rover (JLR).

**\*\*Company History & Evolution:\*\*** The origins of Tata Motors can be traced back to 1863 with the establishment of Alcocks, a British firm that manufactured carriages and locomotives in India. In 1945, Tata Engineering and Locomotive Company (TELCO) was established, initially focusing on manufacturing locomotives. The 1950s marked a pivotal shift with the company venturing into commercial vehicle production, collaborating with Daimler-Benz. The launch of the Tata 407 light commercial vehicle in 1954 revolutionized the Indian transportation sector. The 1980s saw Tata Motors diversifying into passenger vehicles, with the launch of the Tata Sierra, India's first indigenous sports utility vehicle. However, the true breakthrough came in 2008 with the introduction of the Tata Nano, envisioned as the world's cheapest car. While the Nano ultimately faced challenges, it demonstrated Tata Motors' ambition to democratize mobility. A landmark moment in Tata Motors' history was the acquisition of Jaguar Land Rover (JLR) from Ford Motor Company in 2008. This acquisition catapulted Tata Motors onto the global stage, providing access to premium brands, advanced technologies, and established international markets. Since then, JLR has been a significant contributor to Tata Motors' revenue and profitability, though it has also presented its own set of challenges. The company has consistently invested in research and development, focusing on innovation and sustainability.

**\*\*Recent Performance (2023-2025):\*\*** The period between 2023 and 2025 has been characterized by a complex interplay of global economic factors, supply chain disruptions, and evolving consumer preferences. Tata Motors has demonstrated resilience, navigating

## **Project Note**

Due to concurrent academic commitments, including an important exam during the project period, the time available for development and refinement was limited. Given additional time, further improvements could be made, such as enhancing the natural language processing capabilities, integrating more robust error handling, and expanding the range of financial data sources to improve report comprehensiveness. This project lays a solid foundation, and with more time, it could be extended to deliver even greater value and sophistication.