Financial Analysis of Stocks Using AI Agents

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Abstract: This proposed work showcases a minimalistic yet impactful approach to financial analysis using AI agents. Leveraging Python and open-source libraries, the system demonstrates the ability to autonomously gather, process, and analyse stock market data. By utilizing tools such as phi data and Yahoo Finance, the work highlights how AI-driven automation can streamline the analysis process for individual investors and small-scale analysts.

1 INTRODUCTION

Analysing financial data has historically been tedious and a laborious process, needing a significant amount of manual wires in gathering, cleaning, understanding trends and assessing performance. AI agents are growing as disruptive forces in finance powered by the developments made in AI and machine learning (ML) over the past several years. The agents use automation, natural language processing (NLP), as well as deep and reinforcement learning methods to simplify financial analysis, reduce human errors, and make more efficient decisions.

In this paper, we present a cloud-based AI-driven financial analysis system built with Phi data an advanced data pipeline automation framework. It comprises of machine learning models, API-based data extraction, and predictive analytics to autonomously collect financial data, analyse stock trends, and provide actionable insights. Utilizing AI-based approaches, this fluency describes how computational agents could change financial decision-making process. Automated workflows, scalable integration with the cloud, and AI-enhanced visualization tools make financial analysis both more accessible and more efficient.

In doing so, we hope to demonstrate the potential of AI-powered automation to democratize access to financial data and analytics, offering sophisticated analytical insights to individual income earners, analysts, and small businesses while serving as a bridge between the worlds of traditional finance and AI innovation.

Motivation.

The financial landscape is changing rapidly, thanks to a number of key trends: increased reliance on data-driven decision making and machine learning analytics. But the ability to apply sophisticated financial analysis tools remains predominantly in the hands of large institutions and hedge funds, which can afford top-tier computing infrastructure and proprietary AI models. Such advanced tools are typically out of reach for retailer investors, small-scale analysts and individual traders, negatively affecting the individual traders and the day traders decision-making process by depriving them of the instantaneous market information and AI-enhanced vision.

Our goal is to make this access gap smaller by building an intuitive and lightweight financial analysis system using AI agents and automation frameworks like phi data. The system enables you to use the system with no complex setups or high-cost software as it uses open-source tools, external APIs (Yahoo Finance API, for example), and pre-trained AI models. It helps users (with or without tech background) to easily monitor stock trends and identify anomalies as well as analyse financial sentiment from news articles and reports.

This work proposes a cheaper, real-time alternative to traditional financial analysis systems by streamlining the deployment steps and cutting down on the computation expenses. As a mission, we aim to democratise AI-based financial insights for individual investors, students, and finance freedom

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lovers to leverage the latest AI technologies without needing particular expertise and capital.

2 LITERATURE REVIEW

AI in Financial Analysis: According to research, AI is being increasingly used in sentiment analysis, market prediction, risk management, and market segmentation.

- Open-Source Tools: Frameworks like phi data can simplify AI development, according to research.
- Automation with AI Agents: The efficiency of agent-based systems in terms of reducing manual labour and increasing accuracy in financial applications is discussed in the papers.
- Challenges in AI Adoption: Problems like data quality, scalability, and user-friendliness persist.

3 CHALLENGES IN EXISTING SYSTEMS

The models like in faced with one of the main challenges

- Limited Accessibility: Most high-end tools come at a considerable cost which can prevent smaller investors from using them.
- Complexity: Most are too sophisticated, discouraging non-technical users.
- Data Gaps: Other tools may not pull in entire data sets.
- It is also true that information used has its stability and reliability depending on quality of data.

4 OBJECTIVES OF THE WORK

- Build an accessible and straightforward AI agent for financial data analysis.
- Automate data collection from reliable sources like Yahoo Finance.
- Deliver clear, actionable insights with minimal user input.
- Showcase the capabilities of AI agents in simplifying financial decision-making.

Innovation of the work.

The great innovation is the simplicity and efficiency of the work. Using Phidata, an AI-powered data engineering framework, the regulator creates a cohesive pipeline for extracting, processing, and analysing data. Phidata streamlines the deployment and monitoring of monetary knowledge analysing AI agents. Moreover, this work makes use of Yahoo Finance API to fetch real-time stock market data, ensuring continuous access to the latest financial information.

The system also utilizes machine learning models to analyse trends and detect anomalies, as well as NLP (Natural language processing) models for sentiment analysis of financial reports and news articles. Additionally, the summary generation module leverages large language models (LLMs) to translate raw data on stock performance into digestible insights and patterns that users can interpret.

While classical systems require significant manual labour and computational effort, this work focuses on simplicity, low-cost and fast turnaround time. With lightweight and capable AI agents, it removes the pain of a difficult configuration, bringing financial analysis to the world of the individual investor, small-scale analyst, and educational user. This powerful AI enabled automation also improves the accuracy of the analysis work while driving down both the cost of doing the work and the time it takes to deliver the analysis thereby making the financial insights accessible to the greater audience. Figure 1 show the LLM Agent System Architecture.

5 PROPOSED SYSTEM

In order to circumvent the limitations noticed in previous research, our proposed system presented several improvements to enable more efficient and intelligent stock market analysis through AI Agents. Our model empowers business analysis and democratizes financial interpretation by utilizing automated data collection, real-time querying, and AI-driven financial intelligence.

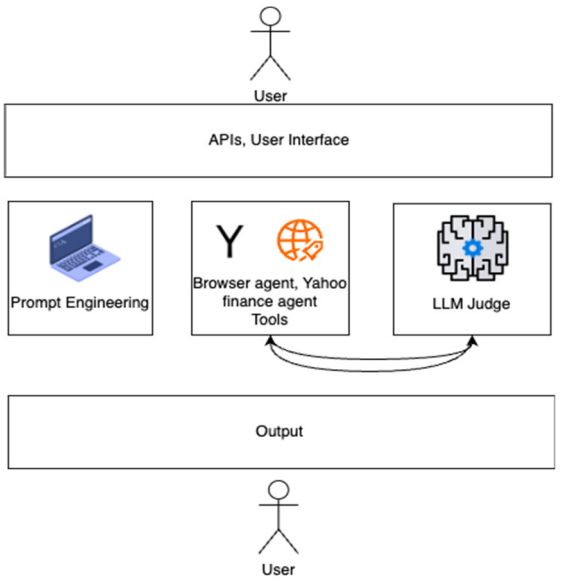

Figure 1: LLM agent system architecture.

5.1 Data Collection and Processing

Most existing financial analysis models depend on static data, our system dynamically fetches live stock market data using Yahoo Finance and other financial APIs. The use of AI agents, where the system pre-processes, normalizes, and stores this data for fast, efficient analysis.

5.2 Real-Time Query Interface

Our system allows for ad-hoc, user-defined queries in real-time a capability missing from many legacies financial tools. Rather than manually sifting through massive data, users key in stock symbols, time ranges, and financial metrics, retrieving relevant insights within seconds. Dynamic Stock Screening: Enables user-based stock filtering based on PE ratio, EPS, market trends and pricing power.

Trend Analysis Queries: to help investors to ask questions like "show stocks with the growing NPS score in the last quarter?"

Integration of Mind Trend to Conduct Sentiment Analysis: Based on news articles, earnings reports, financial announcements, and so forth to gauge market sentiment. A second core technology is the use of Generative AI for summarization in natural language. Our system does not simply present numerical data, as traditional models would, but transposes that data in human-readable financial insight. Figure 2 show the LLM-Based Financial Data Analysis Pipeline.

5.3 Algorithm Description

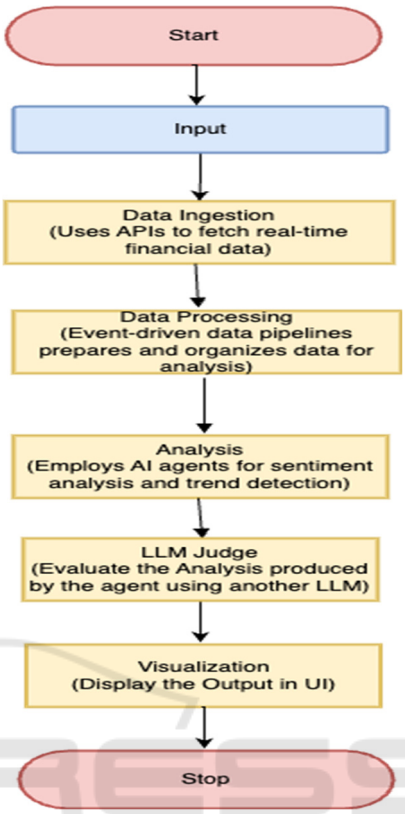

Figure 2: LLM-based financial data analysis pipeline.

Table 1: Input specifications:.

Input Type	Description
Stock Symbol	The ticker symbol of the stock (e.g., AAPL for Apple, TSLA for Tesla).
Timeframe	User-specified period for analysis (e.g., daily, weekly, monthly).
Financial Reports & News	Real-time news articles, reports, and sentiment data fetched from APIs.
User Query	Inputs related to specific financial metrics (e.g., revenue, P/E ratio).
Market Trends Data	Historical and real-time stock price data retrieved using Yahoo Finance API.

5.4 Data Collection Module

Utilizes Yahoo Finance API to collect real-time and historical stock price data, financial reports, and key performance indicators (KPIs). The Yahoo Finance API automatically updates stock data at defined intervals for continuous monitoring. Cleans raw financial data by handling missing values, anomalies, and noise. Transforms data into structured formats (CSV, JSON, Pandas DataFrames) for faster processing and analysis. Table 1 show the Input Specifications:

Phidata's automation capabilities streamline the data pipeline, ensuring real-time stock data updates without manual intervention.

5.5 AI-Based Analysis Module

Utilizes NLP models for sentiment analysis from financial reports and news articles:

Large Language Models (LLMs) (e.g., GPT-based models, FinBERT) analyze financial news, earnings reports, and social media sentiment.

Extracts positive, negative, or neutral sentiment for stocks and industries.

Identifies market-moving news and predicts investor sentiment shifts.

Implements machine learning models for trend forecasting and anomaly detection:

Uses time series forecasting models (LSTMs, ARIMA, and Transformer-based models) to predict stock price movements.

Detects unusual price fluctuations and alerts users about potential risks or investment opportunities.

Phidata facilitates efficient data pipelines, making it easier to process large volumes of stock market data quickly.

5.6 Query Interface Module

Accepts user-defined inputs (e.g., stock symbol, timeframe, financial metric):

Users can enter stock symbols, date ranges, and financial KPIs (e.g., P/E ratio, market cap, revenue growth).

Allows for custom queries related to stock trends, risk factors, and sector-specific performance.

Retrieves relevant stock trends, sentiment analysis, and predictive insights:

Combines real-time data with AI predictions to provide actionable investment insights.

Uses Phidata workflows to efficiently process and return query results in a structured format.

Enables interactive exploration of stock trends without requiring financial expertise.

5.7 Summary Generation Module

AI-powered engine for generating natural language summaries based on analysed financial information:

LLM-based report generation from stock data, sentiment analysis, and forecasts.

General impact of the financial news across stock price movements of the typical stocks and the future assessments of risk.

Instead of just stock data gives you intuitive insights:

Instead of showing complicated graphs and numbers, the system gives plain-text summaries (for example, "Stock X is seeing a good upward trend in light of strong quarterly earnings").

Allows investors lacking coding knowledge to get a picture of financial trends without advanced analytics capabilities.

5.8 LLM Judge Evaluation Module

Employs LLMs to review the output produced by the summary generation module:

Uses reinforcement learning with another Judge LLM to verify AI generated summaries are factually accurate and in the right context.

Aims Open source LLMs Llama 3.1 70 b versatile assume as true financial summaries through comparing to live inventory piece of evidence.

Minimizes human intervention and evaluates the accuracy of the output:

Conducts cross-check against the original data and results of sentiment analysis.

Note: Potential hallucinations or misleading information detected, providing reliable investment insights.

Lowers manual verification overhead, enabling automated, high-accuracy financial reporting.

6 CONCLUSIONS AND FUTURE WORK

This paper uses AI agents to collect real-time data, analyse sentiment, and query data based on user preferences to address major issues in Financial analysis. The system improves the decision-making process for investors and analysts by automating stock analysis and delivering AI-powered financial insights.

- Enhancing predictive analytics by incorporating deep learning models for more accurate stock price forecasting.
- Integrating multi-source financial data such as earnings transcripts, social media sentiment, and macroeconomic indicators for a more holistic analysis.
- Expanding real-time query capabilities by incorporating advanced NLP models for intuitive, conversational financial queries.
- Optimizing computational efficiency for large-scale financial datasets and real-time AI-driven stock recommendations.

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