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Agentic AI driven Stock Market Insights

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ABSTRACT: This project develops intelligent autonomous agents for stock market analysis using natural language, built on the Phidata framework. It integrates large language models like Groq to interpret financial queries and generate insightful, context-aware responses. Users can interact with the system to compare stocks, analyze trends, and get investment insights. The modular architecture supports easy customization and real-time interaction. It ensures secure API key management and offers personalized experiences by maintaining conversational context. This solution modernizes financial decision-making for both casual investors and professionals through a user-friendly interface.

KEYWORDS: Phidata Framework, Autonomous AI Agents, Stock Market Analysis, Large Language Models (LLMs), Financial Insights, Natural Language Processing (NLP), Investment Insights, Data Extraction, Multi-Agent Systems, API Integration, Market Trend Analysis

1. INTRODUCTION

This project focuses on leveraging advanced AI technologies to create intelligent, autonomous agents that can provide real-time, actionable insights into the stock market. Built using the Phidata framework, this system integrates Large Language Models (LLMs), such as Groq, to process and analyze vast amounts of financial data, enabling the agent to respond to complex queries in natural language. Users can interact with the system by asking for stock comparisons, company overviews, market trends, and investment recommendations, all through conversational interfaces. The modular architecture of the system allows for easy integration of custom tools, knowledge bases, and APIs to enhance the agent's financial analysis capabilities. These agents are designed to operate autonomously, making informed decisions and carrying out tasks without continuous human intervention. They utilize Natural Language Processing (NLP) techniques to understand and respond to user queries effectively, ensuring that even multi-turn conversations are handled smoothly. The project emphasizes flexibility, scalability, and ease of deployment, making it ideal for real-world financial applications. With the ability to integrate various data sources and external services, the agent can provide comprehensive and up-to-date insights to both casual investors and financial professionals. This project showcases the potential of AI-driven systems to modernize and simplify financial research by offering users a personalized, interactive, and efficient way to navigate complex stock market data and trends.

II. LITERATURE SURVEY

[1] Agentic AI Systems Applied to Tasks in Financial Services: Modeling and Model Risk Management Crews (February 2025) by Izunna Okpala, Ashkan Golgoon, Arjun Ravi Kannan.

This paper explores how agentic AI systems can be structured and applied to key tasks within financial services, especially focusing on model development, risk evaluation, and compliance. The authors present a framework where AI agents collaborate in teams or crews to handle data validation, modeling, and ongoing monitoring. The study emphasizes the modular and role-specific nature of these agents, highlighting how distributed responsibilities improve accuracy and efficiency in financial modeling. The paper also addresses the integration of domain expertise into agent workflows and

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provides a roadmap for scaling such systems in enterprise environments.

[2] AI Agents: Redefining Predictive Market Trend Analysis (21 March 2025) by Dr. Jagreet Kaur Gill.

This paper examines the role of AI agents in transforming predictive market trend analysis by leveraging real-time data, machine learning algorithms, and intelligent decision-making models. It highlights how agent-based systems can autonomously gather financial data, detect emerging patterns, and forecast market movements with improved accuracy. The study further explores the integration of AI agents with advanced analytics tools and emphasizes their ability to adapt to dynamic financial environments. The author concludes that AI agents significantly enhance the speed and precision of market predictions, making them invaluable tools in modern financial research and trading strategies.

[3] Building a Multi-Agent AI System for Financial Market Analysis (18 February 2025) by Adarsh Balan.

This article discusses the development of a multi-agent AI system tailored for financial market analysis, focusing on how individual agents can be assigned specialized roles such as data collection, trend detection, and report generation. It emphasizes the benefits of dividing responsibilities among agents to improve scalability and performance. The system leverages language models and real-time financial APIs to generate accurate and timely insights for investors. The paper also outlines the architecture used, highlighting the flexibility and modularity of the multi-agent design. The author concludes that this approach enhances the overall decision-making process by enabling simultaneous, cooperative analysis from multiple AI perspectives.

[4] A Comparative Review on Stock Market Prediction Using Artificial Intelligence (September 2024) by Pulok Sarker, Adnan Sayed, Abu Bakar Siddique, Avijit Saha Apu.

This paper reviews various AI techniques used in stock market prediction, such as neural networks, support vector machines, and deep learning models. It compares their accuracy, preprocessing needs, and adaptability to market changes. The authors highlight AI's strength in handling noisy and nonlinear financial data. Both short-term and long-term forecasting have improved through these methods. The study concludes that hybrid AI models offer the best results across diverse scenarios.

[5] FinVision: A Multi-Agent Framework for Stock Market Prediction (29 October 2024) by Sorouralsadat Fatemi, Yuheng Hu.

This paper introduces *FinVision*, a multi-agent framework designed to enhance stock market prediction by distributing tasks among specialized agents. Each agent focuses on a specific component such as data collection, sentiment analysis, trend detection, or forecasting. The study emphasizes the coordination between agents to improve prediction accuracy and scalability. By integrating natural language processing, historical data analysis, and real-time market feeds, FinVision demonstrates improved adaptability to dynamic market conditions.

III. EXISTING SYSTEM

Existing systems for financial stock analysis primarily depend on traditional dashboards and static data visualization tools, which require manual data input or predefined filters. These platforms typically lack real-time interactivity and do not support natural language queries, making them less accessible to users without financial expertise. Most existing tools use fixed algorithms and do not learn or adapt based on user interactions or changing market conditions. Additionally, they often fail to incorporate intelligent multi-agent collaboration or dynamic integration with external APIs for enriched analysis. As a result, the insights generated are generic, not personalized, and the systems are rigid, limiting their flexibility and effectiveness in delivering comprehensive and user-friendly financial analysis.

IV. DE-MERITS OF EXISTING SYSTEM

- Most existing systems lack personalized responses tailored to individual user preferences or investment goals.
- They typically do not support interactive, conversational interfaces, making them hard to use for non-experts.
- These tools often rely on outdated or static data, which limits real-time market insight capabilities.
- Current platforms don't use autonomous agents, so they require constant human input for analysis.
- Integration of external APIs or dynamic data sources is usually limited or not user-configurable.
- They are less scalable and modular, making it difficult to upgrade or add new financial tools and services.

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V. PROPOSED SYSTEM

The proposed system introduces autonomous AI agents capable of natural language interaction, designed to handle complex financial queries with accuracy. These agents integrate large language models like Groq to understand user input, generate insightful responses, compare stocks, and conduct market analysis using real-time data. The system employs a multi-agent architecture, allowing parallel processing of tasks such as data extraction, trend analysis, and forecasting, thereby improving overall efficiency. Advanced NLP techniques are utilized to ensure queries are understood contextually, enabling even non-experts to interact with ease. Its modular design supports seamless integration of APIs, tools, and external data sources, allowing adaptability to new techniques or markets. Real-time financial data integration ensures up-to-date insights on market trends. The user interface is designed to be intuitive and conversational, offering a smooth experience for both casual users and financial professionals. The architecture also supports scalability, making it suitable for high-volume use cases. The system enables flexible deployment, whether in testing environments or live production. Agents operate independently and intelligently, requiring minimal human oversight. This ensures high responsiveness and reliability in delivering financial insights. Customization options allow the platform to evolve with user needs and industry demands. Overall, the proposed system modernizes financial analysis with AI-powered, accessible intelligence.

The main objectives of our proposed system are:

- ✓ To develop autonomous AI agents capable of delivering accurate and meaningful financial insights using natural language.
- ✓ To integrate large language models (LLMs) like Groq for understanding user queries and generating context-aware financial responses.
- ✓ To design a modular and scalable architecture that allows easy integration of APIs, custom tools, and financial knowledge bases.
- ✓ To implement a user-friendly conversational interface that enables users to interact with the system without requiring technical or financial expertise.
- ✓ To ensure real-time data access and updates from external sources for up-to-date stock market information.



Fig 5.1: Proposed System Diagram



Fig 6.1: Methodology Diagram

This project involves building an AI-powered financial agent to help users gain insights into stock data. The process starts by collecting different types of financial documents, such as news articles, analyst ratings, and market reports. These documents are cleaned and processed to remove any unnecessary information. The cleaned data is then transformed into vector format using embedding techniques, allowing for fast search and matching. A vector database stores this embedded data for easy access. When a user submits a question related to a stock, the system uses Natural Language Processing (NLP) to understand the query. The AI agent then selects the most relevant tools to handle the question. These tools might fetch current prices, analyze stock fundamentals, or summarize analyst opinions. The agent acts as a controller that connects all parts of the system. It sends the user query to the right tools and gathers their responses. After gathering the information, the agent organizes the result and returns it to the user in a clear and readable format. The backend is powered by FastAPI for smooth interaction and scalability. The language model, hosted locally or in the cloud, ensures intelligent reasoning and responses. The system supports real-time data fetching and analysis. It is designed to be modular so new tools can be added easily. The agent reduces manual work and speeds up financial research. This makes stock insights more accessible to everyday users and analysts alike.

VII. RESULTS

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Fig 7.1: User interface showing a Finance AI Agent connected and ready for use.



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Fig 7.2: Finance AI Agent interface summarizing Tesla's analyst recommendations and latest news

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Fig 7.3: Comparison of Tesla and NVIDIA's stock data using the Finance AI Agent in Playground Interface

VIII. CONCLUSION AND FUTURE SCOPE

The project presents a powerful and innovative approach to financial analysis by combining the capabilities of autonomous AI agents, large language models, and real-time data integration. The system successfully addresses the challenge of interpreting complex financial data and delivering simplified, context-aware insights through a conversational interface. By leveraging multi-agent coordination, the system distributes tasks like trend detection, stock comparison, and market analysis efficiently, resulting in faster and more accurate outcomes. The use of a modular architecture and API enrichment further enhances its adaptability, allowing the system to scale as needed. Through natural language processing, the platform ensures a smooth user experience, empowering individuals with little to no financial background to make informed decisions. The system also demonstrates how AI can move beyond traditional data dashboards to become an interactive assistant in the financial domain. Overall, this project signifies a

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shift toward democratized financial intelligence, where powerful insights are accessible to everyone.

Looking ahead, the project can be expanded in several promising directions to further improve functionality and reach. Integration with more advanced financial datasets, including cryptocurrency trends, international markets, and ESG (Environmental, Social, and Governance) metrics, can significantly enhance the depth of analysis. Enhancements in agent autonomy could allow the system to proactively suggest investment strategies or send alerts based on user-defined triggers. Future versions could incorporate voice-based interactions using speech-to-text models for a more immersive experience. With increasing AI capabilities, the platform can also be trained on historical success patterns to offer predictive insights. Adding support for multilingual conversations would make the tool accessible to a global audience. Moreover, partnerships with brokerage APIs could transform the system into a full-fledged financial advisor platform. Security and ethical safeguards will also be crucial as the system expands, ensuring user data privacy and regulatory compliance. These future improvements aim to transform the tool into a comprehensive and intelligent financial companion.

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