Stock Analysis Chatbot

Akshaj Jauhri
Electronics and Communication Engineering
Manipal Institute of Tehnoplogy
Manipal, Karnataka, India
akshaj.jauhri@learner.manipal.edu

Aric Sharma
Electrical and Electronics Engineering
Manipal Institute of Tehnoplogy
Manipal, Karnataka, India
aric.sharma@learner.manipal.edu

***Abstract*— This report presents the design and implementation of a Stock Analysis Chatbot, which utilizes OpenAI's GPT-3.5 model for natural language processing and Yahoo Finance's API for retrieving stock data. The chatbot provides users with real-time stock information, including stock prices, simple moving averages (SMA), exponential moving averages (EMA), relative strength index (RSI), and graphical representations of stock prices. The chatbot comprehends both simple and complex inputs to fulfill user requests, offering a seamless and intuitive experience for stock analysis.**

Keywords*— *Stock Analysis Chatbot, OpenAI GPT-3.5, Natural Language Processing, Yahoo Finance API, Real-time Stock Information, Stock Prices, Simple Moving Averages (SMA), Exponential Moving Averages (EMA), Relative Strength Index (RSI)

I. Introduction

In today's fast-paced financial markets, access to timely and accurate stock information is crucial for investors and traders. However, extracting meaningful insights from vast amounts of data can be challenging. Chatbots equipped with natural language processing capabilities offer a user-friendly interface for accessing financial data and analysis.

In today's dynamic financial landscape, the stock market presents both opportunities and risks to investors. As investing becomes more accessible, there is a greater demand for simplified access to market insights. Our project, Stock Analysis Chatbot Assistant, addresses this need by leveraging AI technology to provide users with an easy-to-use interface for understanding market trends and making informed decisions.

Recognizing the complexities of navigating the stock market, our project stands out as a beacon of simplicity and insight. This chatbot, founded on the mission of democratizing access to stock market analyses and insights, employs artificial intelligence to provide users with an easy-to-use interface for understanding market trends, evaluating investment opportunities, and making informed decisions.

Motivated by growing interest in stock market participation and AI advancements, our chatbot aims at empowering novice and experienced investors with the tools they require to effectively navigate finance. This report illustrates the development and implementation of our chatbot, ranging from its features to its potential impact on financial literacy.

II. Methodology

A. System Architecture

The Stock Analysis Chatbot is built using Python programming language and integrates with OpenAI's GPT-3.5 model and Yahoo Finance API. The architecture comprises the following components:

Use the enter key to start a new paragraph. The appropriate spacing and indent are automatically applied.

1) User Interface: Implemented using Streamlit which is a Python library for building web applications.
2) OpenAI GPT-3.5 Model: Responsible for natural language understanding and generating responses to user queries.
3) Yahoo Finance API: Provides access to real-time stock data, including prices, moving averages, and other financial metrics.
4) Backend Functions: Implemented as Python functions to perform specific tasks such as retrieving stock prices, calculating moving averages, computing the RSI, and plotting stock price graphs.

B. Functionality

The Stock Analysis Chatbot offers the following functionalities:

1) Get Stock Price: Retrieves the latest stock price for a given company ticker symbol.
2) Calculate SMA: Computes the Simple Moving Average over a specified window period for a given stock.
3) Calculate EMA: Calculates the Exponential Moving Average over a specified window period for a given stock.
4) Calculate RSI: Determines the Relative Strength Index for a given stock, indicating its overbought or oversold conditions.
5) Plot Stock Price: Generates a graphical representation of the stock price trend over a specified period.

C. Implementation

The chatbot implementation involves defining Python functions to interact with the Yahoo Finance API for retrieving stock data and processing user queries. Streamlit is used to create a user-friendly interface for input and output interactions. OpenAI's GPT-3.5 model is utilized for understanding user inputs, generating responses, and invoking appropriate backend functions based on the user's request.

D. Usage

Users interact with the Stock Analysis Chatbot through a text input interface, where they can enter queries related to stock analysis. The chatbot processes the input, retrieves relevant data from Yahoo Finance, performs necessary calculations, and presents the results back to the user clearly and concisely.

III. Result

The Stock Analysis Chatbot successfully provides users with real-time stock information and analysis, as demonstrated by the following results:

Users can obtain the latest stock price by providing the ticker symbol or name of the desired company. For instance, querying the chatbot with the company name Apple returns the current stock price of Apple Inc. as shown in the screenshot below.

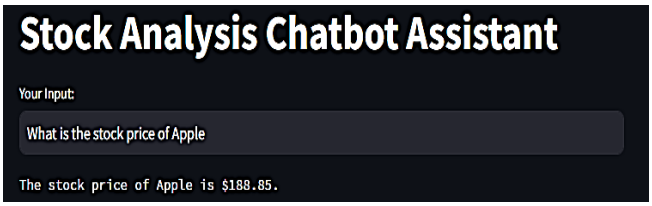

Fig. 1. Displaying Stock Price

Users can visualize the performance of the stock and identify trends and patterns for further analysis. An example plot for the stock price of Apple Inc. is displayed below.

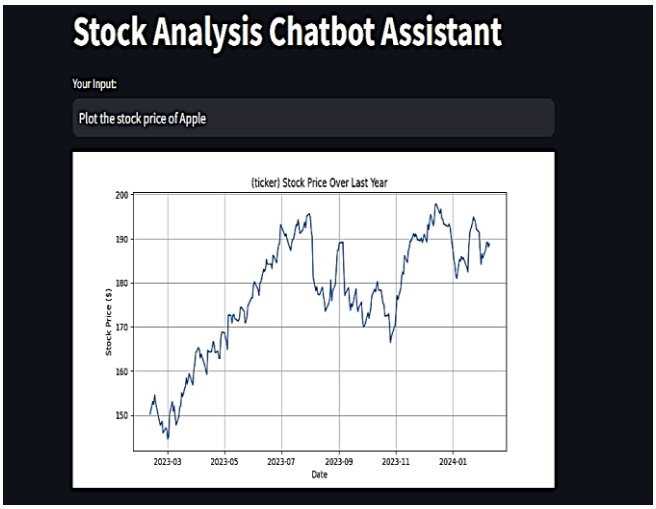

Fig. 2. Displaying Stock Plot

The chatbot can comprehend more complex instructions to fulfill user requests. For instance, users can specify parameters such as the window period for calculating moving averages. The example below demonstrates the calculation of the stock price of the company that Satya Nadella is the CEO of. The bot identifies the company and provides the data.

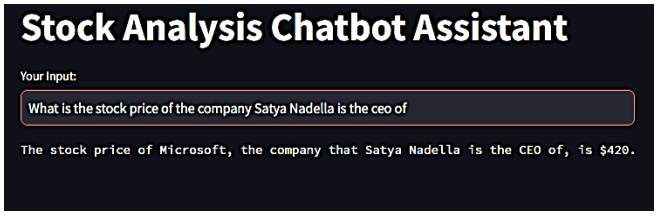

Fig. 2. Displaying Stock Price using Complex Instruction

Users can also obtain the Relative Strength Index (RSI) for a given stock, indicating its overbought or oversold conditions. The chatbot computes the RSI based on historical stock data and presents the result to the user. An example of the RSI calculation for Zomato's stock is shown below.

Fig. 4. Displaying RSI of Company

IV. Obstacles Faced

The creation of the Stock Analysis Chatbot Assistant presented several significant challenges, each necessitating careful consideration and creative solutions. One of the most significant challenges was ensuring the accuracy and availability of real-time financial data. Given the fluctuating state of the stock market, obtaining reliable data sources, and implementing mechanisms for timely updates posed significant challenges.

Designing a coherent conversational flow while ensuring robust error handling and a user-friendly interface presented intriguing difficulties. Balancing the need for comprehensiveness with simplicity and clarity in presenting information to users was a delicate process that commanded multiple design iterations.

Finally, gathering and incorporating user feedback from friends and classmates for continuous improvement posed a perpetual challenge. Adapting to user preferences, perfecting features, and improving the overall user experience necessitated a methodical approach to feedback collection and analysis.

Despite these obstacles, we successfully navigated them by tapping into their expertise and collaborative efforts to overcome challenges. The result is a useful and valuable tool for stock market enthusiasts, poised to improve access to market insights and empower users to make informed investment decisions.

V. Conclusion

The process of creating the Stock Analysis Chatbot Assistant has been a remarkable learning experience, bringing essential insights into natural language processing, financial data integration, and technical analysis. Our dedication to user-centric design and constant improvement, fueled by feedback, was vital in creating the project's success. Collaboration among various disciplines—from NLP to finance to UX design—has strengthened our comprehension of deployment, scalability, security, and privacy concerns.

Furthermore, we identified the project's potential as a solid tool for financial education, empowering users with accessible insights and allowing them to make informed decisions in the complex world of finance. Its adaptability to changing market needs emphasizes its importance in bridging the gap between investors and market knowledge.

In the end, this meticulous journey reinforced our skills in technology, finance, and user-centered development, building the groundwork for future innovation and impact. As we continue to polish and improve the chatbot, we pledge to deliver meaningful solutions that serve consumers with their financial goals.

VI. Future Work

In the coming phase of development, this project aims to evolve into an even more sophisticated and user-friendly tool. We plan to expand its coverage to include a wider array of stocks and foreign markets, enhance its natural language understanding capabilities, and introduce advanced technical analysis features. Additionally, we're exploring the integration of predictive analytics, portfolio management tools, and custom alerts to empower users with comprehensive financial insights. As we move forward, user feedback will remain at the forefront of our efforts, ensuring that the chatbot continues to meet the evolving needs of financiers in the cutthroat world of money.

References

[1] OpenAI. (2022). OpenAI API Documentation. Retrieved from https://openai.com/docs/api/

[2] Streamlit. (2022). Streamlit Documentation. Retrieved from https://docs.streamlit.io/

[3] Yahoo Finance API. (2022). Yahoo Finance API Documentation. Retrieved from https://finance.yahoo.com/