

**A Report on**  
**TradeWave's**  
**Stock Market Sentiment Analyzer**

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July,2025

## Abstract

In today's world of fast-paced financial markets, making informed investment decisions requires not only numerical data but also real-time insights into public sentiment. News articles, social media platforms like Twitter and Reddit, and investor forums significantly influence market behavior. Our project, **Smart Stock Sentiment Analyzer**, aims to bridge this gap by providing a web-based tool that combines real-time sentiment analysis with intuitive visualizations.

This tool leverages Natural Language Processing (NLP) to interpret the mood around specific stocks and uses APIs to fetch live stock prices. It presents users with sentiment scores, real-time alerts, and chatbot-based assistance, all wrapped in an interactive, user-friendly interface. It is built with Python, Streamlit, and Alpha Vantage APIs and integrates features such as portfolio management, live news streams, and AI-powered chat interaction. This system provides not just information, but context and meaning, helping users make smarter, emotionally aware stock decisions.

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# 1. INTRODUCTION

In the ever-evolving world of finance, the stock market is no longer driven solely by traditional numbers and earnings reports. Today, sentiment plays a crucial role. Social media conversations, trending hashtags, influential tweets, and breaking global headlines all have the power to sway investor behavior within moments. A single post from a celebrity or an online community's movement can send a stock soaring or spiraling—regardless of the company's financial performance. This shift signals a significant transformation in how markets operate, where understanding collective emotion is as vital as reading a financial statement.

Historically, stock prediction models have leaned heavily on charts, past performance, and technical indicators. While these tools still have their place, they often fall short in a world where information travels at lightning speed and investor decisions are increasingly influenced by public mood and social narratives. The dramatic rise of events like the GameStop rally showcased how sentiment can overtake fundamentals, creating unprecedented market scenarios.

This evolving reality led to the development of the **Smart Stock Sentiment Analyzer**—a web-based platform built to combine emotional intelligence with data-driven insights. The goal was to empower both amateur and seasoned investors by presenting real-time stock prices, public sentiment from social media platforms like Twitter, and AI-generated insights in a single, streamlined interface.

At the heart of the platform lies the power of **Natural Language Processing (NLP)**. The system scans live tweets and relevant news articles, processes the content, and assigns sentiment values to gauge public opinion about specific stocks. Each stock is analyzed for positive, negative, or neutral tone, and this sentiment is displayed alongside its real-time stock chart. With APIs like Alpha Vantage for financial data and Twitter for sentiment mining, everything is connected to provide a comprehensive, live overview of market perception.

The platform isn't just functional—it's designed to be engaging. Built using

**Streamlit**, the interface is vibrant, clean, and intuitive. Animations bring sections to life, while charts respond fluidly to user input. The dashboard enables users to add or remove stocks from their portfolios with ease, track mood shifts through sentiment alerts, and stay informed without the need to toggle between multiple platforms.

One of the standout features is the built-in chatbot. This AI assistant combines rule-based NLP logic with live API integrations to answer user queries. Whether asking for the price of a stock or seeking sentiment trends, the chatbot delivers relevant responses instantly, acting as a real-time guide through the market's emotional landscape. When sentiment dips sharply for a stock in the user's portfolio, proactive alerts ensure the user remains informed and ahead of potential risks.

Behind the scenes, the project brings together multiple technologies:

- **NLP tools** like VADER and TextBlob for sentiment analysis
- **API integrations** for up-to-date market and social data
- **User authentication** for secure profile and portfolio handling
- **AI-driven interactions** through the chatbot interface
- **Dynamic visualizations** with color-coded sentiment indicators

This fusion creates an ecosystem where emotion and data meet, helping users better understand not just what is happening in the markets, but what people are *feeling* about it.

The **Smart Stock Sentiment Analyzer** stands as a testament to how emerging technologies can make market insights more accessible and intuitive. It's more than a hackathon submission—it's a response to the growing complexity of investment decisions in the digital age. With a focus on user engagement, aesthetic presentation,

and meaningful insights, the platform brings clarity to the noise of the modern market.

In essence, this is a tool built to inform, assist, and empower. It transforms raw data and scattered emotions into structured intelligence—allowing users to invest not just with numbers, but with confidence in understanding the full picture.

## **2. Problem Statement**

Despite the abundance of financial data available today, the retail investor often struggles to process the emotional undertone of the market. Factors like breaking news, tweets, public discussions, and media coverage have a direct yet volatile influence on stock prices. Manual tracking of these sources is nearly impossible due to their volume and pace.

Moreover, not every investor possesses deep financial knowledge to interpret such trends effectively. There is a growing need for an intelligent, automated solution that provides emotional context to the cold numbers. This problem is especially evident in markets driven by sudden sentiment shifts due to events like political announcements, earnings reports, or tech controversies. Our project aims to solve this by automating the sentiment analysis process and presenting it visually and intuitively for users of all experience levels.

### 3 Existing Systems

In the domain of sentiment-driven stock analysis, several platforms have gained recognition for offering insights into public perception and market trends. However, most of these are either limited in scope or are designed with a specific type of investor in mind. Here are some of the most notable systems in this space

#### **StockTwits**

StockTwits is a popular social media platform that allows users to share stock-related messages in real-time. It focuses on capturing retail investor sentiment, offering live feeds of trending tickers and public discussions. While effective in showcasing the current mood around a stock, it is primarily driven by user-generated content and doesn't integrate deeper analysis or multiple data sources. This often makes it hard to extract actionable investment insights.

#### **Sentifi**

Sentifi caters mostly to institutional investors, using AI to analyze a vast range of financial news, blogs, and social media signals. The platform provides powerful analytics and predictive indicators based on global market activity. However, its complex and enterprise-level design makes it less accessible or customizable for everyday retail investors. Additionally, it does not prioritize slang or casual investor language often found on platforms like Reddit or Twitter.

#### **MarketPsych**

MarketPsych delivers sentiment analytics through its integration with Bloomberg Terminal. It primarily serves hedge funds and large financial firms, leveraging financial news and curated data sources. While powerful, it is highly specialized and not designed for everyday use by independent investors. The platform lacks flexibility and customization for emerging investor needs, particularly those engaging through online communities or seeking simplified insights.



## 4 Proposed System

To bridge the accessibility and engagement gaps found in the existing platforms, we developed the **Smart Stock Sentiment Analyzer**—a robust, real-time sentiment intelligence platform tailored for **retail investors**, especially beginners and intermediate-level users.

Our solution stands out by offering:

- **Multi-source sentiment analysis** using Twitter, Reddit, and news articles
- **A clean, interactive, and user-friendly interface**
- Integrated **stock price tracking** using live APIs like Alpha Vantage
- A smart, **AI-powered chatbot** that offers insights in a conversational format
- A sentiment-based **alert system** that warns users about negative mood shifts
- **Custom portfolio tracking** with easy add/remove functionality
- A fully **open-source and customizable** backend for community growth and personalization

By combining **natural language processing (NLP)** tools like VADER and TextBlob with an intuitive frontend built in Streamlit, our system transforms how investors perceive and respond to market sentiment. It doesn't just show sentiment—it interprets it, visualizes it, and **guides users toward smarter decisions** with emotional context in mind.

Unlike StockTwits, which limits itself to a single social platform, we aggregate a wider and more diverse data set. Unlike Sentifi and MarketPsych, which are tailored for institutions, our solution is built **for the everyday investor**—with modern UX, conversational interaction, and actionable insights at its core.

## 5 Objectives

Our primary objective is to simplify stock market insights for everyday users by building a system that:

- Fetches real-time tweets, news headlines, and community posts related to specific stocks.
- Analyzes sentiment using NLP and classifies it into positive, negative, or neutral.
- Visualizes sentiment trends over time with respect to live stock price movements.
- Supports a personalized portfolio where users can add or remove stocks.
- Alerts users of risky sentiment dips or rapid opinion changes.
- Provides a chatbot for answering user queries based on intent and real-time data.

## 6. Hardware and Software Requirements

Category	Tool /Library
Language	Python
Web Framework	Streamlit
NLP	VADER, TextBlob, Transformers
Visualization	Matplotlib, Plotly
Database	SQL
API Integration(For Analysis)	Twitter API,Google news
API Integration/Imports (For Chatbot)	Gemini 1.5 Flask , YFinance

## 7. Architecture of the System

The architecture of our Smart Stock Sentiment Analyzer is modular, meaning every part of the system has a clear role and works together to deliver real-time, insightful stock analysis. Here's a walkthrough of how the different components come together

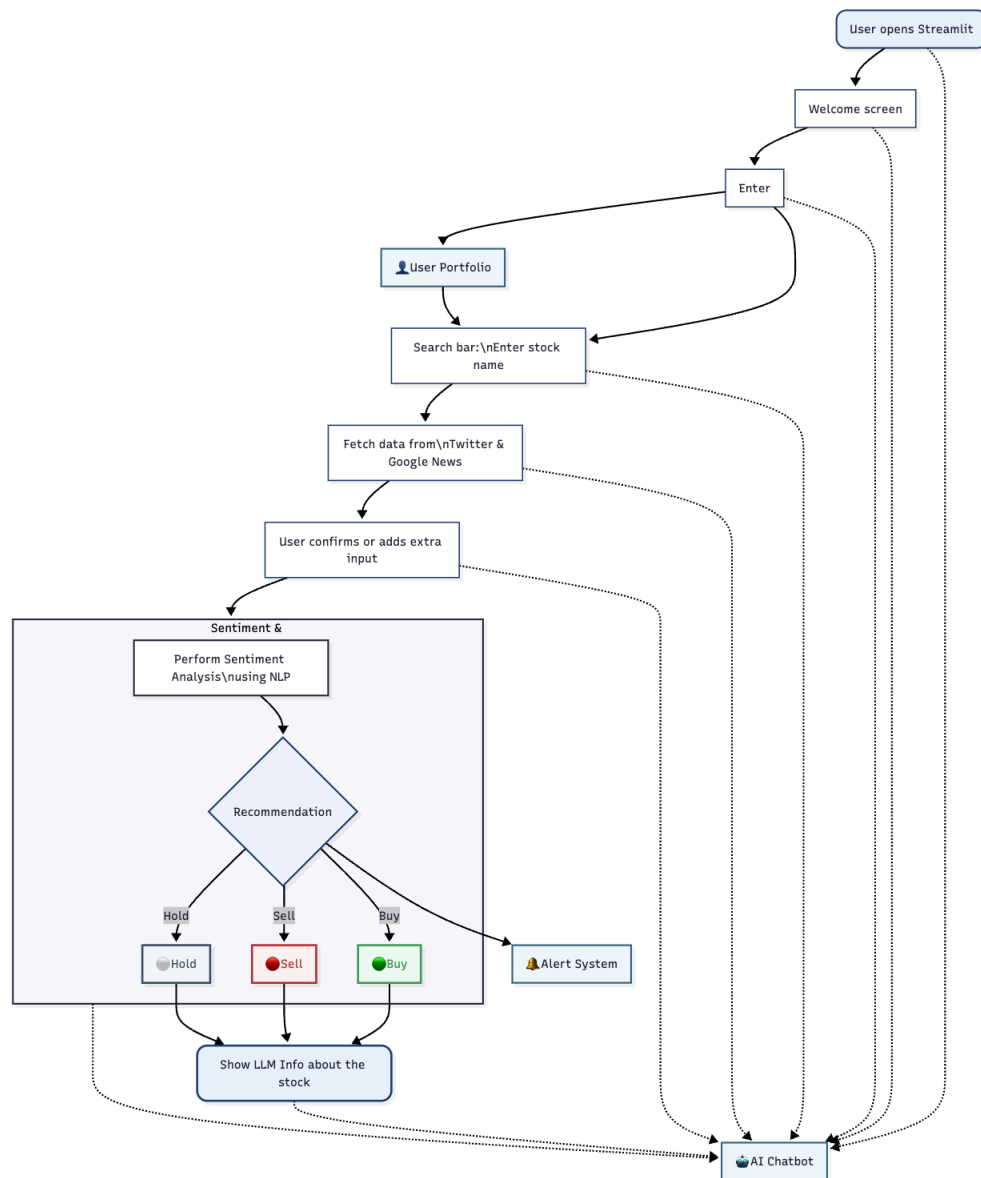
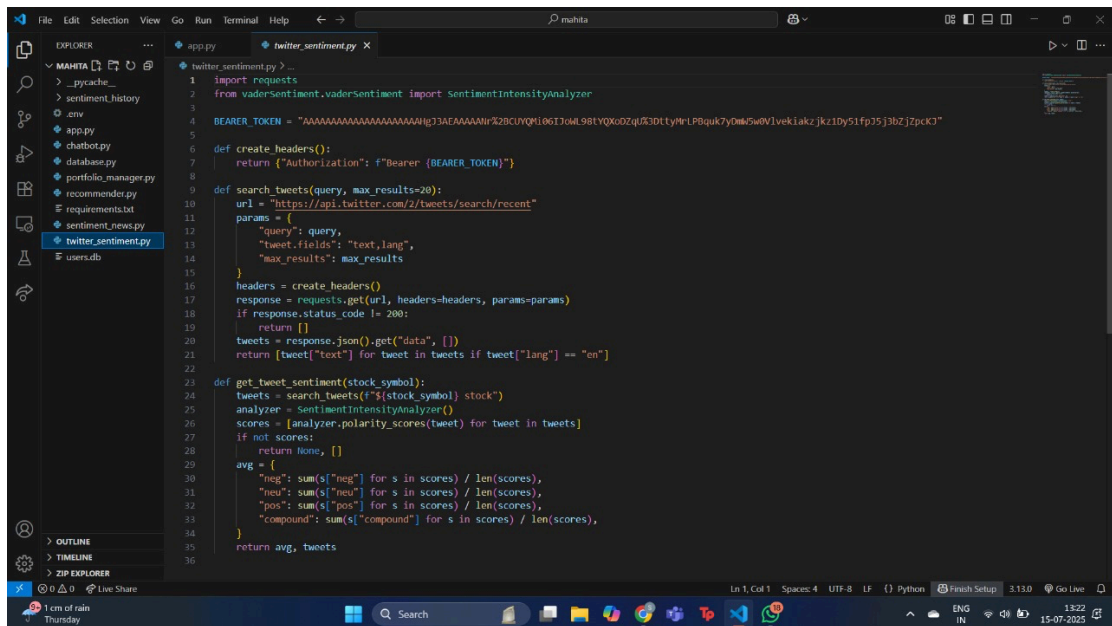


Figure 3.1 Architecture of Serenity Scape

## **Flow Summary**

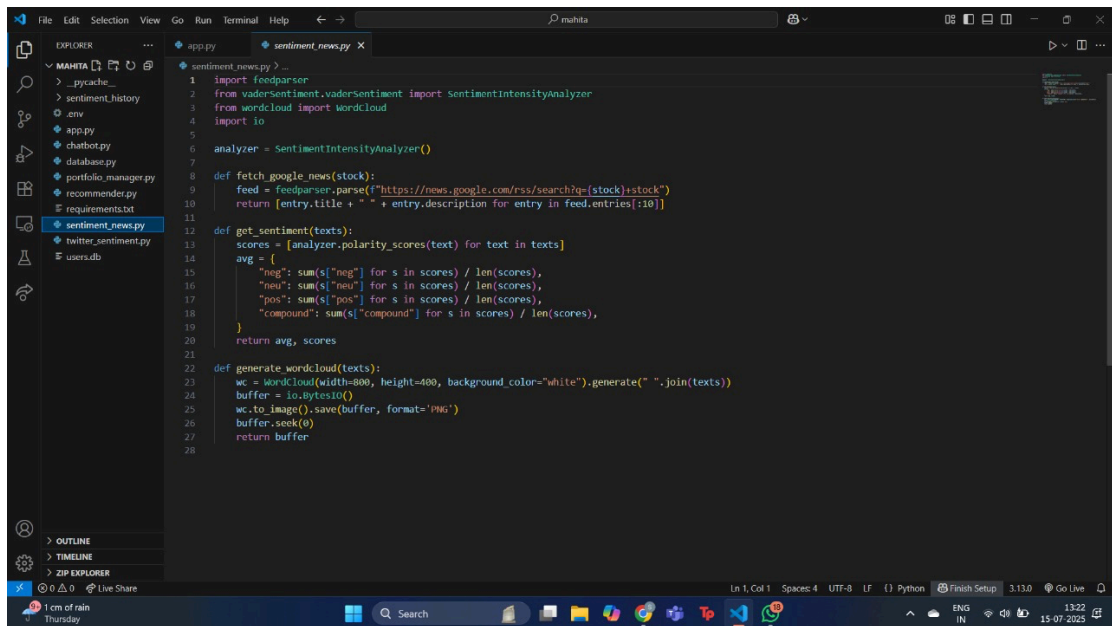
1. Users log in and enter their stock portfolio.
2. The app fetches real-time tweets and stock prices.
3. Sentiment analysis is run on the tweets using VADER.
4. The chatbot interprets queries using NLP rules and API responses.
5. Charts and alerts are updated dynamically and shown in the dashboard.

## 8. IMPLEMENTATION



```
1 import requests
2 from vaderSentiment.vaderSentiment import SentimentIntensityAnalyzer
3
4 BEARER_TOKEN = "AAAAAAAAAAAAAAAAAAAAHj3AEAAAAANh7A2BCLVQh106T3dML98tYQX0ZqU3D3tYwLP8qk7yDm5wN1vekiakzjkz1Dy51fp75j3bZjZpck3"
5
6 def create_headers():
7     return {"Authorization": f"Bearer {BEARER_TOKEN}" }
8
9 def search_tweets(query, max_results=20):
10     url = "https://api.twitter.com/2/tweets/search/recent"
11     params = {
12         "query": query,
13         "tweet.fields": "text,lang",
14         "max_results": max_results
15     }
16     headers = create_headers()
17     response = requests.get(url, headers=headers, params=params)
18     if response.status_code != 200:
19         return []
20     tweets = response.json().get("data", [])
21     return [tweet["text"] for tweet in tweets if tweet["lang"] == "en"]
22
23 def get_tweet_sentiment(stock_symbol):
24     tweets = search_tweets(f"${stock_symbol} stock")
25     analyzer = SentimentIntensityAnalyzer()
26     scores = [analyzer.polarity_scores(tweet) for tweet in tweets]
27     if not scores:
28         return None, []
29     avg = {
30         "neg": sum(s["neg"] for s in scores) / len(scores),
31         "neu": sum(s["neu"] for s in scores) / len(scores),
32         "pos": sum(s["pos"] for s in scores) / len(scores),
33         "compound": sum(s["compound"] for s in scores) / len(scores),
34     }
35     return avg, tweets
```

Fig 4.1 Twitter Integration



```
1 import feedparser
2 from vaderSentiment.vaderSentiment import SentimentIntensityAnalyzer
3 from wordcloud import WordCloud
4 import io
5
6 analyzer = SentimentIntensityAnalyzer()
7
8 def fetch_google_news(stock):
9     feed = feedparser.parse(f"https://news.google.com/rss/search?q={stock}&stock={stock}")
10     return [entry.title + " " + entry.description for entry in feed.entries[:10]]
11
12 def get_sentiment(texts):
13     scores = [analyzer.polarity_scores(text) for text in texts]
14     avg = {
15         "neg": sum(s["neg"] for s in scores) / len(scores),
16         "neu": sum(s["neu"] for s in scores) / len(scores),
17         "pos": sum(s["pos"] for s in scores) / len(scores),
18         "compound": sum(s["compound"] for s in scores) / len(scores),
19     }
20     return avg, scores
21
22 def generate_wordcloud(texts):
23     wc = WordCloud(width=800, height=400, background_color="white").generate(" ".join(texts))
24     buffer = io.BytesIO()
25     wc.to_image().save(buffer, format='PNG')
26     buffer.seek(0)
27     return buffer
```

Fig 4.2 NLP Integration

The project is built using **Python** and **Streamlit** to create an interactive, AI-powered stock sentiment analysis platform. We integrated multiple modules to handle different functionalities seamlessly:

### 1. User Interface:

Designed with inspiration from Visily, the UI uses Streamlit with custom HTML and CSS styling to create a clean, card-based layout. The interface includes a login/signup page, portfolio view, sentiment results, and chatbot interaction — all within a modern dashboard format.

### 2. Sentiment Analysis:

We fetch real-time news headlines and tweets related to the searched stock using **Feedparser** and **Tweepy APIs**. These texts are analyzed using **VADER (Valence Aware Dictionary and Sentiment Reasoner)** to classify sentiments into **positive**, **negative**, or **neutral**.

### 3. Recommendation Engine:

Based on sentiment scores, the app gives smart recommendations — **Buy**, **Sell**, or **Hold** — and shows visual summaries such as charts and word clouds.

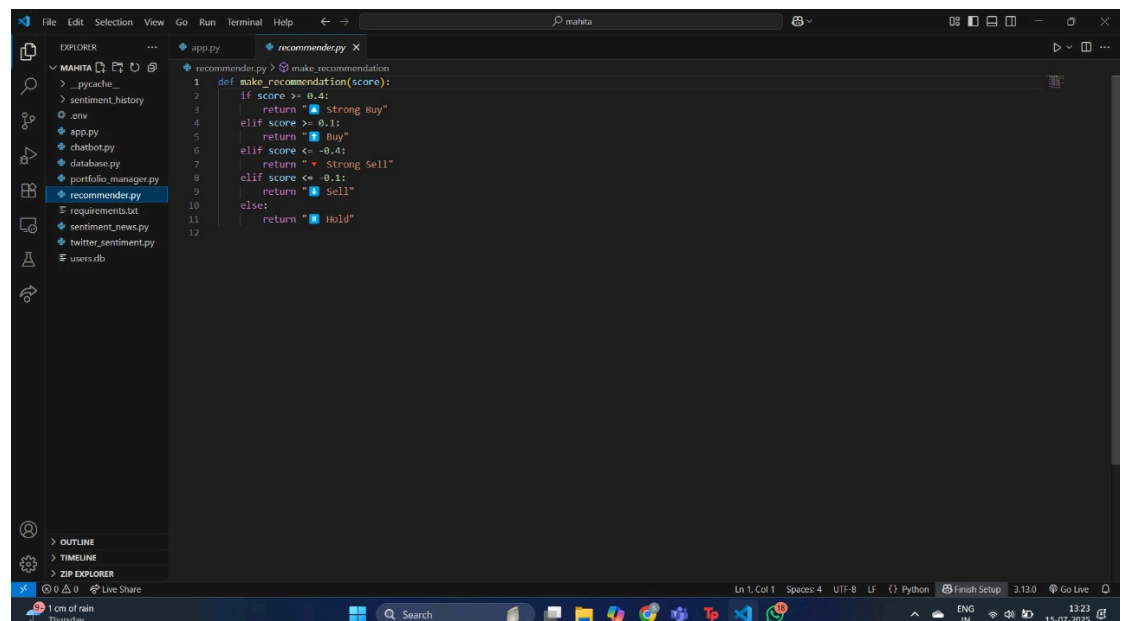


Fig 4.3 Recommendations

### 4. Chatbot Module:

A chatbot powered by **Google Generative AI (Gemini)** is integrated to allow users to ask stock-related queries and get AI-generated insights.

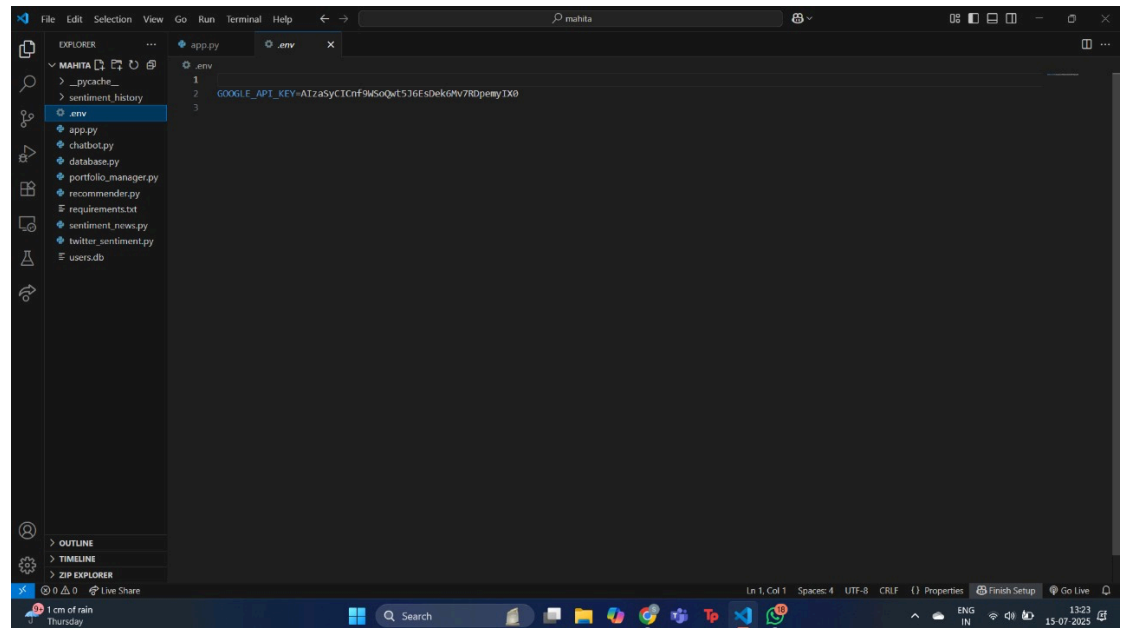


Fig 4.4 API Integrations

## 5. Portfolio Management:

Logged-in users can add or remove stocks from their portfolio, with the data stored securely using **SQLite** via custom database handlers.

## 6. Alert System (Optional):

When certain sentiment thresholds are crossed, the system is designed to trigger alert logic (e.g., high negative sentiment).

All these modules work together in real time to give users a clear understanding of stock sentiment trends, recommendations, and personalized insights.



## 9. RESULTS AND DISCUSSIONS

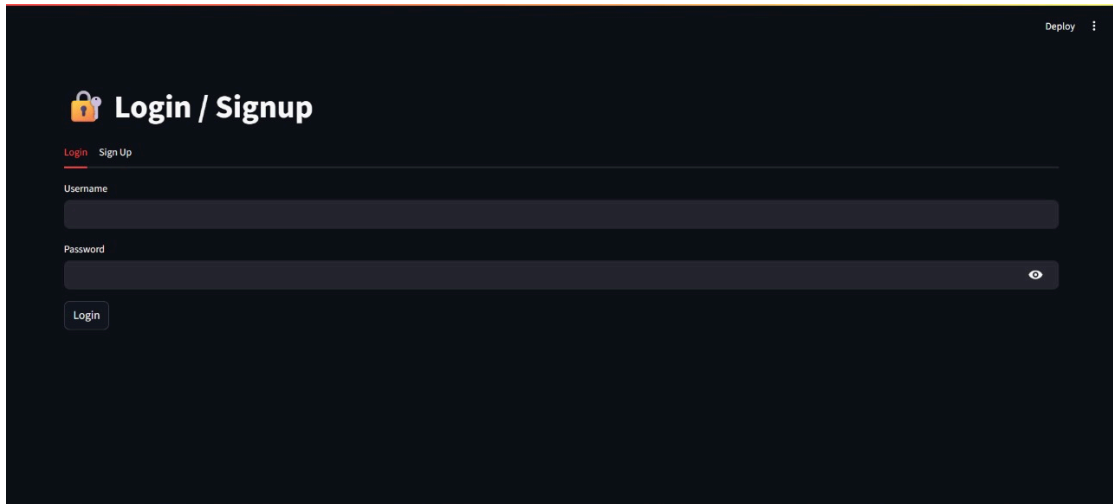


Fig 5.1 Login/Signup Page

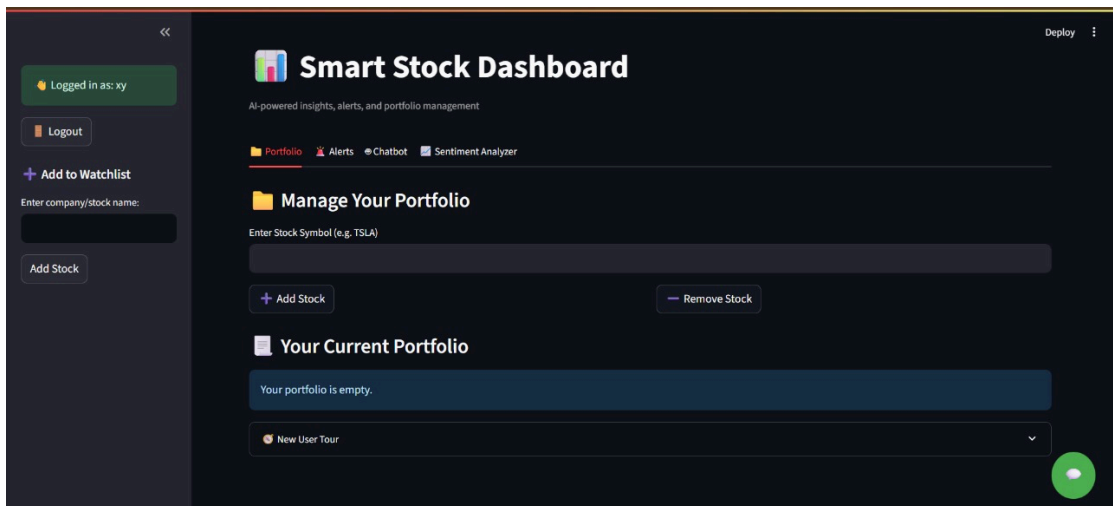


Fig 5.2 Portfolio Page

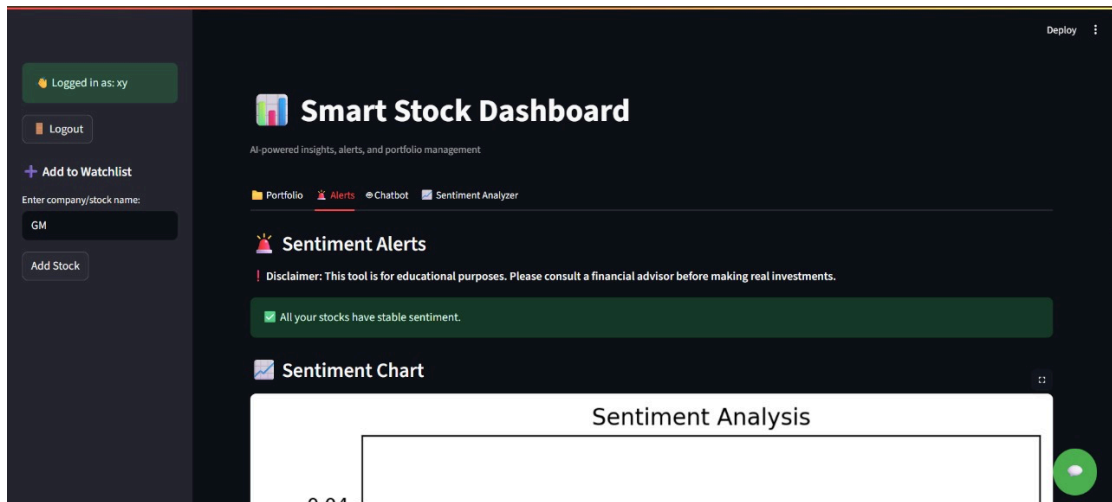


Fig 5.3 Alerts Page

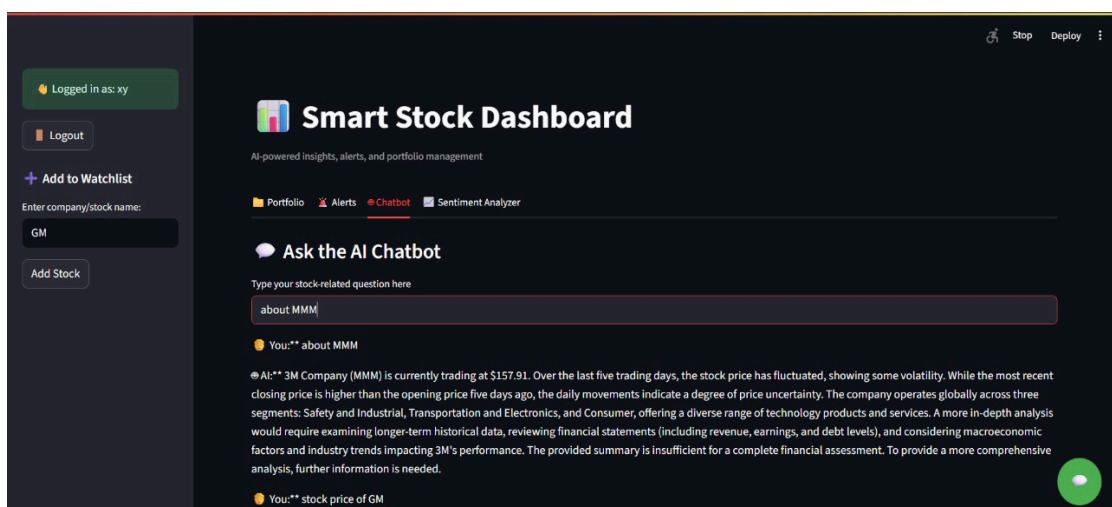


Fig 5.4 AI powered Chatbot

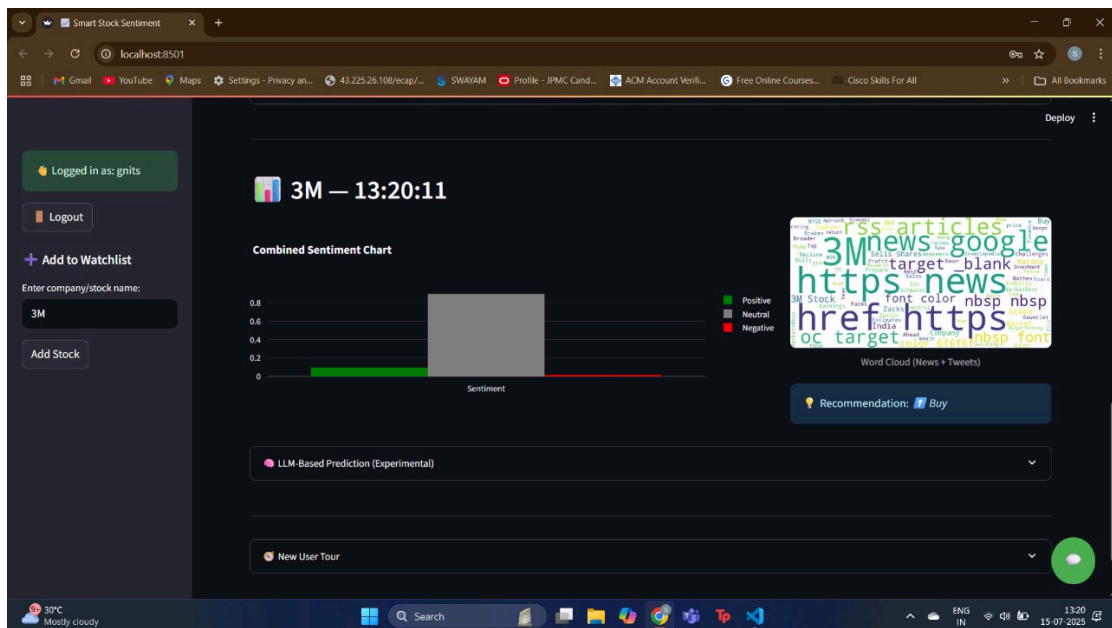


Fig 5.5 Sentiment Analysis

## 10. CONCLUSIONS AND FUTURE ENHANCEMENTS

This project successfully demonstrates how AI and NLP can be leveraged to make stock market sentiment more understandable, accessible, and actionable. By combining real-time data from social media and news sources with advanced sentiment analysis, we've created a platform that empowers users—especially retail investors—to make more informed decisions.

Our clean and intuitive UI, built with Streamlit and styled based on Visily mockups, enhances the user experience while preserving the core analytical capabilities. The chatbot integration and personalized portfolio tracking further bridge the gap between raw data and investor insight.

Overall, this tool brings together data, design, and decision-making in one seamless experience.

### **Future Enhancements**

Looking ahead, there are several meaningful ways to expand and enhance this platform. One key improvement would be building a real-time sentiment dashboard by integrating live data streaming through APIs like Twitter's X API v2 or WebSockets. This would allow users to monitor stock sentiment as it happens, without needing to refresh the page. Another powerful addition would be stock price forecasting, using time-series models such as LSTM or Prophet to predict future movements based on both historical data and sentiment trends. Expanding the platform to include sector-wise sentiment mapping—covering areas like technology, finance, and healthcare—could offer users a broader market perspective, visualized through heatmaps or radar charts.

Improving the user experience through a mobile-responsive UI would make the platform more accessible and convenient for on-the-go investors. Adding a notification system could further personalize the experience by sending email or SMS alerts when sentiment around a user's tracked stocks shifts significantly. Finally,

supporting multilingual sentiment analysis—for example, in Hindi, Spanish, or Mandarin—would increase inclusivity and enable a wider global audience to benefit from the tool.