MULTIMEDIA UNIVERSITY

ASSIGNMENT

TWT6223 - WEB TECHNIQUES AND APPLICATIONS

TRIMESTER MARCH/APRIL 2025 (TERM 2510)

Title: Stock Analysis Web Application for Analytic Insight and Prediction

Lab Section: WT2 2E

Submission Date: 16 June 2025

NO	STUDENT ID	STUDENT NAME	MAJOR
1.	1211112304	KUEH PANG TENG	AI

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1.0 Introduction

In today's world, investors and traders, especially beginners, need quick and reliable access to comprehensive stock market insights that are easy to understand. However, entering the world of trading can be intimidating due to several reasons. Most existing stock analysis platforms are designed with experienced trraders in mind, featuring complex financial jargons, technical charts and overwhelming data visualisations which can be intimidating and confusing for beginners. Additionally, these platforms often require account registration and paid subscriptions which discourages users from trying to explore and limit their learning opportunities.

Hence, Stock Wise is developed to address this challenge by delivering a responsive and beginner-friendly stock analysis web application that enables access to financial market information. It provides users with real-time stock data and interactive charts, essential technical indicators, price predictions based on historical trend analysis, up-to-date stock market news and a knowledge hub with fundamental market concepts. All features are presented through an intuitive and clean interface designed for ease of understanding and navigation. Stock Wise eliminates the need for user authentication while empowering users to explore and analyse the stock market with a clean interface and interactive features built using HTML5, CSS and JavaScript with a client-side server. This enables users to gain immediate access to all features without registration, and they can explore the stock market freely and build analytical skills. This platform serves as the ideal educational and analytical tool, empowering users to learn market fundamentals, explore investment opportunities and make informed decisions in an accessible and supportive environment.

2.0 Objectives

Stock Wise aims to deliver a comprehensive, user-friendly web-based stock analysis platform that removes barriers for investors and traders while providing essential market analysis tools. To achieve this vision, the project seeks to accomplish the following objectives:

1. To provide users with seamless user experience by delivering a responsive web application that provides stock insights without registration barriers and subscription requirements.
2. To enable real-time access to comprehensive stock price data and interactive charts with essential technical indicators that facilitate informed market analysis and decision-making.
3. To offer simple price predictions based on historical trends analysis and help users to observe potential future price movements with confidence level.
4. To keep users informed through live stock market news updates that help explain price movements and market sentiment that might affect stock performance
5. To educate users through a knowledge hub that explains fundamental stock market concepts, investment terminology, and analysis techniques in beginner-friendly language.

All in all, Stock Wise serves as an accessible entry point for beginner investors while providing valuable tools for experienced traders.

3.0 System Scope

3.1 Features and Functions

1. Stock Analyser
    a) Users can input stock symbols such as AAPL, TSLA or MSFT to fetch and visualize stock data with real-time updates.
    b) The platform offers interactive candlestick and line charts with drawing tools including trend lines, shapes, zoom, pan and full screen mode for enhanced analysis.
    c) Users can select the timeframes such as 1D, 1W, 1M, 3M, 1Y to identify short-term patterns and long-term trends in historical stock data.
    d) Users can fetch technical indicators such as Moving Averages SMA 14, SMA 50), Relative Strengh Index (RSI 14), Moving Average Convergence Divergence (MACD), Bollinger Bands to support informed decision-making.
    e) Stock Wise provides simple next-day price prediction with confidence percentage bar and trend indication of up or down.
    f) The platform generates comprehensive summary insights including key metrics such as daily high/low prices, average values, the latest price changes, and volatility measurements derived from technical indicator analysis.

2. Market Overview
    a) Users can access real time summaries of major global indices such as NASDAQ, S&P 500, Dow Jones Industrial Average, FTSE 100 (UK), DAX (Germany) and Nikkei 225 (Japan).
    b) The index data is displayed in a grid layout to allow easy comparison and reference across different global markets.

3. Stock News Feed
    a) Users can view and read the latest news articles quickly and clearly.
    b) The web application fetches and displays current stock market headlines with concise summaries, ensuring users stay informed about market-moving events.
    c) Users can access full articles through redirection functionality and allow deeper exploration of the interested topics.

4. Knowledge Hub
   - Users can gain basic knowledge about stock such as the basics, technical analysis, fundamental analysis, strategies, risks and psychology related to stock markets.
   - The content is presented in expandable cards with "Learn More" toggles to show and hide the detailed explanation.

3.2 Deliverables

1. Stock Wise Web Application
   a) A functional client-side stock analysis web application developed using HTML5, CSS, and JavaScript.
   b) The web application offers an intuitive, user-friendly interface for stock exploration and analysis.
   c) The webapp provides real-time data through fetching data from APIs on a device connected to the Internet.
   d) It includes all the features and functions outlined in the program scope.

2. Stock Wise Documentation
   a) A comprehensive document providing an overview of the web application.
   b) Describe the system, interface design, and detailed feature explanation.
   c) Includes screenshots and samples of inputs or outputs for each functional component.

3. Stock Wise Presentation Video
   a) A demo video showcasing the application's interface and features.
   b) Demonstrate the functionality of each feature.

3.3 Constraints

1. Limited Stock Symbol from each country

   The stock data is primarily sourced from the Alpha Vantage API, which mainly focuses on U.S. markets and frequently traded global stocks. As a result, coverage of companies from non-U.S. markets may be limited or unavailable, restricting global analysis. For example, it does not allow searching for Malaysia stocks.

2. Limited API request

   Alpha Vantage imposes a rate limit on free-tier API usage, typically allowing 5 requests per minute and 500 per day. These limits may result in delays or temporary feature unavailability, especially when fetching real-time data, technical indicators, or predictions frequently.

3. Client-Side Limitations

   The application runs entirely on the client-side using HTML5, CSS, and JavaScript, without any backend server or database. This limits advanced capabilities such as secure data storage and user profiles.

4. Prediction Logic

   The next day stock price prediction is derived from basic historical trends and simple statistical analysis. It does not incorporate complex market factors or advanced AI/ML models, which may impact on its accuracy and reliability, particularly in volatile market conditions.

4.0 Choice of Web Components

Stock Wise is a client-side web application developed using HTML5, CSS, and JavaScript, using modern web technologies and external APIs to deliver comprehensive stock market analysis. It uses API services from Alpha Vantage for analysis, Marketaux for stock news, and Trading View for charts. The code is managed using GitHub. The technical architecture and implementation details of each component are discussed below:

1. HTML

   HTML creates a well-organised document structure for Stock Wise by defining the layout and elements of the web applicatikon such as input fields, buttons, charts and content sections for analyser, news and knowledge.

2. CSS

   CSS is used to provide visual styling to the HTML content and ensure the web applicatiokn is responsive and visually appealing to Stock Wise’s intuitive user interface. CSS enables layout organization, component styling, responsive design, hover effects, and the overall user experience enhancements in Stock Wise.

3. JavaScript

   JavaScript is the core programming language used for API integration, add interactivity, data processing, event handling, DOM manipulation, error handling and manage dynamic behaviour across the application. For instance, it is used for fetching news and stock data, updating the charts dynamically, generating predictions and summarizing insights, and managing navigation between the sections in Stock Wise.

4. Alpha Vantage API

   The API is used to provide comprehensive stock market data and technical analysis for stock data. It fetches stock prices, trading volumes, and stock data for analysis and display. Alpha Vantage API supports international stock exchanges and indices which enable users to analyse stocks from major global markets. It also provides precalculated technical indicators including moving averages, RSI, MACD and Bollinger Bands for analysis.

5. Trading View API

   This is a lightweight charting library that is used to provide charting and visualisation of stock data. The widget is embedded into Stock Wise to allow candlestick and line chart options, drawing tools including trend lines and geometric shapes for technical analysis, time frame selection which include 1D, 1W, 1M, 3M, 1Y, and All and zoom, pan and full-screen functionality. Trading View provides live chart updates and real-time price movements for trading and analysis.

6. Marketaux API

   This API is used to deliver up-to-date financial news and market sentiment analysis. It fetches current financial news articles, headlines, and market updates relevant to specific stocks and general market conditions. It includes publication dates, source information, and article overview to help users quickly obtain news relevance.

7. GitHub

   GitHub is used as a version control system. It allows code versioning and history tracking. The source code for Stock Wise is available and managed at: https://github.com/pangtengg/StockAnalyser

5.0 Sample Screenshots

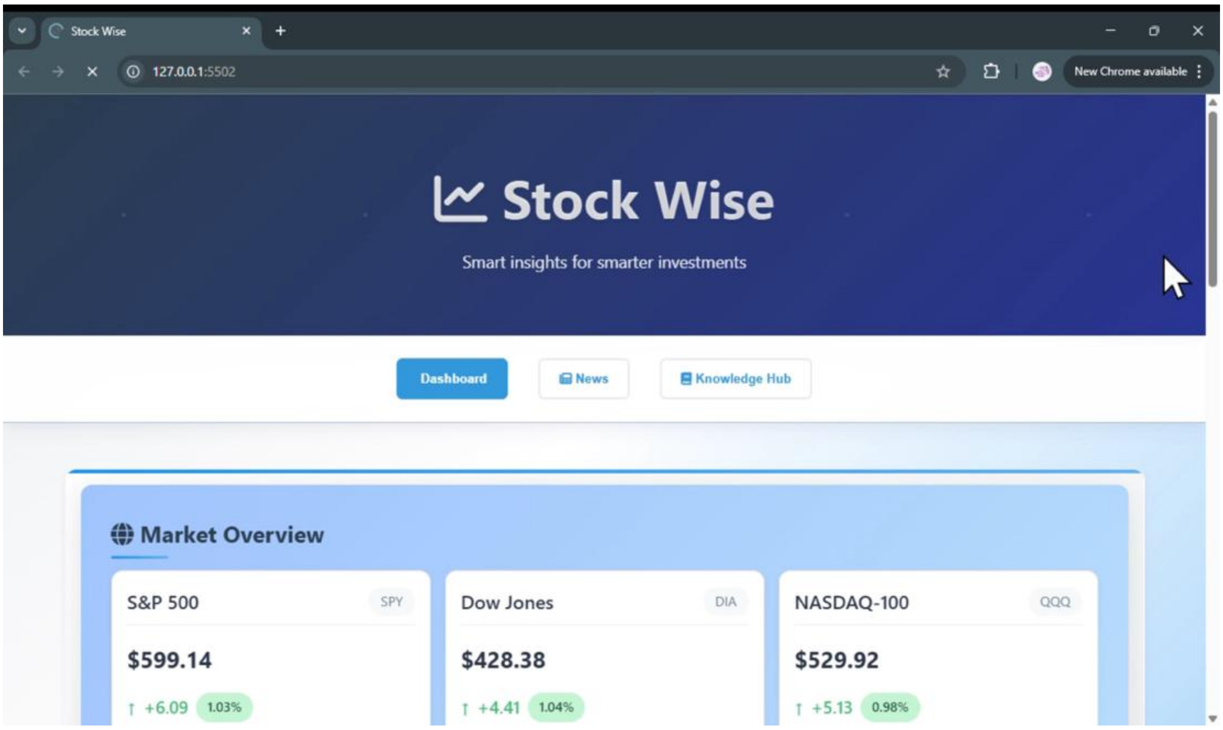


Figure 1 shows Stock Wise’s dashboard.

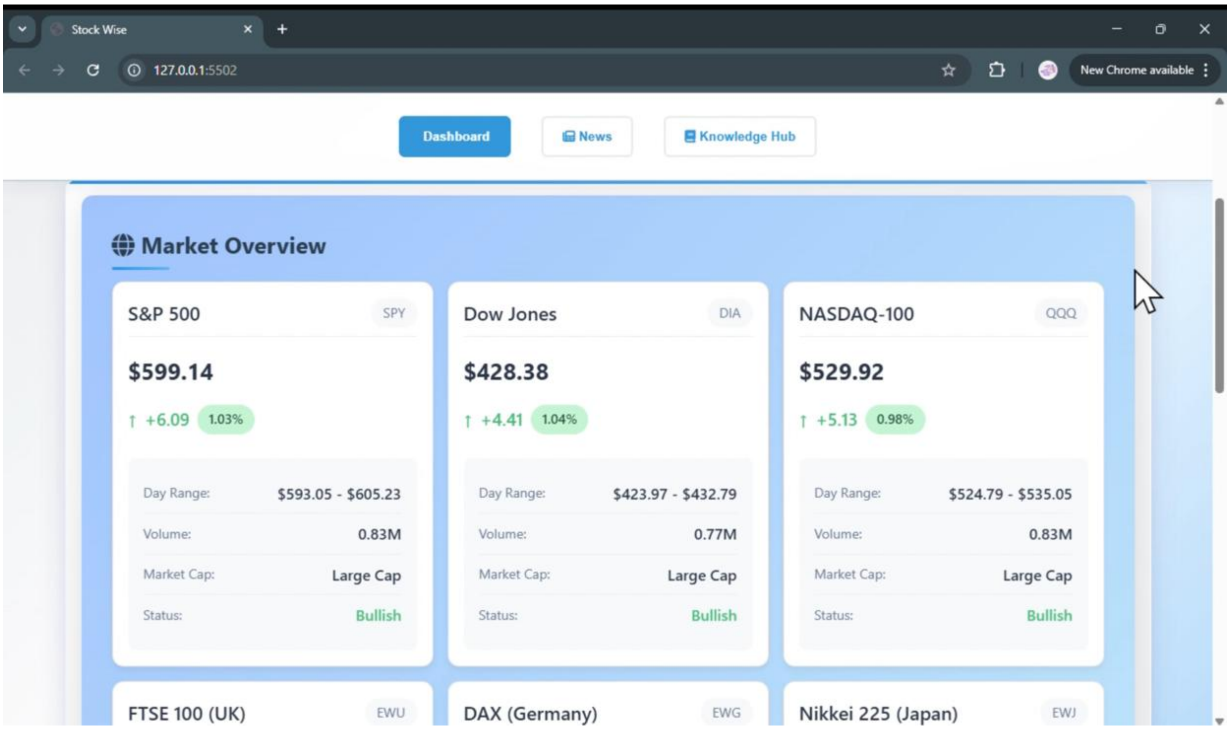


Figure 2 shows the global market overview based on their index.

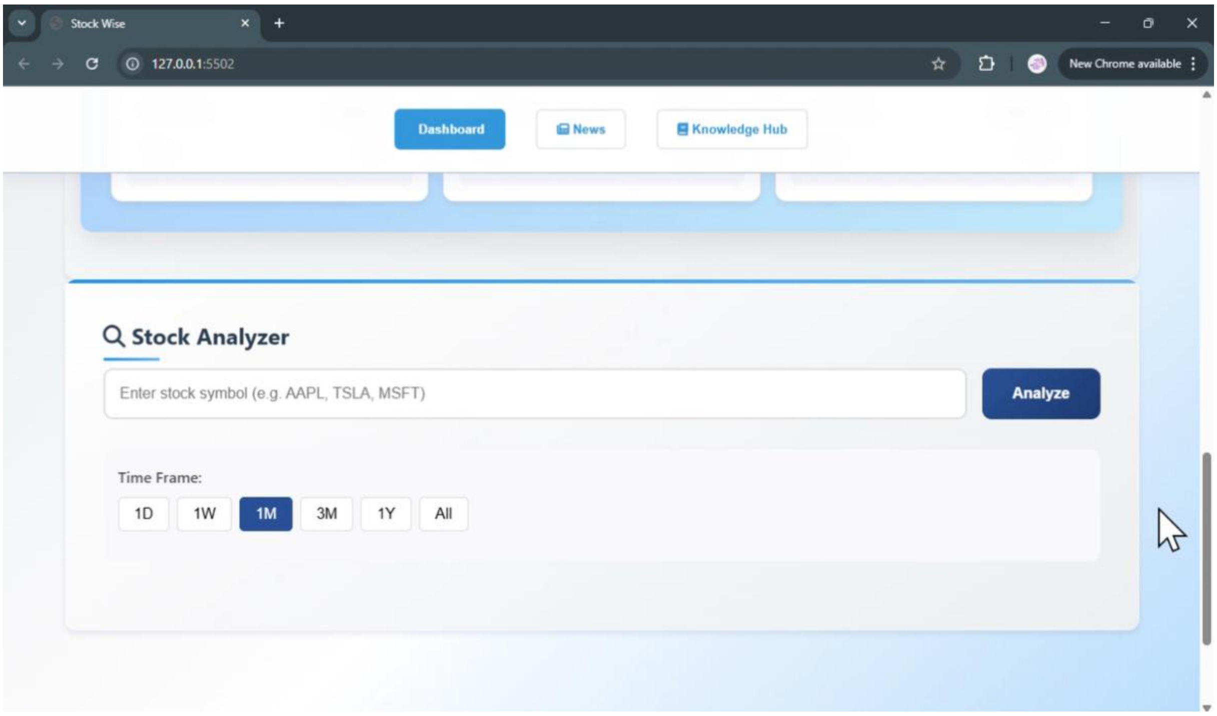


Figure 3 shows the search bar for stock analysis based on their symbols and timeframe selection.

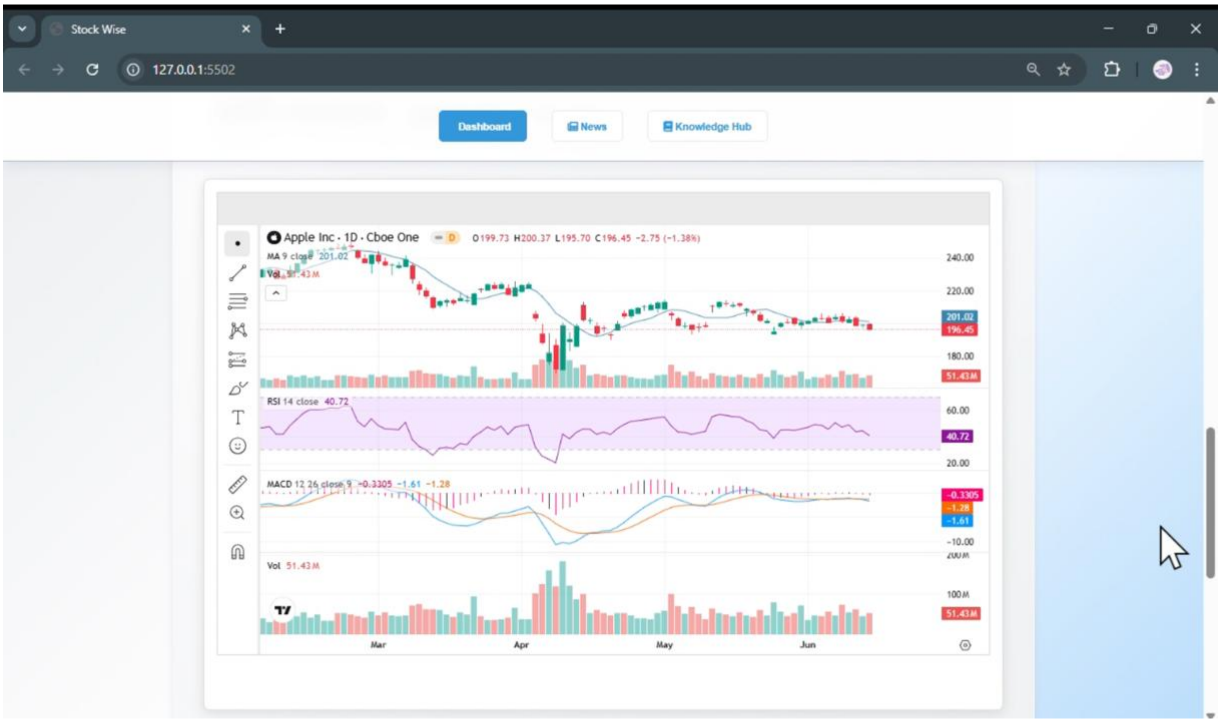
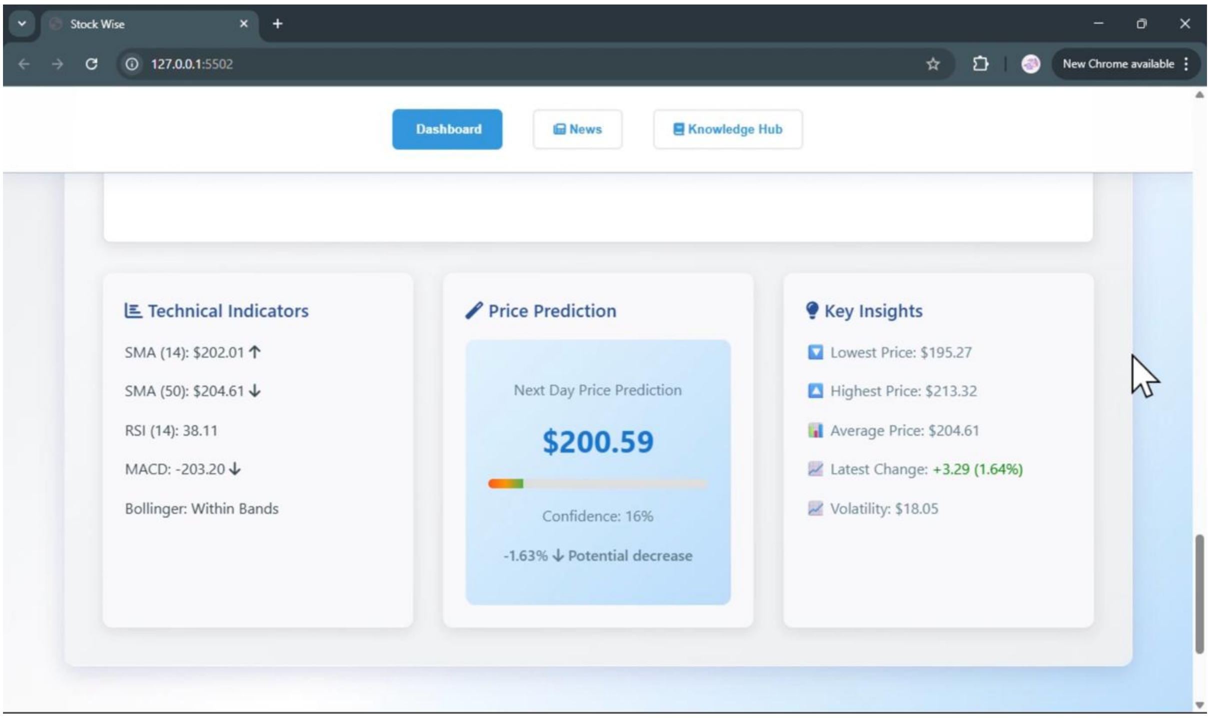


Figure 4 shows the result of the chart based on the search result



Technical Indicators

SMA (14): $202.01 ↑

SMA (50): $204.61 ↓

RSI (14): 38.11

MACD: -203.20 ↓

Bollinger: Within Bands

Price Prediction

Next Day Price Prediction

$200.59

Confidence: 16%

-1.63% ↓ Potential decrease

Key Insights

Lowest Price: $195.27

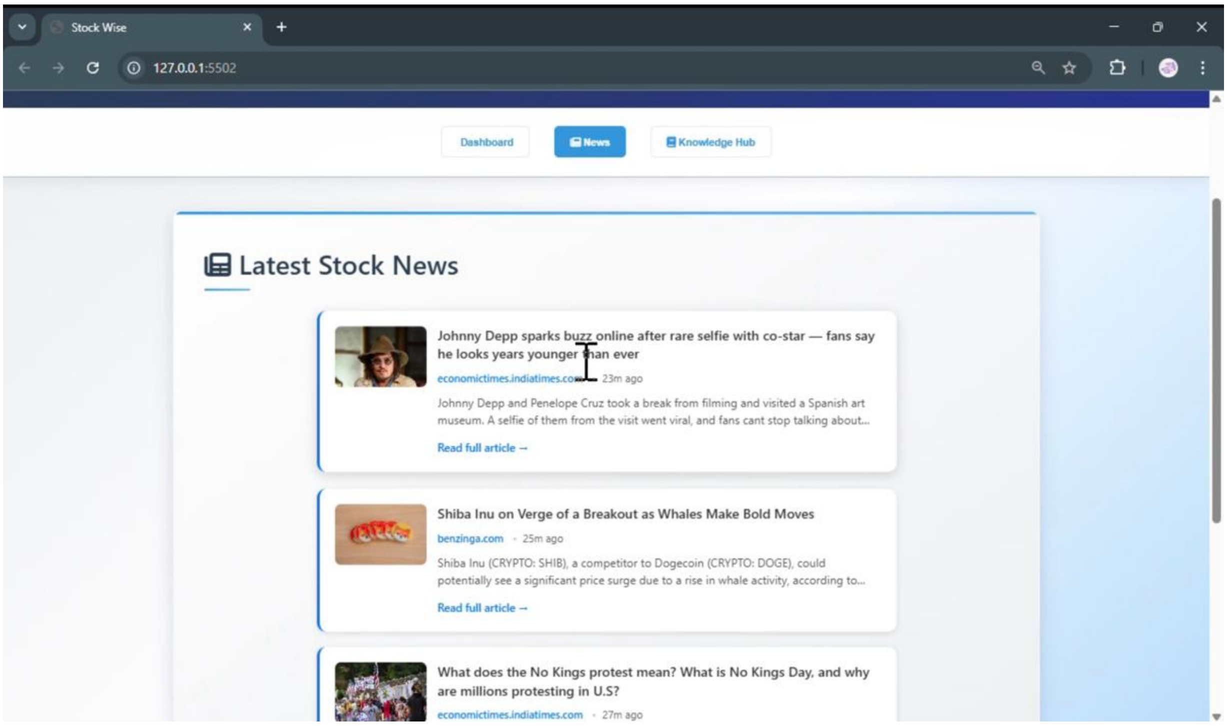
Highest Price: $213.32

Average Price: $204.61

Latest Change: +3.29 (1.64%)

Volatility: $18.05

Figure 5 shows the analysis of the stock with indicators, predictions and insights.



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Johnny Depp and Penelope Cruz took a break from filming and visited a Spanish art museum. A selfie of them from the visit went viral, and fans cant stop talking about...

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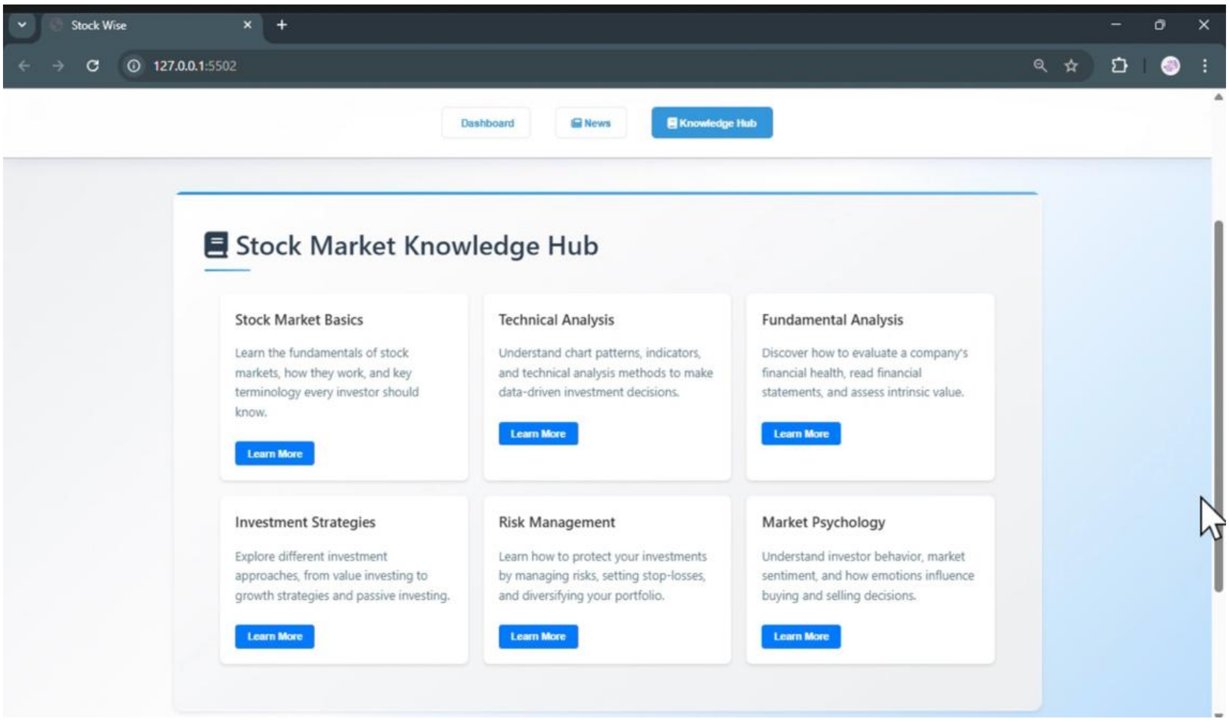
economictimes.indiatimes.com · 27m ago

Figure 6 shows the news tab that refreshes the news each time user clicks



Stock Market Knowledge Hub

Stock Market Basics

Learn the fundamentals of stock markets, how they work, and key terminology every investor should know.

Technical Analysis

Understand chart patterns, indicators, and technical analysis methods to make data-driven investment decisions.

Fundamental Analysis

Discover how to evaluate a company's financial health, read financial statements, and assess intrinsic value.

Investment Strategies

Explore different investment approaches, from value investing to growth strategies and passive investing.

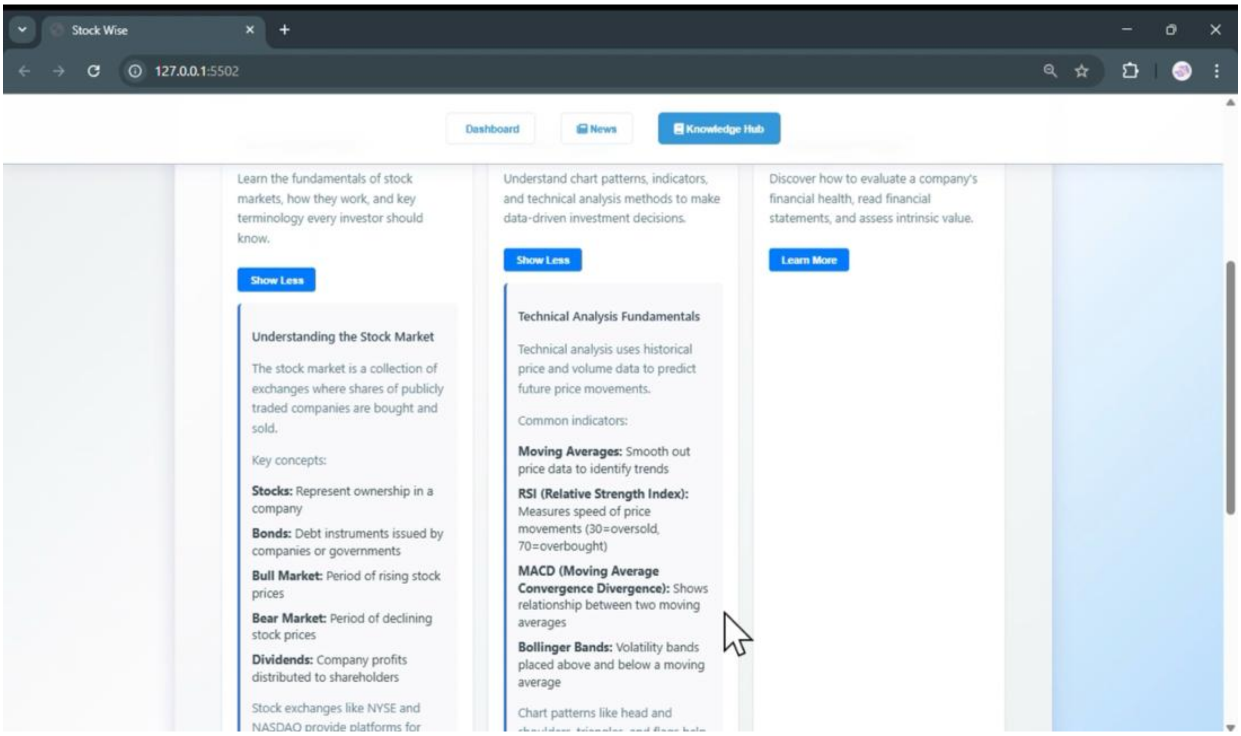
Risk Management

Learn how to protect your investments by managing risks, setting stop-losses, and diversifying your portfolio.

Market Psychology

Understand investor behavior, market sentiment, and how emotions influence buying and selling decisions.

Figure 7 shows the knowledge hub tab.



Learn the fundamentals of stock markets, how they work, and key terminology every investor should know.

Understanding the Stock Market

The stock market is a collection of exchanges where shares of publicly traded companies are bought and sold.

Key concepts:

Stocks: Represent ownership in a company

Bonds: Debt instruments issued by companies or governments

Bull Market: Period of rising stock prices

Bear Market: Period of declining stock prices

Dividends: Company profits distributed to shareholders

Stock exchanges like NYSE and NASDAQ provide platforms for

Understand chart patterns, indicators, and technical analysis methods to make data-driven investment decisions.

Technical Analysis Fundamentals

Technical analysis uses historical price and volume data to predict future price movements.

Common indicators:

Moving Averages: Smooth out price data to identify trends

RSI (Relative Strength Index): Measures speed of price movements (30=oversold, 70=overbought)

MACD (Moving Average Convergence Divergence): Shows relationship between two moving averages

Bollinger Bands: Volatility bands placed above and below a moving average

Chart patterns like head and

Discover how to evaluate a company's financial health, read financial statements, and assess intrinsic value.

Figure 8 shows the knowledge tab expanded after the Learn More button is clicked.

Technical Indicators

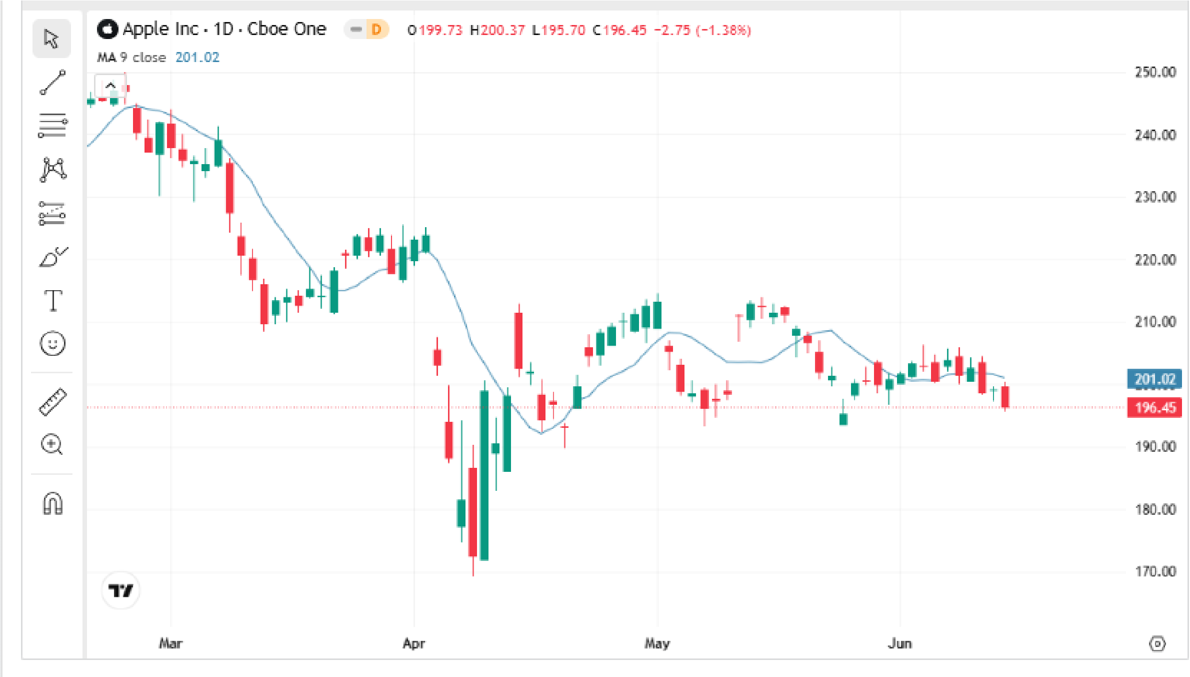


Figure 9 shows the price chart with Moving Average (MA). The gray line which indicates MA smooths out price fluctuations to reveal the trend direction which helps identify whether the stock is in an uptrend, downtrend or sideways movement.

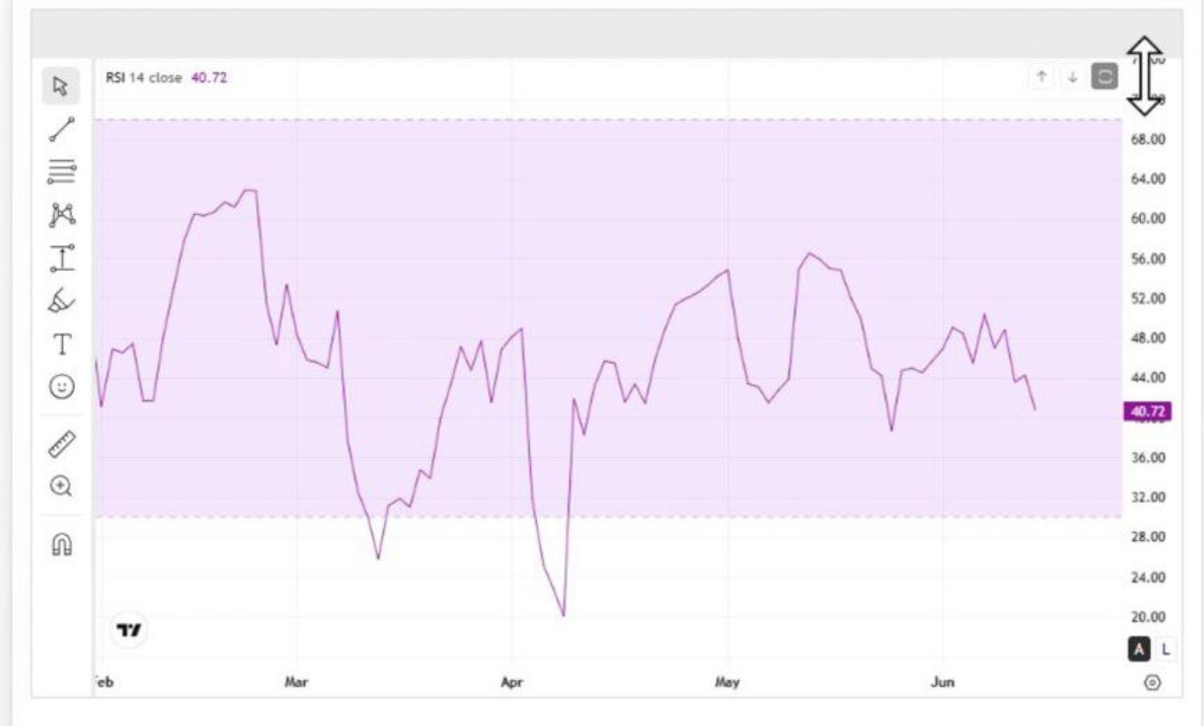


Figure 10 shows Relative Strength Index (RSI) oscillators ranging from 0-100. RSI suggests the momentum and identifies overbought conditions which are above 70 and oversold conditions which are below 30. The values between 30 and 70 indicate neutral momentum which is neither overbought nor oversold.

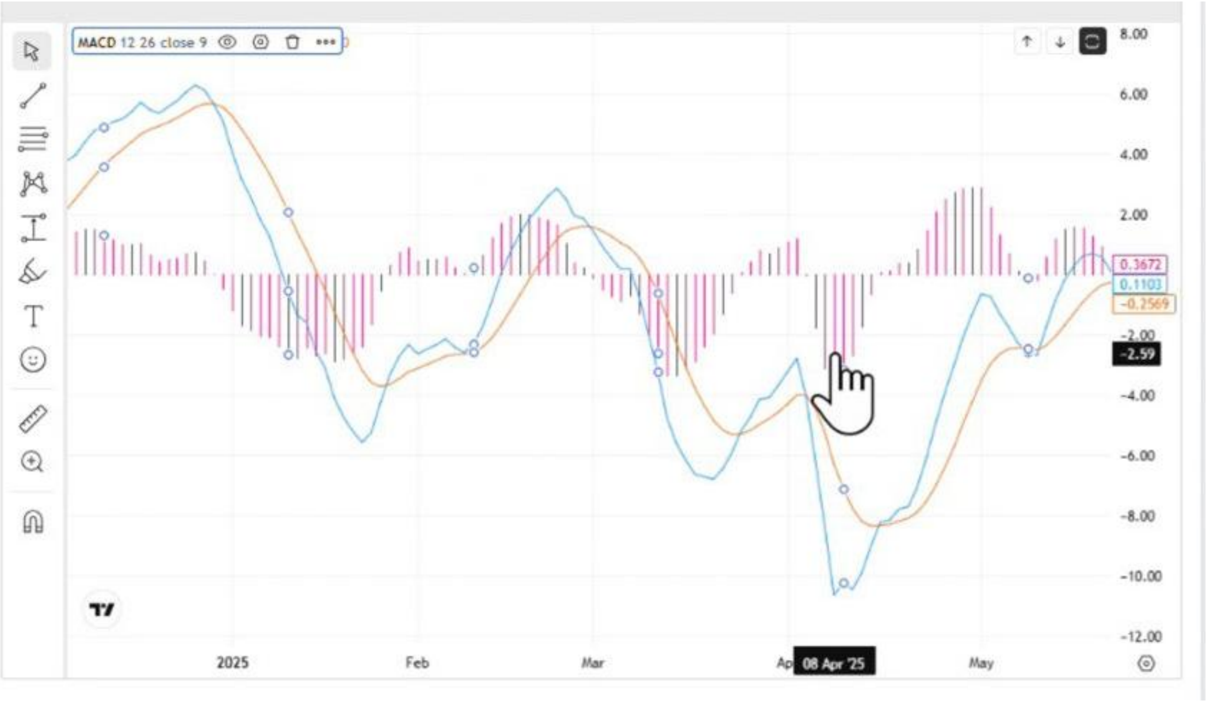


Figure 11 shows Moving Average Convergence Divergence (MACD) lines with histogram bars. The blue and orange lines indicate fast and slow MA while the histogram shows the difference between them. MACD help identifies the trend changes and momentum shifts.

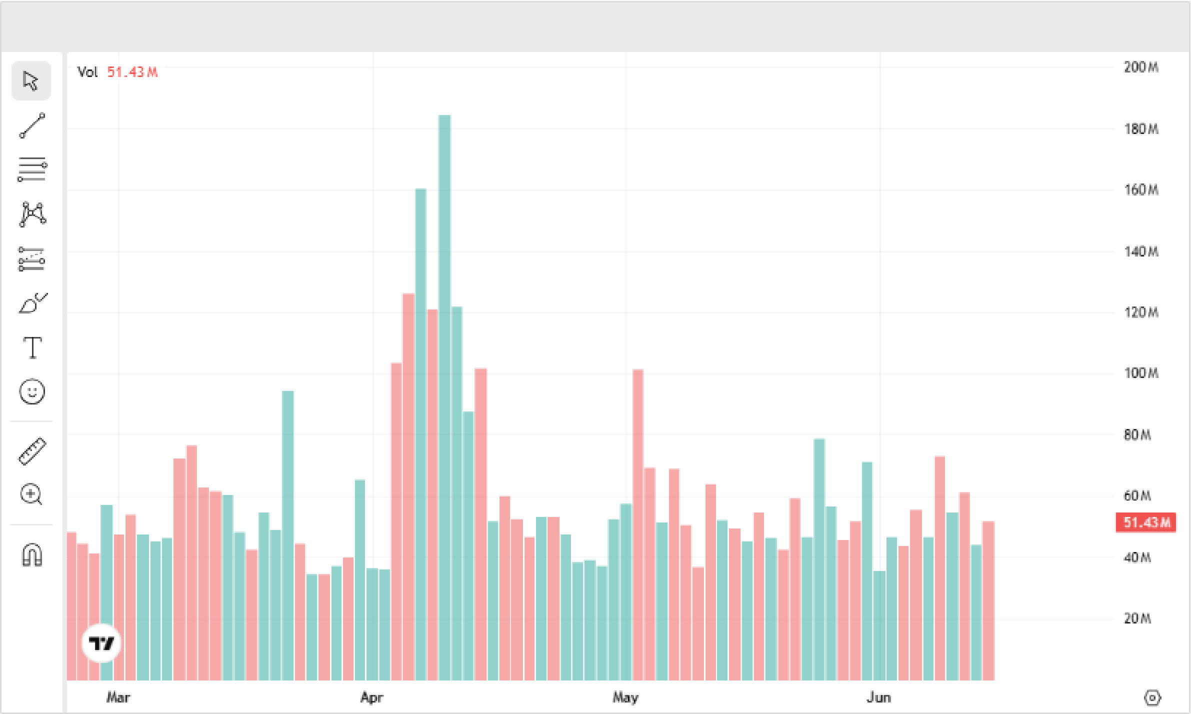


Figure 12 shows trading volume over time with red and green bars representing volume during down and up price movements respectively. High volume confirms price movements while low volume suggests weak confidence. Spikes often indicate significant price movements or new events.

Tools

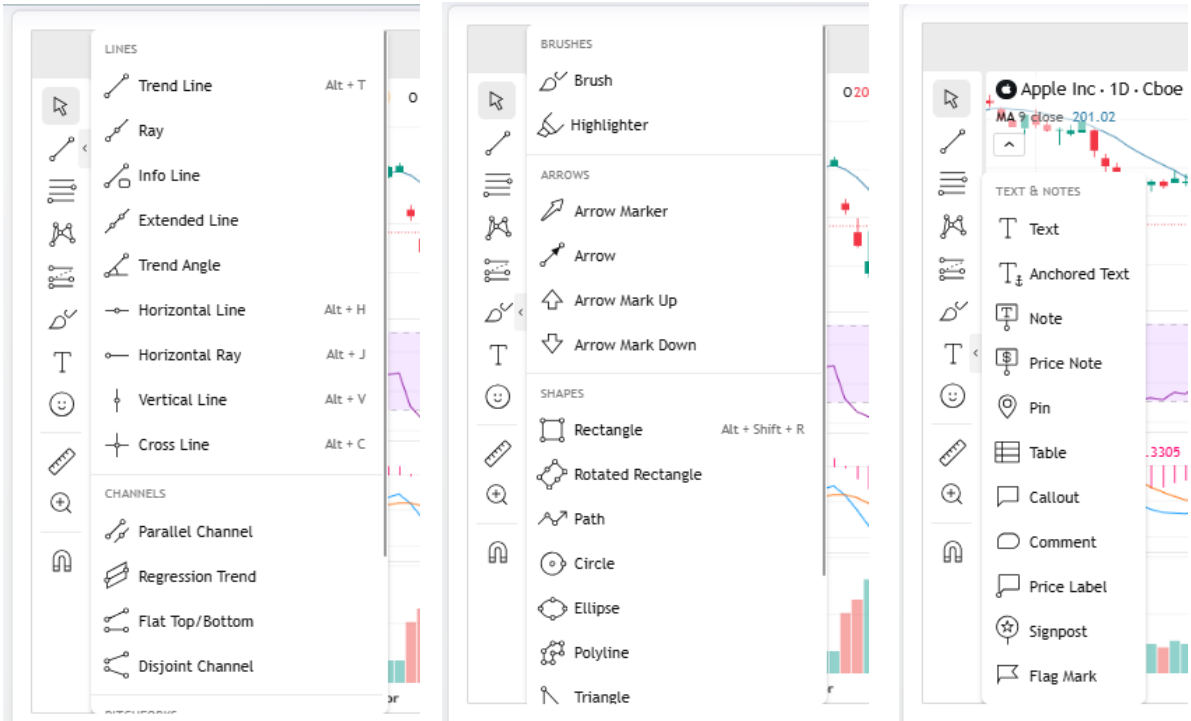


Figure 13 shows some tools provided such as lines, channels, brushes, arrows, shapes, text and notes for annotation to mark the trend lines.

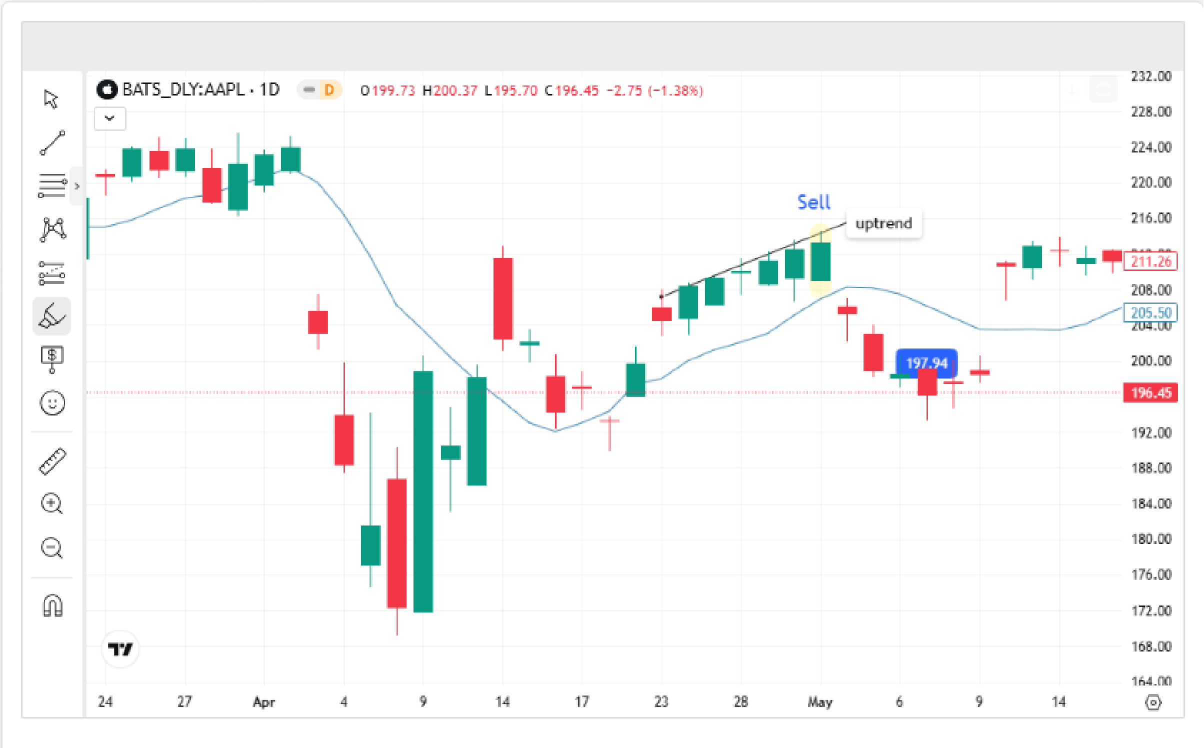


Figure 14 shows the annotation and markers made on the chart.

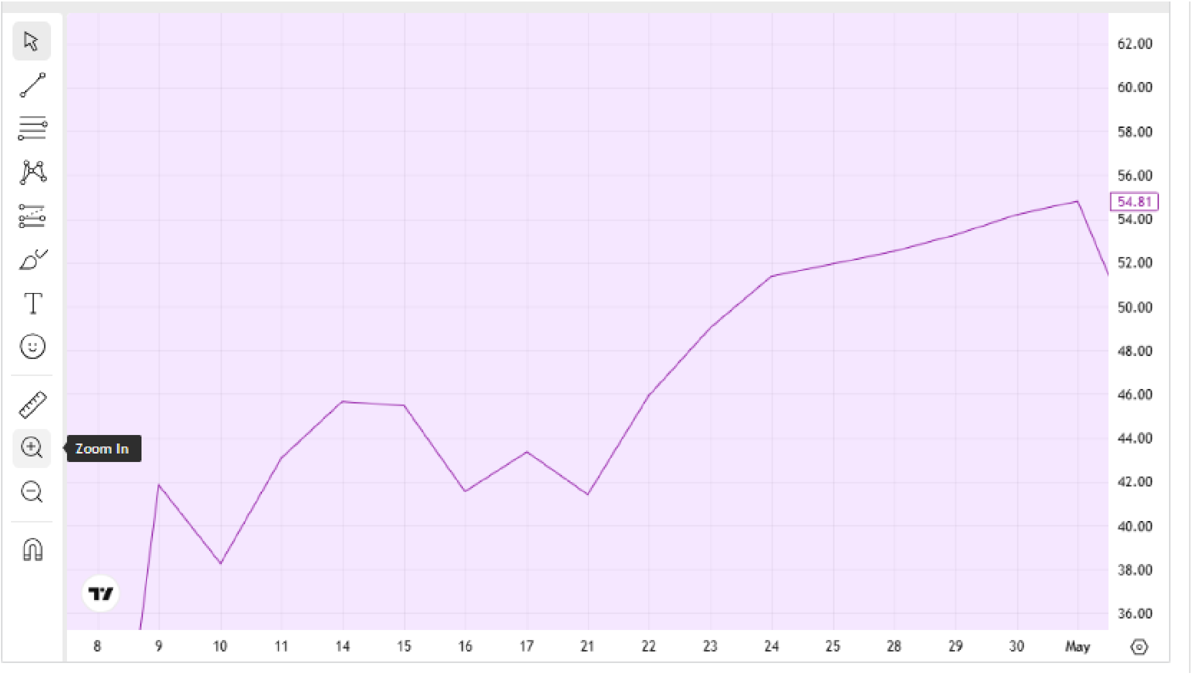
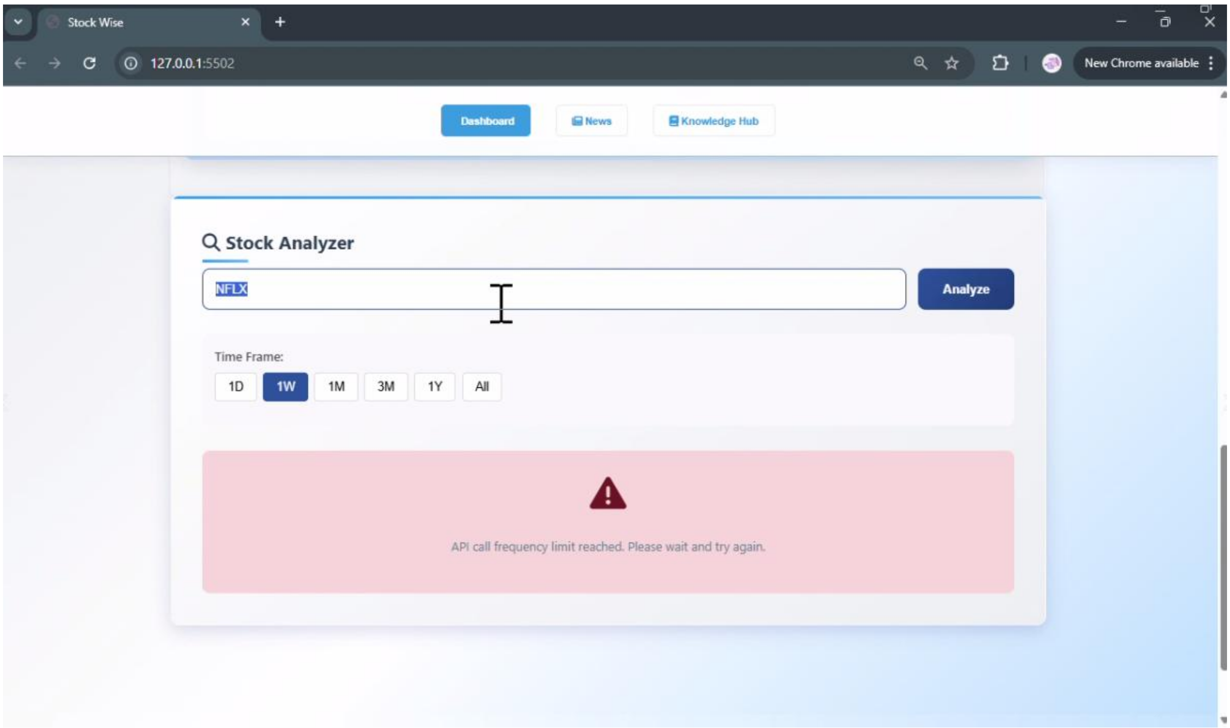


Figure 15 shows zoom and pan tools for detailed analysis.



Stock Analyzer

NFLX

Time Frame:

API call frequency limit reached. Please wait and try again.

Figure 16 shows error handling when the API reached its frequency limit.

6.0 Contribution of the Assignment

The development of Stock Wise contributes meaningfully to the public by making stock market analysis more accessible, educational and user-friendly for both beginners and experienced traders. By offering a free platform that consolidates real-time stock data, interactive charts, technical indicators, financial news, and learning resources, the application empowers users to explore and understand stock trends without needing advanced financial knowledge or expensive tools. This web application plays a vital role in:

- Democratizing financial analysis by providing easy access to powerful analytical tools.
- Promoting financial literacy through knowledge hub, which explains key investment concepts in simple terms.
- Encouraging responsible investing by helping users make data-driven decisions while understanding associated risks.
- Supporting self-learning by allowing users to experiment with stock analysis interactively at their own pace.

Ultimately, Stock Wise bridges the gap between technology and financial education, and helps users to make informed decisions and adopt a more thoughtful and sustainable approach to investing.

7.0 Explanation of Important Source Code

The source code of Stock Wise can be found in this GitHub repository: https://github.com/pangtengg/StockAnalyser

HTML	
index.html	- The HTML file provides the overall structure to the page using <header>, <nav>. <main>, <section> and <footer>. - The navigation bar is defined inside <nav> and contains buttons that allow users to switch between Dashboard, section, News section and Knowledge Hub section. Each button triggers the showSection('sectionId') function to display the content dynamically. - Each section is connected to a specific JavaScript file. For example, <section id = “global-market-overview”> is connected to overview.js which fetches and displays global stock market data. - The footer records my name and student ID. - The javascript file is connected to different modules.
JavaScript	
analysis.js	- There is getStockData() which is the core function called when user search for a stock symbol. The data is fetched from the GLOBAL_QUOTE API provided ny Alpha Vantage. It tries to the TIME_SERIES_DAILY method if quote data fails the required field. The current price, change from previous close, daily data analysis is displayed. - The getStockDataAlternative() uses TIME_SERIES_DAILY if GLOBAL_QUOTE fails. It feeds the stock data into showInsights(), showPrediction() and showTechnicals(). - The getDailyDataAndAnalysis() functiokn fetcches daily price history and sends it into howInsights(), showPrediction() and showTechnicals(). - showInsights(prices) calculates and shows basic insights from price history such as lowest price, highest price, average, daily change and volatility which is the range between max and min.

	- showPrediction(prices) uses simple Linear Regression to predict next day's price, calculate confidence using R-squared, estimate direction (up/down) and display a confidence bar - showTechnicals(prices) displays multiple technical indicators such as SMA (14, 50) which is simple averages over 14 and 50 days, RSI to detect if a stock is overbought or oversold, MACD as trend-following indicator aand Bollinger Bands which uses standard deviation to detect price breakout behaviour.
chart.js	- initTradingViewChart(symbol, interval) initializes and embeds a TradingView chart widget on Stock Wise with symbol, interval, indicators on MA, RSI, MACD, Volume, theme and background. - getStockData() function runs when the user clicks the Analyze button. It gets the stock symbol from input, loads the TradingView chart for the symbol. Then, a loader will be displayed while fetching the data until the result is shown. - setTimeFrame(timeFrame, btnElement) handles changing the chart's time frame when a button is clicked. It converts our human-readable time frame into the supported interval. Then, it reinitialises the chart with the interval and highlights the button to show that it is active. - There is a DOMContentLoaded event listener to wait for the page to fully load before running JavaScript to ensure the Analyse button works after the HTML is loaded. - Error handling is implemented using a try/catch block during chart initialisation. If the chart fails to load or encounters any issues, an error message will be displayed to the user.
knowledge.js	- There is a knowledgeContent Object that stores the content for different stock market knowledge topics such as the basics, technical, fundamental, strategies, risk and psychology of stock market. - The expandKnowledge(topic) function allows the content to expand or collapse when the button is click ed respectively
main.js	- The API Key is initialised to fetch the stock data.

	- The variables related to chart, currentSymbol, currentChartType, currentTimeframe, lastSymbol and indicators is initialised to manage the state of the chart and user settings. - A windows.onload function initialises the app view when the page loads. - showSection(id) manages the visibilitu of each section - An indicators object tracks the technical indicators like SMA, MACD and RSI.
news.js	- The function fetchStockNews() fetches the latest stock news articles from the Marketaux API, processes the data, and then displays it dynamically in the web application. - It retrieves the article title, source, image, description, url and published time for each card. - Error handling is implemented using a try/catch block during news fetching. If there are issues fetching the news, an error message will be displayed to the user.
overview.js	- A list if ETF symbols were defined to represent major global market indices to be used and fetched later. - The loadGlobalMarkets() function fetches the data for the ETF symbols and get real-time data using GLOBAL_QUOTE. It extracts information such as price, change and percentage change from the API call. A try /catch block is used if the fetch fails and it falls back to loadMockMarketData(). - The renderMarketDataAlpha(indices) function loops through all indices according to the symbols defined and put them into the card with name, symbol, price, change, day range, volume, market cap and status. - Error handling is implemented using a try/catch block during display of the market overview. If there are issues such as API rate limit, an error message will be displayed to the user.
CSS	

base.css	- This file determines the theme and colour management for Stock Wise. It ensures clean typography is applied consistently across the web application. It also applies gradients, shadows and transitions to ensure smooth interactions of the application.
components.css	- It defines the style for reusable UI elements such as buttons, input fields, loaders, error messages and taglines across Stock Wise. For example, it determines the style of loader to provide feedback when data is loading.
layout.css	- This file provides a full layout for Stock Wise to allow interactive elements, responsive behaviour and reusable utility classes to create a sleek UI.
sections.css	- This file determines the style of sections and components of Stock Wise such as the header, container, buttons, loader and card.

8.0 Conclusion

In conclusion, the development of Stock Wise demonstrates a fully functional and interactive stock analysis web application. The system successfully integrated real-time stock data, interactive TradingView charts, a range of technical indicators, simple price prediction model, up-to-date financial news and knowledge hub. This web application also provides the user with a clean, intuitive and responsive interface.

Throughout the development of this assignment, I gained valuable hands-on experience in web technologies of HTML, CSS, and JavaScript, while also learning to utilises and work with external APIs, perform DOM manipulation, apply modular JavaScript development, and implement effective error handling. This assignment has deepened my understanding of client-side web development and the practicality skills to deliver meaningful and educational financial tools to users.

Ultimately, Stock Wise aims to contribute to improving financial literacy, encouraging responsible investing, and making analytical tools more accessible to the public. Stock Wise empower users especially beginners to make stock analysis tools more approachable and informative.

In the future, features such as secure user authentication, personalised portfolio tracking, and advanced machine learning models can be integrated to make accurate stock predictions. Looking ahead, these improvements will further transform Stock Wise into a powerful educational and analytical tool for beginner investors and traders alike.