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# AI Stock Insight: An Intelligent Platform for Real-Time Stock and IPO Prediction Using Machine Learning and Sentiment Analysis

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**Abstract:** *The rapid growth of Artificial Intelligence (AI) and data analytics has brought a major transformation to the financial world, helping investors and traders make better, data-driven decisions.*

*AI Stock Insight is an intelligent, GUI-based platform that predicts daily stock prices and upcoming IPO trends using a combination of machine learning algorithms, technical indicators, and real-time news sentiment analysis.*

*The system gathers live financial data through APIs such as Yahoo Finance and Twelve Data, which provide up-to-date stock and market information. For price forecasting, Linear Regression and Random Forest Regression models are used, offering reliable short-term predictions. At the same time, TextBlob-based sentiment analysis reads live financial news and headlines to understand the public's mood and investor confidence, helping to predict whether a company or IPO might perform positively or negatively in the market. The system also analyzes technical indicators such as RSI (Relative Strength Index), MACD (Moving Average Convergence Divergence), and Bollinger Bands to study stock momentum and market stability.*

*For IPO forecasting, the system evaluates companies like OYO Rooms, Mobikwik, Pharmeasy, and Ola Electric etc., identifying listing price trends and potential investor demand based on both technical and sentiment-based data.*

*All analysis and predictions are displayed in an interactive GUI dashboard that shows clear graphs, comparison charts, and trend summaries. Users can explore multiple stocks, view 5-day forecasts, check IPO trends, and download visual reports in just a few clicks. By combining AI models, live financial data, and sentiment analytics, AI Stock Insight delivers a smart and user-friendly solution for real-world financial forecasting.*

**Keywords:** *AI Stock Insight, Machine Learning, Random Forest, Stock Prediction, IPO Forecasting, Sentiment Analysis, Real-Time Market Data, Data Visualization AI Stock Insight, Machine Learning, RSI, MACD, Bollinger Bands, Python, GUI, YFinance, TwelveData.*

## I. INTRODUCTION

In today's time, the stock market has become one of the most interesting and risky fields. Every person wants to earn profit by investing in shares or IPOs, but because the market changes very fast, it is not easy to guess what will happen next. Sometimes even experts fail to predict correctly because the stock prices depend on many different factors like company performance, news, economy, and even people's emotions. Because of all this, I decided to make a project that can help in understanding and predicting market movement in a simple and smart way. My project is called AI Stock Insight, which uses machine learning and artificial intelligence to study the past data of different stocks and try to predict their upcoming prices. The system also predicts IPO performance, so people can get an idea of how a new company's stock may perform on the first day.

The main aim behind creating this system is to help normal users who don't know much about the stock market but still want to get some idea before investing. This project takes live stock data and applies different technical indicators like RSI (Relative Strength Index), MACD (Moving Average Convergence Divergence), and Bollinger Bands to understand whether the market is going up, down, or staying stable. One of the most unique parts of this project is that it also checks news sentiment. It collects latest news about a company and analyzes if the news is positive or negative. If the news is good, it means people have confidence in that company, and the stock may go up. If the news is bad, the system may show a fall prediction. This combination of both data and emotion makes the prediction more powerful. The system has a simple GUI (Graphical User Interface) where anyone can just enter a stock name or symbol and instantly get results. It shows the current price, predicted prices for the next 5 days, and also the trend color — green for positive, red for negative, and white for neutral. Along with this, there are interactive graphs which show how the stock performed before and what can happen next. Users can also download the data as a PDF or Excel file and keep it for their record.

This feature makes it more useful for students, traders, and researchers who want to study and compare different stocks.

Apart from stocks, this project can also predict how upcoming IPOs will perform. For example, IPOs like OYO Rooms, Mobikwik, Pharmeasy, and Ola Electric can be analyzed based on listing price, public interest, and market news. The system then shows if the IPO may perform positive or negative on launch day. Along with stock predictions, the system also focuses on IPO performance analysis. When a new company enters the stock market, predicting whether its IPO will perform well or not is a big challenge. Using AI Stock Insight, users can check IPO-related data, past IPO trends, and related financial news to understand the possible success rate of a new listing. The system's ability to analyze fresh news articles ensures that users are always up-to-date with the latest market trends before investing. The idea of AI Stock Insight is not only to make predictions but also to make people learn how AI and data can be used together in the financial field. It helps to make better decisions, save time, and reduce risk while investing. Overall, this project is a small step toward showing how technology can make finance easier. With the help of AI, anyone can now get a basic idea of the stock market trend without needing to be an expert. The project gives a modern, data-based way to see the market clearly, understand it better, and take smarter investment decisions. The platform shows live graphs, interactive charts, and real-time news updates that make every prediction look like a full story — not just about what *might* happen in the market, but also why it could happen. For example, if a stock price is going up, users can also see related news or trends that explain the reason behind it. This makes the system not only smart but also easy to trust and understand.

With such features, AI Stock Insight works like a personal guide that helps investors stay updated, reduce risks, and make better financial moves in the fast-changing market. In simple words, this project combines machine learning, technical analysis, and sentiment analysis under one easy and interactive interface. It studies past 10 years of stock data, learns from it, and then predicts upcoming trends in a way that is simple to understand for everyone.

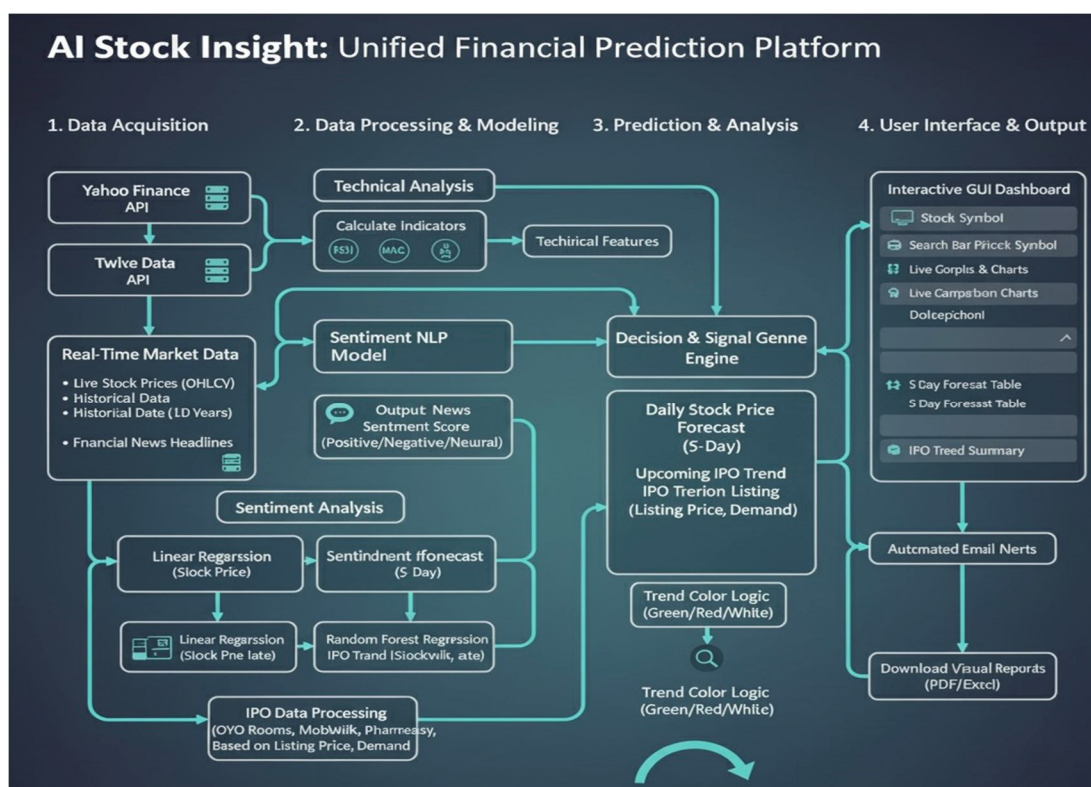


Fig1.1. Ai stock Insight workflow

## II. REVIEW

The financial market is one of the most unpredictable systems in the world. For many years, researchers and developers have tried to use technology to make sense of its ups and downs. Earlier models depended only on statistical data and technical indicators, which often failed to react quickly to fast-changing trends. With the rise of Artificial Intelligence (AI) and Machine Learning (ML), it has now become possible to predict market movements with better accuracy and deeper insights. Many studies in the past have focused on stock price forecasting using traditional methods like Moving Average, ARIMA models, and simple regression techniques.

However, these models often ignored other important factors like public sentiment, real-time news impact, and IPO trends. Modern AI-based systems such as AI Stock Insight are designed to overcome these gaps by combining multiple data sources, applying intelligent learning algorithms, and delivering predictions in an easy-to-use graphical interface. Recent research has shown that machine learning algorithms like *Random Forest*, *Linear Regression*, and *Time Series Forecasting* models perform well when trained on properly cleaned and structured financial data. These algorithms can identify hidden patterns in price history and make future predictions. The AI Stock Insight system applies the *Random Forest Regression* model, which is widely used because of its ability to handle noisy and non-linear market data. This improves prediction stability and reduces the chances of overfitting, leading to more reliable results. Another key area that researchers have been working on is sentiment analysis. Many market changes are not only due to numbers but also due to emotions — like investor confidence, fear, or excitement. Systems that combine *Natural Language Processing (NLP)* and sentiment detection tools such as TextBlob or VADER can measure the tone of financial news headlines and social media posts. In AI Stock Insight, the news sentiment analysis feature helps the user understand how the general public and media feel about a particular stock or IPO. This gives an additional layer of clarity that traditional models miss.

Apart from prediction and analysis, user interface and accessibility have also become a growing area of study. Many applications have complex designs that make it difficult for non-technical users to access the data. Research suggests that when information is presented through interactive visual dashboards, users engage more deeply and make better decisions. The AI Stock Insight system is built with this idea — it provides a simple Graphical User Interface (GUI) that displays live graphs, stock trends, and forecast results in a visually appealing way. The dashboard is designed to be responsive, allowing users to view it comfortably on mobile or desktop devices. In addition, the integration of APIs like Yahoo Finance and TwelveData has made it easier to collect real-time market data. Earlier, researchers faced difficulties in obtaining consistent and updated financial datasets. With APIs, the system can fetch live data for both Indian and international markets, making the predictions more accurate and relevant.

IPO forecasting is another area where many researchers are now showing interest. Predicting the success or failure of new public offerings is challenging, as it involves analyzing market trends, investor behavior, and company fundamentals. The AI Stock Insight model includes an *IPO trend analysis* module that studies early trading data, recent listings, and sentiment trends to provide an estimate of an IPO's future performance. In summary, existing literature and modern tools show that the combination of machine learning algorithms, sentiment analysis, and live data visualization can bring major improvements in financial forecasting. However, many systems still focus only on a single feature, like price prediction or sentiment alone. The AI Stock Insight platform is unique because it brings together all these elements in one place — real-time stock and IPO prediction, sentiment tracking, and dynamic graphs — all under a simple and friendly GUI. This makes it not just a technical experiment but a practical decision-making tool for traders, investors, and students who want to learn how AI can be applied to real-world finance. By merging data science and human-friendly design, it bridges the gap between technology and everyday financial understanding — showing how AI can truly simplify complex systems.

2025-10-20T17-27\_export

| datetime                | open      | high      | low       | close     | volume   | SMA_10            | SMA_20            | RSI                | MACD               | BB_High            | BB_Low             | ATR                | Prev_Close | Date_Ordinal |
|-------------------------|-----------|-----------|-----------|-----------|----------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|------------|--------------|
| 2025-10-14T00:00:00.000 | 426.79001 | 434.20001 | 417.85999 | 429.23999 | 72669400 | 436.4489960000000 | 434.3919985000000 | 54.22867673314740  | 14.36784525974890  | 456.43506889103900 | 412.3489281089610  | 19.435484472482700 | 435.89999  | 739538       |
| 2025-10-15T00:00:00.000 | 434.89999 | 440.51001 | 426.32999 | 435.14999 | 71558200 | 434.0179960000000 | 434.8564985000000 | 55.89766708978920  | 13.58702162064130  | 456.5495800625230  | 413.1634169374770  | 19.060094153019600 | 429.23999  | 739539       |
| 2025-10-16T00:00:00.000 | 434.73001 | 439.35001 | 421.31    | 428.75    | 77189900 | 433.2929960000000 | 435.4514980000000 | 53.61761711508240  | 12.309886842187800 | 455.7439800863360  | 415.15901591366400 | 18.98723099923250  | 435.14999  | 739540       |
| 2025-10-17T00:00:00.000 | 425.5     | 441.45999 | 423.60001 | 439.31    | 89118900 | 434.2409970000000 | 436.1134975000000 | 56.75222861153630  | 12.011392222690800 | 455.99834097411900 | 416.22865402588100 | 18.906713070715900 | 428.75     | 739541       |
| 2025-10-20T00:00:00.000 | 443.92    | 449.8     | 440.67    | 443.135   | 1120534  | 433.2294970000000 | 436.5597480000000 | 57.863054320235200 | 11.945775159293500 | 456.65318158578200 | 416.4663144142180  | 18.30551927995050  | 439.31     | 739544       |

Fig 2.1. AI Stock Insight Tesla stock price chart

### III. METHODOLOGY

The proposed methodology integrates historical stock market data, technical indicators, and news sentiment analysis to create a robust AI-based stock price prediction and IPO performance model. The approach consists of three main stages: data acquisition, feature engineering and modeling, and predictive simulation.

#### A. Data Acquisition and Preprocessing

##### 1) Data Sources

The study utilizes two primary types of data:

Historical Stock Data

Daily OHLCV (Open, High, Low, Close, Volume) values are collected for approximately 200 trading days.

1) Global stocks are accessed via the Twelve Data API.

2) Indian stocks are obtained using YFinance, with .NS ticker suffixes.

Market News Data

Recent financial news headlines are obtained from NewsAPI, enabling sentiment analysis to capture qualitative market information.

##### 2) Data Cleaning and Formatting

The stock dataset is indexed by date and sorted chronologically. Missing values are addressed using forward-filling techniques. All numerical features are converted to a uniform format, and the date is encoded numerically (Date\_Ordinal) for modeling purposes.

#### B. Sentiment Analysis & Feature Integration

##### 1) Headline Sentiment

- Each news headline processed with **TextBlob** to calculate polarity:

$Pol_i = \text{TextBlob}(\text{Headline}_i).sentiment.polarity$

- Range: **-1 (negative)** → **+1 (positive)**

##### 2) Aggregated Sentiment Feature

- Daily average sentiment:

$S\_Avg = (1/n) * \sum Pol_i$

- Sentiment boost applied to adjust predicted stock prices:  $I\_Sentiment = S\_Avg \times \beta$  ( $\beta = 5$ )

```
if sentiment > 0.1:
```

```
    emoji = "😊"
```

```
elif sentiment < -0.1:
```

```
    emoji = "😞"
```

```
else:
```

```
    emoji = "😊"
```

#### C. Technical Indicator Feature Engineering

- Historical market data transformed into predictive features using **ta library**

- Key indicators:

1) Simple Moving Average (SMA) Short-term: 10-day, Medium-term: 20-day:

$SMA\_N(t) = (1/N) * \sum_{i=0}^{N-1} C_{t-i}$

2) Relative Strength Index (RSI) Measures momentum over 14 days

$RSI(t) = 100 - 100 / (1 + RS(t))$ ,  $RS(t) = AU(t)/AD(t)$



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