

System Description

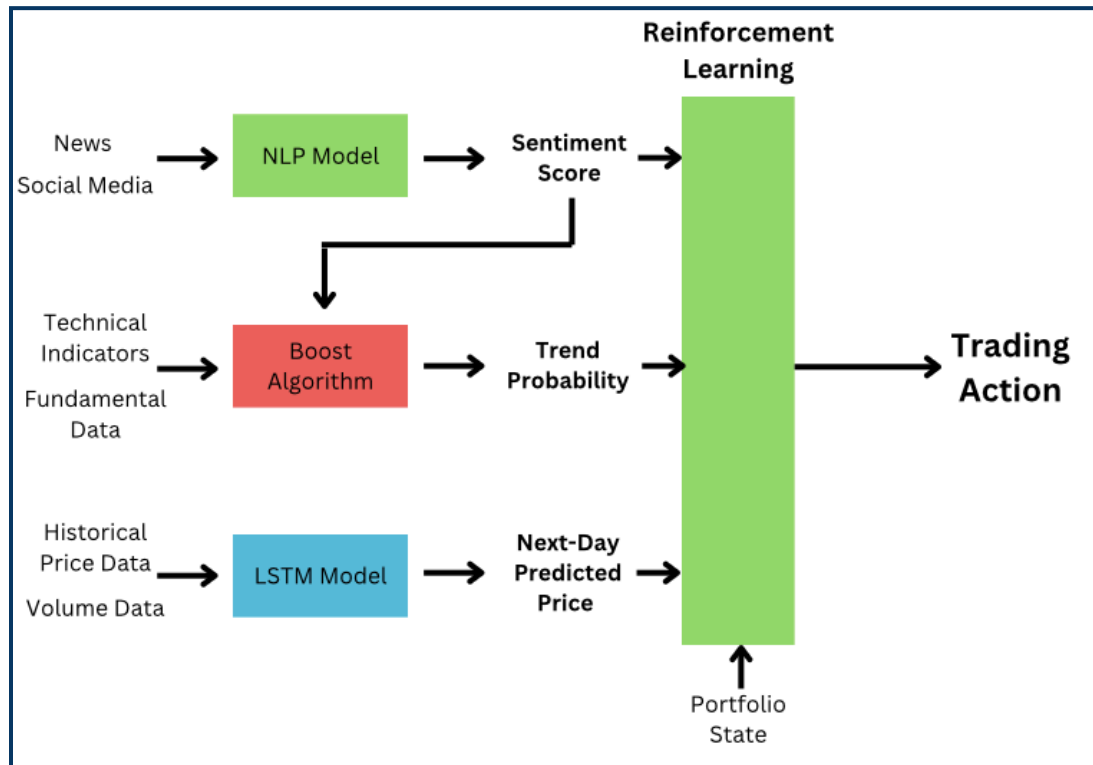


Figure 1: AI Trading Model Architecture

This section provides a detailed explanation of our **Machine Learning-Driven Trading Platform's** technical design. The system contains sophisticated ML models, a variety of data sources, and a RL model that is able to make optimal trading decisions. Each subdivision in Figure 1 is created to process certain data types and submit final information to the trading activities as a group for the RL model to come to a final Trading Action. The architecture at the general level, as shown in Figure 1, depicts how data transitions through the major parts.

High-Level System Architecture

Our proposed solution consists of four interconnected subsystems:

1. NLP Model

- Inputs:** Real-time news feeds and social media data
- Functionality:** The model will be used to figure out the sentiment of market-related news.
- Output:** A numerical score in the range from -1 to 1. The values closest to +1 signify a positive sentiment, and those close to -1 signify negative sentiment.
- Role:** This figure, therefore, becomes intelligence that one can act on in the face of changes in the market.

2. Boost Algorithm:

- a. **Inputs:** Technical indicators (for example Moving Averages, RSI, MACD) and fundamental metrics (for example P/E Ratio, Volume data).
- b. **Functionality:** The boost algorithm deals with varying data and finds non-linear connections.
- c. **Output:** A probability measure that gives the chance of a stock going up or down a certain amount (e.g., bullish or bearish) in the future.
- d. **Role:** The computation of probabilities for short-term predictions of the markets will allow our model to react and act on both technical and fundamental signs.

3. LSTM Model (Long Short-Term Memory)

- a. **Inputs:** Historical price and volume data over a configurable time window (such as the past 30–90 days).
- b. **Functionality:** The LSTM model is optimized for time-series forecasting. It captures long-term relationships in the data, enabling it to predict the Next-Day Price of a given asset.
- c. **Output:** A numerical prediction of the asset's price for the following trading day.
- d. **Role:** This prediction helps in decision-making by providing a forward-looking perspective on market trends.

4. Reinforcement Learning Component:

- a. **Inputs:**
 - i. Sentiment Score (NLP model).
 - ii. Trend Probability (Boost algorithm).
 - iii. Next-Day Predicted Price (LSTM model).
- b. **Functionality:** The RL model optimizes trading decisions. It does it by simulating many portfolio states and trading scenarios, it does it by evaluating the long-term rewards associated with each action (buy, sell, hold).
- c. **Output:** A **Trading Action** that maximizes portfolio returns while minimizing risk.
- d. **Role:** The RL component serves as our decision-maker, combining predictions from the other models.

Data Flow and Integration

The platform's operation begins with the taking in data streams, which are processed by subsystems:

1. Data Collection and Preprocessing

- a. **News and Social Media:** Scraped from APIs (like RSS feeds, News APIs), tokenized, and cleaned for NLP processing.
- b. **Technical Indicators:** Calculated using real-time market data.
- c. **Historical Price and Volume Data:** Retrieved from trading APIs (like Alpha Vantage, Yahoo Finance)

2. Processing and Decision Flow

- a. The NLP model processes text data to produce a Sentiment Score.
- b. Technical and fundamental data are analyzed by the Boost algorithm, generating a Trend Probability.

- c. The LSTM model predicts the Next-Day Price based on historical data.
- d. These outputs are fed into the RL component to determine the optimal trading action.

User Interface

Our platform's user interface (UI) is designed with accessibility and usability:

1. **Real-Time Dashboards:** Interactive visualizations display sentiment trends, predicted prices, and portfolio performance metrics.
2. **Trade Recommendations:** Users receive clear, actionable signals
3. **Customizability:** Users will have the ability to create their own personalized portfolios