Stock Market Trend Predictor

1. Introduction

This project focuses on predicting next-day stock price movement using historical price data, technical indicators, sentiment analysis, and deep learning models. Stock markets are highly volatile and influenced by multiple factors, making prediction a challenging task. The objective is to build a decision-support system rather than exact price forecasting.

2. Problem Statement

The goal of this project is to predict whether the stock price will move upward or downward on the next trading day using historical data and auxiliary features.

3. Dataset Description

The dataset consists of daily stock market data including Open, High, Low, Close, and Volume values. The data spans multiple years and follows business-day frequency.

4. Feature Engineering

Several technical indicators were calculated to capture trend, momentum, and volatility. These include Simple Moving Averages, Exponential Moving Averages, Relative Strength Index, MACD, and Bollinger Bands.

5. Sentiment Analysis

Simulated financial news headlines were analyzed using VADER sentiment analysis. Each headline was converted into a numerical sentiment score and aggregated daily. The sentiment feature was merged with the stock dataset for model input.

6. Time Series Analysis

An ARIMA model was implemented as a baseline time series model using closing prices. This model provides a benchmark for comparison with deep learning approaches.

7. Transformer Model

A Transformer-based deep learning model was trained using multi-feature time series data. The model leverages attention mechanisms to capture long-term dependencies across features.

8. Evaluation Metrics

The model was evaluated using accuracy, confusion matrix, precision, recall, and F1-score. These metrics help assess classification performance.

9. Results and Comparison

Both ARIMA and Transformer models achieved approximately 52–53 percent accuracy. The Transformer demonstrated better utilization of multiple features.

10. Trading Strategy Simulation

Model predictions were converted into basic buy and no-buy signals to demonstrate decision-support capability.

11. Conclusion

This project demonstrates the application of classical time series analysis and modern deep learning techniques for stock trend prediction.

12. Future Work

Future improvements include integrating real news data, applying SARIMA or Prophet models, and improving trading strategy evaluation.