Investment Prediction System

Revision Number: 1.0
Last date of revision: 06/06/2025

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Date Issued	Version	Description	Author
06/06/2025	1	Initial Source Code — V1.0	Suraj Kakulte

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Abstract

In today's fast-paced financial world, stock market prediction plays a critical role in empowering investors to make informed decisions. Traditional methods often fall short due to the volatile nature of the stock market, which is influenced not only by historical trends but also by real-time news and public sentiment. This project presents a comprehensive web-based solution that leverages machine learning models, such as LSTM and ARIMA, in conjunction with sentiment analysis derived from Twitter data, to enhance the accuracy of stock price forecasting.

This project aims to provide a predictive web application that forecasts stock prices for upcoming days by analyzing historical stock data and Twitter sentiments. The solution integrates machine learning models and real-time sentiment analysis to empower investors with data-driven insights for decision-making.

1 Introduction

1.1 Why this High-Level Design Document?

This HLD provides a conceptual blueprint of the system including architectural components, model design, user interaction flow, and technology stack. It helps in early-stage design validation and alignment with requirements.

1.2 Scope

The application predicts future stock prices using ML models (LSTM, ARIMA, Linear Regression) and sentiment analysis of tweets. It provides features for users to check stock news, currency conversion, and stock education.

1.3 Definitions

Term	Description
Sentiment Score	Polarity of tweets on a stock
LSTM	Long Short-Term Memory
NASDA	Stock Exchanges (India/USA)

2 General Description

2.1 Python Perspective

A Python-Flask and WordPress integrated system offering real-time and predicted stock data.

2.2 Problem statement

Predicting stock prices is challenging due to market volatility. Existing systems lack integration of social sentiments and ML-based forecasts.

2.3 Proposed Solution

The app predicts stock trends using ML models trained on historical data and recent news/tweets. Sentiment polarity augments prediction accuracy.

2.4 Further Improvements

- Add user-based personalization
- Use deep learning models like BERT for sentiment
- Real-time market feed integration

2.5 Technical Requirements

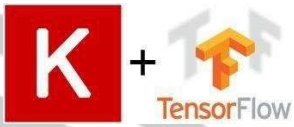
- Python 3.x, Flask
- SQL DB for user data
- XAMPP with WordPress
- Twitter API access
- Yahoo Finance API

2.6 Data Requirements

- Historical stock data (CSV/JSON)
- Real-time tweets via Tweepy
- News headlines (optional RSS)
- At least 3 years of past data

2.7 Tools used

- Python, Flask
- TensorFlow, Keras, Sklearn
- Tweepy, Numpy, Pandas
- WordPress, PHP
- MySQL



2.8 Constraints

- Requires active internet
- May face API rate limits
- Sentiment model language-dependent

2.9 Assumptions

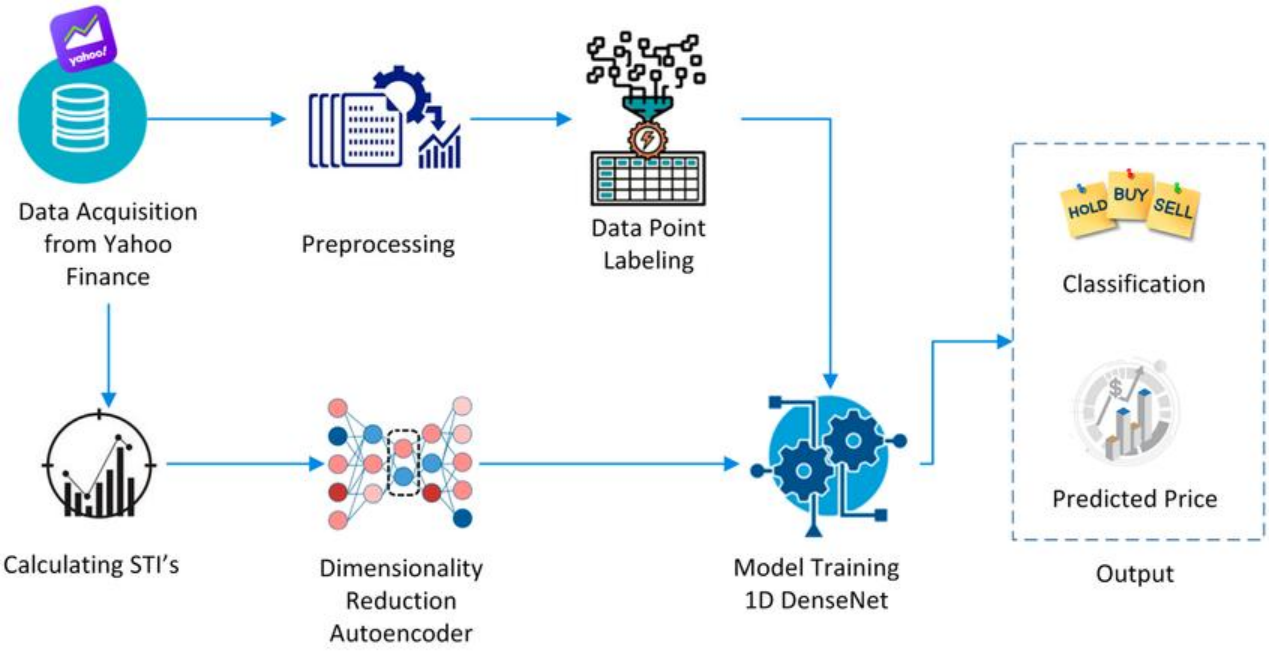
- Users are aware of stock terminology
- APIs are accessible and keys valid
- Training models are periodically updated

3 Design Details

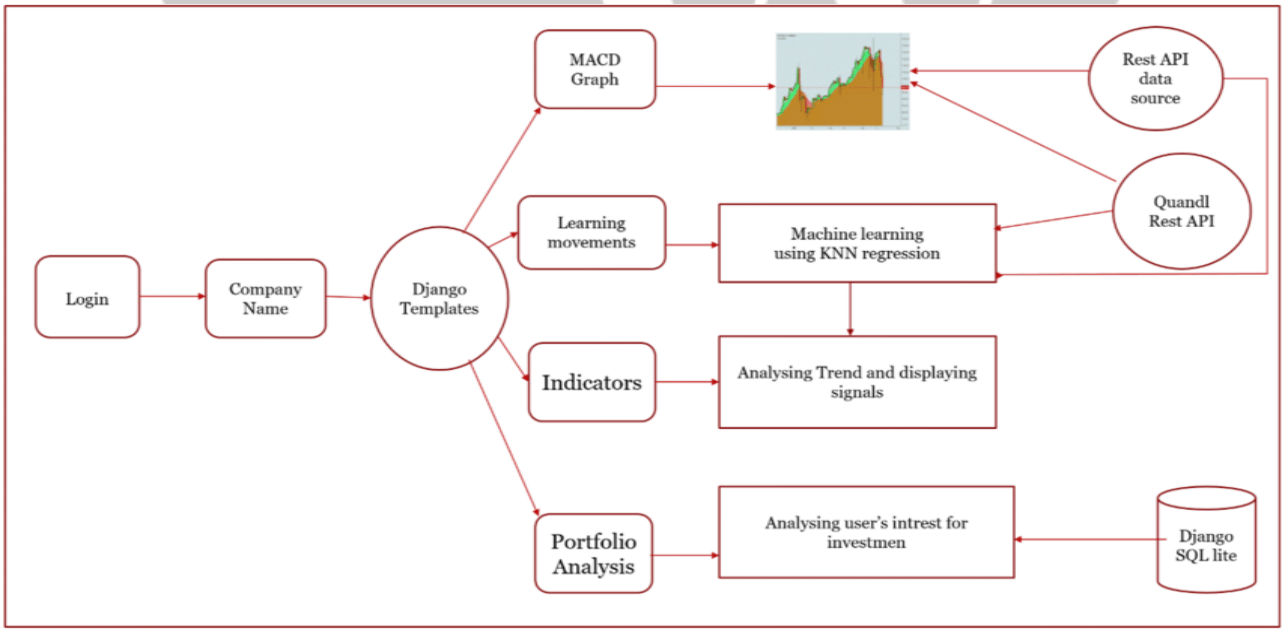
3.1 Process Flow

For identifying the different types of anomalies, we will use a deep learning base model. Below is the process flow diagram is as shown below.

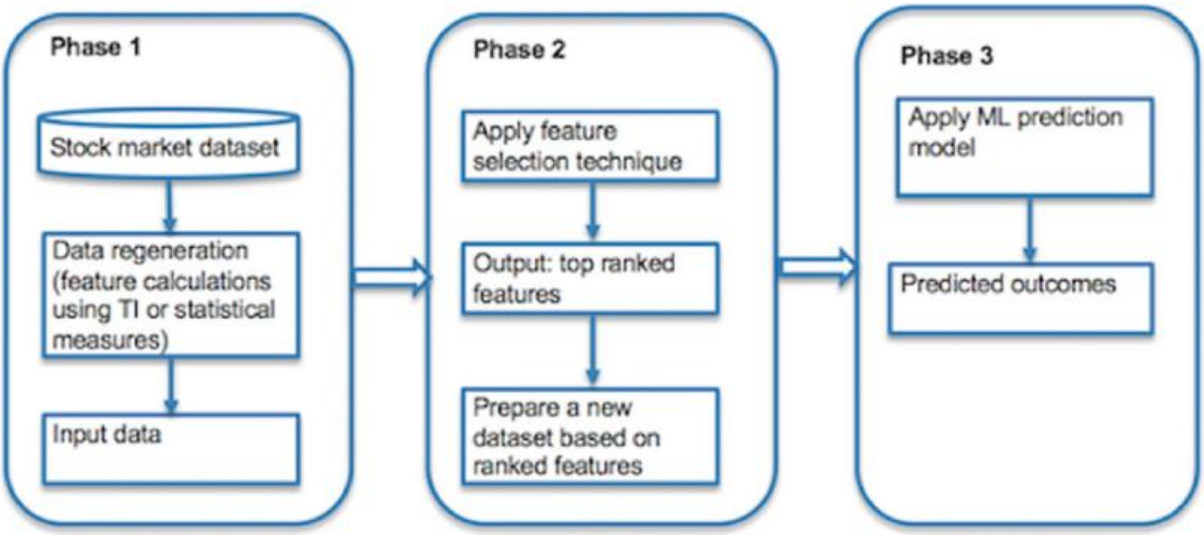
Proposed methodology:



3.1.1 Model Training and Evaluation



3.1.2 Deployment Process



3.2 Event log

1. Log user access, prediction
2. Log API calls for auditing
3. Monitor ML model performance

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3.3 Error Handling

1. Handle missing API data
2. Invalid stock ticker handling
3. Network issues gracefully reported

4 Performance

The overall performance of the Stock Market Prediction Web App is evaluated across multiple dimensions to ensure reliability, responsiveness, and usability.

4.1 Reusability

- Modular ML scripts for reuse
- Templates for different stocks

4.2 Application Compatibility

- Runs on Windows/Linux
- Browser-based interface

4.3 Resource Utilization

- High during prediction phase
- Lightweight for static views

4.4 Deployment

- Locally via XAMPP/Flask
- Optionally deploy on AWS or Heroku

5 Dashboards

The application includes an interactive and dynamic dashboard to present data insights, prediction results, and user-friendly visualizations. These dashboards aim to help users make informed investment decisions based on both technical and sentiment-driven analysis.

5.1 KPI's (Key Performance Indicators)

1. Accuracy of predictions (RMSE)
2. Sentiment trend chart
3. Stock price trend chart
4. User activity analytics
5. Real-time tweet stream

6 Conclusion

This Stock Market Prediction Web App provides users with intelligent insights for stock trading through machine learning and sentiment analysis. It is designed to be scalable, extensible, and usable by general investors with basic stock knowledge.

The Stock Market Prediction Web App integrates advanced machine learning models with real-time sentiment analysis to deliver actionable insights for retail investors and enthusiasts. By leveraging historical stock data and public opinion from platforms like Twitter, the system provides more accurate and context-aware forecasts.

The architecture is modular, scalable, and user-friendly—ensuring maintainability and adaptability for future enhancements. This predictive solution bridges the gap between traditional quantitative forecasting and real-time qualitative sentiment, offering a robust tool for intelligent market analysis.

7 References

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