Test Document for Stock Price Prediction App

Table of Contents

1. Introduction

This test document outlines the testing strategy for the Stock Price Prediction App. The objective is to verify that the application meets the specified requirements, performs reliably, and provides accurate predictions.

2. Testing Objectives

- Ensure the app fetches and displays historical stock data correctly.
  (SRS Reference: FR3.2.1.1, FR3.2.1.2)
- Verify the accuracy and performance of the technical indicators.
  (SRS Reference: FR3.3.1.1, FR3.3.1.2)
- Validate the predictions made by the Prophet and LSTM models.
  (SRS Reference: FR3.4.1.1, FR3.4.1.2)
- Confirm that the user interface is intuitive and user-friendly.
  (SRS Reference: UR3.5.2.1, UR3.5.2.2)
- Assess the app's performance under various conditions.
  (SRS Reference: PR5.1.1, PR5.1.2)
- Ensure the app is secure and handles user data responsibly. (SRS Reference: SR5.2.1, SR5.2.2)

3. Test Environment

Operating System: Windows 10, macOS
Browser: Google Chrome, Microsoft Edge
Python Version: 3.7+
Libraries: Streamlit, yfinance, pandas, ta, Prophet, matplotlib, TensorFlow, scikit-learn, NumPy

4. Test Cases

Functional Testing

Test Case 1: Select Stock Ticker
Objective: Ensure the user can select a stock ticker from the dropdown.
Steps:
1. Launch the app.
2. Select a stock ticker from the dropdown menu.

Expected Result: The selected ticker should be displayed, and the app should proceed to fetch data.
SRS Reference: FR3.1.1.1, FR3.1.1.2

Test Case 2: Fetch Historical Data
Objective: Verify that the app fetches historical data for the selected ticker.
Steps:
1. Select a stock ticker.
2. Wait for the app to fetch and display the data.

Expected Result: The historical data table should be displayed with correct columns and rows.
SRS Reference: FR3.2.1.1, FR3.2.1.2

Test Case 3: Display Technical Indicators
Objective: Confirm the technical indicators are calculated and displayed correctly.
Steps:
1. Select a stock ticker.
2. View the charts for EMA, MACD, and RSI.

Expected Result: The charts should display accurate calculations of the technical indicators.
SRS Reference: FR3.3.1.1, FR3.3.1.2

Test Case 4: Prophet Model Forecast
Objective: Validate the forecast made by the Prophet model.
Steps:
1. Select a stock ticker.
2. View the Prophet forecast chart.

Expected Result: The forecast should be displayed as an interactive Plotly chart.
SRS Reference: FR3.4.1.1

Test Case 5: LSTM Model Prediction
Objective: Verify the LSTM model predictions and compare them with actual prices.
Steps:
1. Select a stock ticker.
2. View the LSTM prediction chart.

Expected Result: The chart should display both actual and predicted prices accurately.
SRS Reference: FR3.4.1.2

Usability Testing

Test Case 6: User Interface Navigation
Objective: Ensure the app is easy to navigate.
Steps:
1. Launch the app.
2. Navigate through different sections and features.

Expected Result: The app should be intuitive, and users should easily find and use features.
SRS Reference: UR3.5.2.1

Test Case 7: Data Visualization Clarity
Objective: Confirm that charts and tables are clear and informative.
Steps:
1. Select a stock ticker.
2. View all displayed charts and tables.

Expected Result: Visual elements should be clear, properly labeled, and easy to interpret.
SRS Reference: UR3.5.2.2

Performance Testing

Test Case 8: Data Fetch Performance
Objective: Assess the time taken to fetch and display historical data.
Steps:
1. Select a stock ticker.
2. Measure the time from selection to data display.

Expected Result: Data should be fetched and displayed within a reasonable time frame.
SRS Reference: PR5.1.2

Test Case 9: Model Prediction Performance
Objective: Evaluate the performance of the Prophet and LSTM models.
Steps:
1. Select a stock ticker.
2. Measure the time taken for the models to produce predictions.

Expected Result: Predictions should be generated within a reasonable time frame.
SRS Reference: PR3.4.2.1, PR3.4.2.2

Security Testing

Test Case 10: Data Privacy
Objective: Ensure user data and interactions are secure.
Steps:
1. Use the app to select a stock ticker and view data.
2. Verify that no sensitive data is exposed.

Expected Result: User data should be handled securely, and no sensitive information should be exposed.
SRS Reference: SR5.2.1, SR5.2.2

5. Test Schedule

Week 1: Functional Testing
Week 2: Usability Testing
Week 3: Performance Testing
Week 4: Security Testing

6. Test Reporting

Daily Reports: Summarize the tests performed, issues found, and resolutions.
Weekly Summary: Comprehensive report on testing progress, major findings, and any blockers.
Final Report: Detailed report covering all testing phases, results, and recommendations.

7. Conclusion

The test document outlines the comprehensive testing strategy for the Stock Price Prediction App. By following this plan, we aim to ensure the app is reliable, user-friendly, performs well, and securely handles user data.

SRS Requirement Code	SRS Requirement Description	Test Case
FR3.1.1.1	Allow users to select a stock ticker from a dropdown list	Test Case 1: Select Stock Ticker
FR3.1.1.2	Update dynamically to reflect the data related to the selected stock ticker	Test Case 1: Select Stock Ticker
FR3.2.1.1	Fetch historical stock data from external sources using the yfinance API	Test Case 2: Fetch Historical Data
FR3.2.1.2	Provide an error message if the selected stock ticker data is unavailable	Test Case 2: Fetch Historical Data
FR3.3.1.1	Compute technical indicators such as EMA, MACD, and RSI	Test Case 3: Display Technical Indicators
FR3.3.1.2	Display these indicators in a comprehensible format on the user interface	Test Case 3: Display Technical Indicators
FR3.4.1.1	Implement the Prophet model to forecast stock prices for up to one year	Test Case 4: Prophet Model Forecast
FR3.4.1.2	Implement an LSTM neural network for short-term stock price predictions	Test Case 5: LSTM Model Prediction
PR3.4.2.1	Generate and display forecasts within 30 seconds after user requests	Test Case 9: Model Prediction Performance

PR3.4.2.2	Maintain accuracy levels as per predefined benchmarks during testing phases	Test Case 5: LSTM Model Prediction, Test Case 9: Model Prediction Performance
UR3.5.2.1	Ensure the interface is intuitive and the charts are easily interpretable by users with basic knowledge of stock markets	Test Case 6: User Interface Navigation
UR3.5.2.2	Provide tooltips and help documents within the application to guide new users on the interpretation of the data	Test Case 7: Data Visualization Clarity
PR5.1.1	The application should be capable of handling up to 100 simultaneous users without performance degradation	Test Case 8: Data Fetch Performance, Test Case 9: Model Prediction Performance
PR5.1.2	Response times for fetching historical data from external sources should not exceed 5 seconds	Test Case 8: Data Fetch Performance
SR5.2.1	All data transmitted over the internet must be encrypted using SSL/TLS	Test Case 10: Data Privacy
SR5.2.2	User data should be stored securely, with sensitive information encrypted in transit and at rest	Test Case 10: Data Privacy