Software Requirements Specification (SRS)

1. Introduction

1.1 Purpose

The purpose of this document is to outline the requirements for a stock analysis and prediction website that centers on the Macedonian Stock Exchange (MSE). The website is intended to use machine learning for stock price predictions, along with technical and fundamental analysis, and sentiment insights. Additionally, it includes an automated system for weekly database updates and model retraining to maintain data accuracy and model reliability. A model will be applied per stock, tailoring predictions to each individual stock. User profiles will allow for personalized watchlists and weekly notifications.

2. Overall Description

2.2 Product Functions

The website's main functionalities consist of:

- **Technical Analysis**: Showing technical indicators on stock charts.
- **Fundamental Analysis**: Displaying financial metrics for MSE-listed stocks.
- **Sentiment Analysis**: Evaluating news sentiment for each stock.
- **Price Prediction**: Utilizing an LSTM model for each stock to provide custom forecasts.
- **User Profiles and Watchlists**: Enabling users to create watchlists with weekly email updates.
- **Automated Weekly Updates and Retraining**: Ensuring that stock data is updated weekly and models retrain automatically for accuracy, supported by a machine learning framework.

3. User Scenarios and Personas

3.1 Personas

Ana, a Beginner Investor

- **Profile**: Ana is a recent graduate who is new to investing and eager to learn about the stock market. She wants guidance to make informed choices without deep technical knowledge.
- **Goals**: Ana looks for simple, actionable insights to help her make initial investments in Macedonian stocks. She depends on weekly predictions and sentiment insights without needing to go into complex details.

Bojan, an Experienced Financial Analyst

- **Profile**: Bojan is a financial analyst at a local investment firm, with advanced expertise in technical and fundamental analysis. He regularly trades in MSE-listed stocks.
- **Goals**: Bojan seeks detailed technical and fundamental analysis and sees machine learning predictions as a way to complement his own assessments. He values real-time data and technical indicators for short-term trading.

Maja, a Part-Time Trader

- **Profile**: Maja works in another field but follows stock trading as a side interest. She has a solid grasp of trading basics and wants support in staying updated on trends weekly.
- **Goals**: Maja wants to track her preferred stocks on a personalized watchlist and receive weekly updates. She uses sentiment analysis and price predictions to spot trends without needing constant monitoring.

3.2 User Scenarios

Scenario 1: Ana's Weekly Prediction Notification

- **Description**: Ana has set up an account and added MSE stocks to her watchlist. She receives an email each week that provides the latest predictions for her selected stocks based on the most recent LSTM models.

- **Outcome**: Ana uses these predictions to make decisions, focusing on stocks with positive predictions and sentiment scores. This helps her choose investments without needing in-depth analysis.

Scenario 2: Bojan's Real-Time Analysis and Data Retrieval

- **Description**: Bojan logs into the website to check real-time technical analysis for his stocks. He sees live values for moving averages, MACD, and RSI, and also reviews P/E ratios and other fundamentals.
- **Outcome**: Bojan leverages technical and fundamental metrics to validate his hypotheses. He cross-references the predictions to add depth to his trading strategies.

Scenario 3: Maja's Sentiment Analysis for Investment Decision

- **Description**: Maja is considering buying more shares of a stock on her watchlist. She checks the sentiment score on the platform and sees that the sentiment is largely positive based on recent news.
- **Outcome**: The positive sentiment and forecast confirm her decision, leading her to increase her investment. The sentiment analysis enables her to make data-informed choices.

Scenario 4: Ana's Exploration of Stock Fundamentals for Long-Term Investment

- **Description**: Ana wants to assess a stock's financial health before making a long-term investment. She views the fundamental analysis dashboard, which displays P/E ratio, EPS, and dividend yield.
- **Outcome**: Ana feels confident in the stock's stability and adds it to her watchlist for continued tracking, relying on weekly prediction emails for performance updates.

Scenario 5: Bojan's Comparative Analysis of Technical Indicators Across Multiple Stocks

- **Description**: Bojan compares several stocks to identify potential trades. He views technical indicators such as moving averages and Bollinger Bands on his watchlist.
- **Outcome**: Spotting a bullish signal, Bojan decides to make a buy order. He values the ability to quickly compare indicators for multiple stocks.

Scenario 6: Maja Uses Sentiment Analysis to Gauge Market Reactions to News

- **Description**: Maja reads news articles about a company she follows. She checks the sentiment dashboard for the stock, which aggregates scores from various sources.
- **Outcome**: Observing a positive sentiment trend, Maja increases her position in the stock. The platform's sentiment analysis allows her to make an informed choice based on public opinion.

Scenario 7: Ana Learns from Prediction Accuracy

- **Description**: Ana reviews the platform's historical predictions, comparing them with actual performance to evaluate model accuracy.
- **Outcome**: Ana gains confidence in the model's predictions, noticing consistent accuracy. This builds her trust in using the weekly forecasts for guidance.

Scenario 8: Maja Exports Historical Data and Analysis for Personal Records

- **Description**: Maja downloads historical data for her stocks, including sentiment and technical analysis, for offline analysis.
- **Outcome**: Maja stores and analyzes the data independently, maintaining records for personal use. Exporting stock data supports her investment tracking and research.

4. Specific Requirements

4.1 Functional Requirements

FR1 - User Registration and Login

The system shall allow users to register, log in, and securely manage their accounts.

FR2 - Watchlist Management

The system must enable users to create and manage a watchlist of preferred stocks.

FR3 - Weekly Prediction Notifications

The system shall send a weekly email with price predictions for stocks in each user's watchlist.

FR4 - Real-Time Technical Analysis

The system must provide a dashboard showing real-time technical indicators like moving averages and RSI.

FR5 - Fundamental Analysis

The system shall display key financial metrics, such as P/E ratio and EPS, for each stock.

FR6 - Sentiment Analysis

The system must provide sentiment scores for each stock based on news and social data.

FR7 - Stock-Specific Price Prediction

The system shall use an LSTM model for each stock to generate tailored price predictions.

FR8 - Historical Data Access

The system must store and allow users to access historical stock data.

FR9 - Automated Data Import and Transformation

The system shall automatically retrieve, format, and store stock data using a Pipe-and-Filter approach.

FR10 - Weekly Database Update

The system must update the stock database weekly with new data.

FR11 - Automated Model Retraining

The system shall retrain each stock's model weekly using a machine learning framework.

FR12 - Admin Dashboard

The system must include an admin dashboard to manage data sources, model retraining, and system performance.

4.2 Non-Functional Requirements

NFR1 - Performance

The system must provide timely responses, with real-time dashboards loading within a few seconds.

NFR2 - Scalability

The system shall handle an increasing number of users and data volume without a decrease in performance.

NFR3 - Usability

The interface must be intuitive and accessible, enabling ease of use for all user levels.

NFR4 - Reliability

The system shall maintain a high uptime, ensuring data retrieval and model predictions are consistently available.

NFR5 - Security

The system must securely handle user data, utilizing encryption and secure protocols for all data exchanges.

NFR6 - Data Integrity

The system shall maintain the accuracy and consistency of data, especially for stock information and model predictions.

NFR7 - Maintainability

The system must have a modular design, enabling easy updates, especially for data processing and model retraining components.

NFR8 - Compatibility

The system shall be compatible across major browsers and devices to provide broad accessibility.

NFR9 - Logging and Monitoring

The system must have logging and monitoring features to track system health, performance, and data updates.

NFR10 - Adaptability

The system shall support updates in data sources or algorithms without major reconfiguration, allowing seamless adaptation to changes.

5. Descriptive Narrative

The website is intended to be a valuable resource for a wide range of Macedonian Stock Exchange investors, including beginners, experienced analysts, and part-time traders. The website gives current and personalized predictions by utilizing user-friendly dashboards and automated weekly updates. The use of one model per stock ensures that each prediction is particular to that stock's performance, increasing prediction accuracy.

Every week, the system obtains and stores updated data, and then retrains each stock's LSTM model using a machine learning framework. This guarantees that all predictions mirror current trends. Users with watchlists receive weekly email updates summarizing the projections for their selected companies, with an additional layer of sentiment analysis to provide insight.

The admin role is streamlined by a dashboard that enables monitoring of model retraining and data updates, supporting efficient, continuous operation with minimal manual involvement.

This setup enhances the MSE investment experience by merging technical and fundamental data, sentiment insights, and machine learning, making it easier for investors at all levels to make informed decisions.