5 Engineering Requirments

This section outlines the necessary engineering requirements for developing the AI trading assistant

5.1 Data Collection and Preprocessing
- **Historical Stock Data:** We must gather at least three years of daily stock data for our equity including open, high, low, and close prices. We will need technical indicators in the data including trading volume and moving averages. We must format the data to train our LSTM from it.
- **Real-Time Data**: We will integrate a real-time financial data source for continuous updates on stock markets and relevant market indicators using a public API. This will be displayed to our users via our web application.

5.2 LSTM Model
- **Prediction Accuracy**: The LSTM model must predict daily stock prices with an accuracy, measured by the mean squared loss, of less than 0.10 on the test set.
- **Overfitting Prevention:** The model must implement regularization techniques to prevent overfitting. L2 Regularization with tunable lambda values will be applied to limit model complexity and improve generalization.

5.3 XG Boost Algorithm
- **Signal Classification:** The model must classify trading actions (buy, sell, hold) with at least 70% precision. In addition to precision, the model's performance will be evaluated using recall and F1-score to ensure a balanced approach, particularly in minimizing false positives and false negatives.
- **Feature Integration:** The model must combine technical indicators, sentiment scores, and LSTM predictions to generate its trading signals.

5.4 Reinforcements Learning for Trading Strategy Optimization
- **State-Action Space**: The reinforcement learning agent must support three trading actions (buy, sell, hold) and incorporate input features from the LSTM model.
- **Backtesting:** The system must support backtesting for a given equity.
- **Reward Function:** The reward function must incentivize profit maximization while penalizing large drawdowns.

5.5 Web Application
- **Backend Architecture**: The system must include a robust backend that handles requests from the user interface, processes data, and communicates with the machine learning models and database through REST APIs.
- **Dashboard Visualization**: A Web-based dashboard that provides real-time visualization of a stock price and trading signals that we determine.
- **Cloud Integration**: The web application will be hosted on a could service and accessible to all users.