# Work Summary for week 2

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This week, I worked on a stock price analysis and trading strategy backtesting system. The goal was to analyze historical stock data, detect patterns, and test trading strategies to see if they would have been profitable.

## Main Tasks

**Data Processing**

* Loaded one stock data from an Excel file.
* Cleaned and sorted the data, especially fixing how trading volume was recorded.

**Technical Analysis**

* Calculated **Moving Averages、MACD、RSI** to measure momentum shifts.
* Added Candlestick Pattern Detection to better decision
* Generate Trading Signals
* Backtesting and simulated a trading strategy starting with initial cash of $10,000 to see how it would perform
* Calculate metrics like total return, sharp ratio, etc. to evaluate the strategy

**Visualization**

* Plotted stock prices with buy/sell signals.
* Displayed MACD, RSI and Candlestick pattern charts.
* Tracked how the portfolio value changed over time.

**Plan for next week**

Use AI & Reinforcement Learning

* Try using AI models to improve buy/sell decisions.
* Test reinforcement learning to see if it can make better trades over time.
* See if AI can increase profits compared to simple strategies.

Detailed Plan:

Detecting key moments in the stock market, such as trend reversals and breakouts, is crucial for making profitable trades. Next week I plan to focus on using Decision Trees (LightGBM, XGBoost) and Reinforcement Learning (Q-Learning, Deep Q-Networks) to detect key market points.

**Steps to Implement:**

* Gather Historical Data: Collect stock prices and key indicators (SMA, MACD, RSI, volume, volatility).
* Label Key Market Points: Identify past peaks, bottoms, and reversals.
* Train Decision Trees (LightGBM, XGBoost): Detect trend reversals based on past market behavior.
* Test Predictions: Evaluate model accuracy using past market data.
* Integrate Reinforcement Learning: Train a Q-Learning or DQN agent for smarter trading.
* Optimize Trading Strategy: Combine ML predictions with trading rules to maximize returns.