Bonus Task Report: LSTM Model for Stock Movement Prediction

Model Setup:

- Built a Long Short-Term Memory (LSTM) neural network to leverage temporal dependencies in technical indicator sequences.

- Input features included popular indicators: SMA_20, EMA_20, RSI, MACD, MACD_signal, MACD_diff, ATR, and OBV.

- Used a sequence length of 10 days to capture short-term temporal patterns.

- Target was binary classification of next-day price movement (up/down).

Performance Metrics:

Metric	Value
Accuracy	0.5704
Precision	0.8148
Recall	0.2821
F1 Score	0.4190
ROC AUC	0.6534

Backtest Results:

Metric	Value
Cumulative Return	18.25%
Sharpe Ratio	3.50
Maximum Drawdown	-2.62%

Insights:

- The LSTM model **outperformed traditional Random Forest and XGBoost models** in both classification metrics and trading strategy returns.

- Precision is high (81%), indicating the model is effective at identifying upward movements with relatively few false positives.

- Recall is modest (~28%), suggesting there is still room to better capture all positive moves, but overall classification balance improved (F1 ~0.42).

- The **strategy's cumulative return of 18.25%** and a Sharpe ratio of **3.5** indicate a much stronger risk-adjusted performance compared to previous models.

- Maximum drawdown at -2.62% shows the model provides smoother equity curves with reduced risk exposure.

Conclusion:

- Incorporating temporal sequences with LSTM networks significantly enhanced predictive power and trading performance.

- The model effectively captures short-term dependencies in technical indicators, leading to better trade timing and higher returns.

- This approach shows promise for further refinement, potentially including more features, longer sequences, or hybrid models combining LSTM with other methods.