Project Proposal

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Problem Selection

The problem chosen by our group is to predict future stock price trends using historical financial data. In our view, stock price prediction is a critical task in the financial field, providing insights to investors and stakeholders. Our group chose this problem because it has practical significance and solving it using a deep learning model can generate significant benefits.

Dataset

We will use a dataset compiled by companies listed on NASDAQ and NYSE, excluding funds, futures, and options. The dataset includes annual financial statements and the year-end adjusted closing stock prices of the companies. This dataset is large enough to train deep learning models because of the number of companies and the historical depth of financial data.

Deep Network

Our group plans to use a Long Short-Term Memory (LSTM) network for this project. LSTM is well suited for time series data and can capture dependencies between consecutive inputs. I will use the standard form of LSTM and customize it to the features of the dataset, such as incorporating specific financial ratios or trends.

Framework

The network will be implemented using TensorFlow/Keras. This framework was chosen because of its strong support for LSTM networks, extensive documentation, and community support, which facilitates efficient model development and troubleshooting.

References

Our group will refer to academic papers and practical guides on applying LSTM networks to financial forecasting. The main references include books on stock price prediction and TensorFlow framework documentation.

Performance metrics

The performance of the model will be judged using metrics such as mean squared error (MSE) and mean absolute percentage error (MAPE) for regression tasks. In addition, I will qualitatively evaluate the model's predictions by analyzing the predicted trend vs. the actual trend.

Planned steps

Data preprocessing and exploratory data analysis.
Model setup and initial training run.
Hyperparameter tuning and customization of the LSTM model.
Final model evaluation and report preparation.