

Executive Summary

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Project Description

This project aims at predicting the trend of stock prices and takes Apple Inc. as an example stock to make the forecast. The project improves the baseline model ARIMA tremendously by adding multiple financial, macroeconomic and market factors. The project then builds a RNN model LSTM which also significantly improves the baseline model.

Data and Features

Apple stock prices. Financial, macroeconomic and market factors. All from 2012 to 2022. Features are selected based on the correlations of the factors with the stock prices.

Models

1. Baseline model: ARIMA.
2. Improved ARIMA model: basic ARIMA with financial, macroeconomic and market factors added to perform a dynamical regression.
3. RNN model: LSTM.
4. RNN model: LSTM with multiple factors.

Results

The baseline ARIMA model has a mean square error (MSE) of 3672.56. No trend captured.
The improved ARIMA model 1 with partial factors has a MSE of 961.65. Can capture trends.
The improved ARIMA model 2 with partial factors has a MSE of 951.78. Can capture trends.
The LSTM model without features has a MSE of 384.86. Can capture trends.
The LSTM model with partial features has a MSE of 468.09. Can capture trends.

Future

The project can be expanded in plenty of dimensions. One could consider:

1. adding more and constructing more factors
2. explore different RNN models with different architectures
3. explore if CNN models can be used to make predictions
4. explore more other models