Predicting Stocks' Hidden Factors

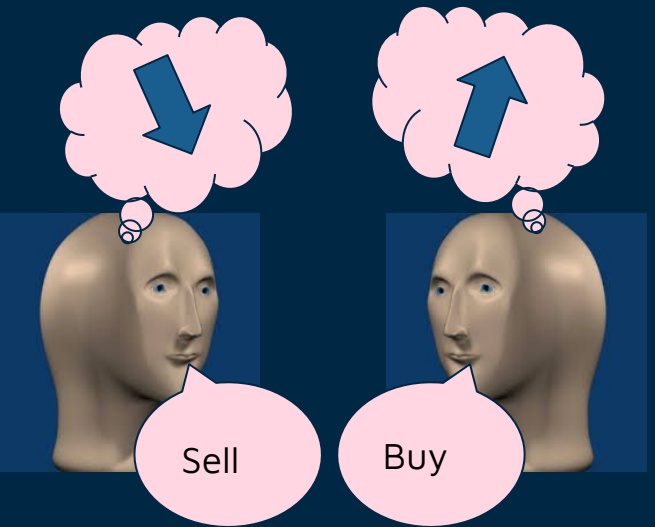
Matthew Andrews

Predicting Stock Prices

First Stock Exchange: Amsterdam, 1602

Competing philosophies:
Fundamental analysis: Study the company vs Technical analysis: Study the past

Arguably Impossible:
Burton Malkiel: A Random Walk Down Wall Street



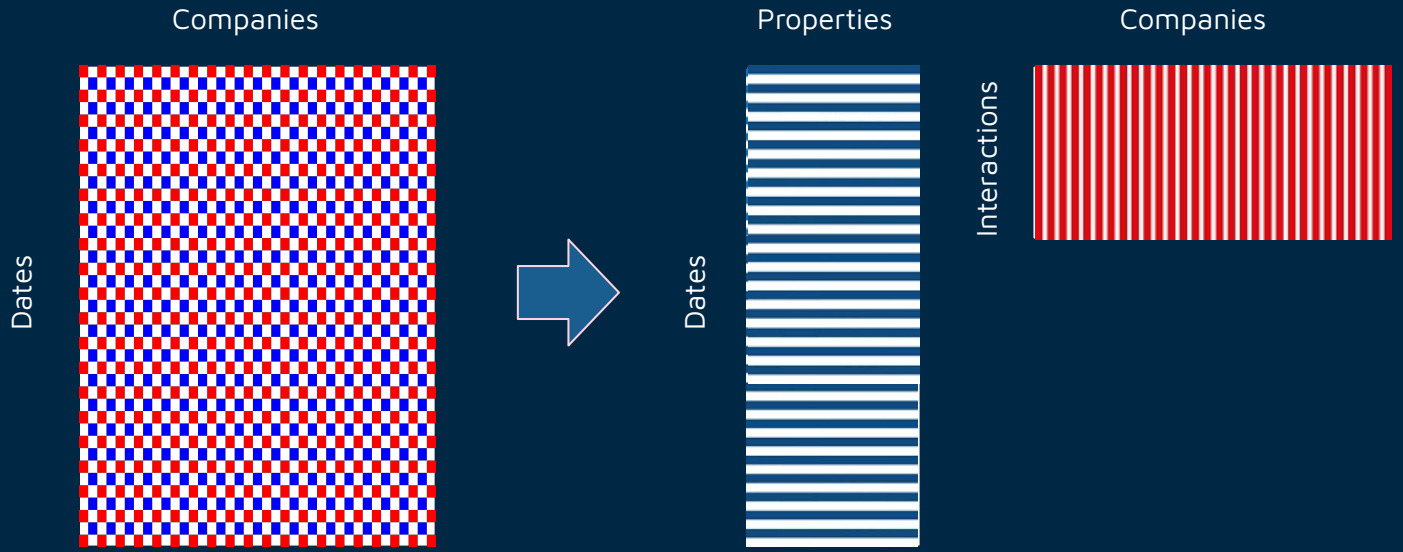
Trade as disagreement,
Any tool used to gain insight

.

Neural Networks

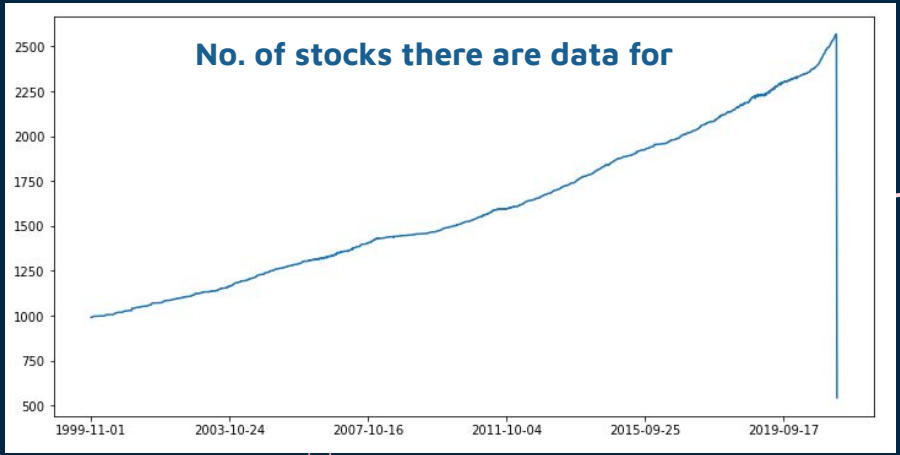
Hidden Factors

SVD, Singular Value Decomposition



Data

Acquired using Alpha Vantage API



Data gathered

2570 stocks, from NYSE

From 1999 to present

Data used

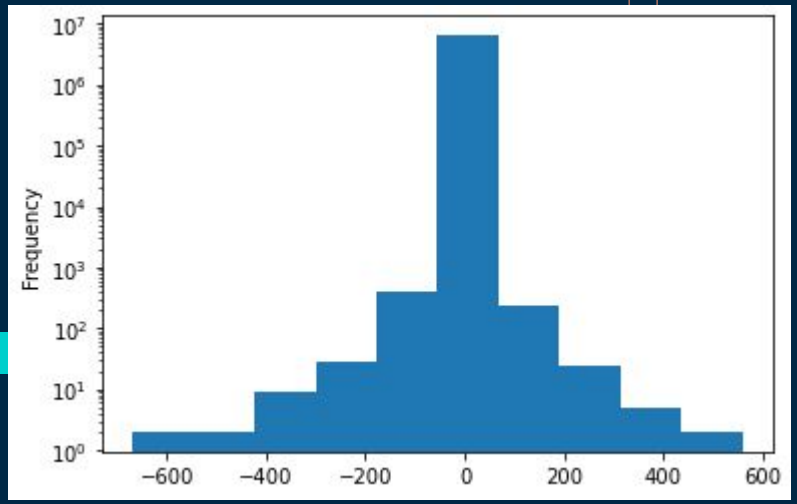
2169 stocks

2004 -2018

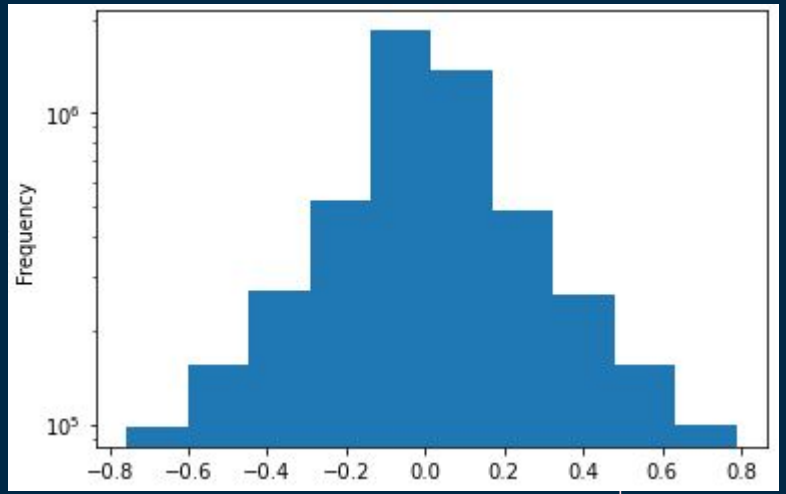
Engineered Features:
midpoint value, change in midpoint value

SVD

Input With Outliers



Input Without Outliers



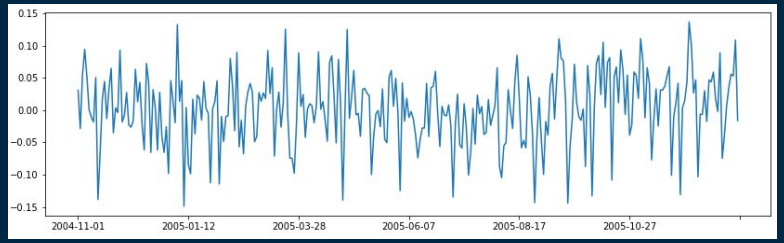
RMSE: 0.194 (between actual Stocks x Days table and the table made when the resultant tables are recombined)

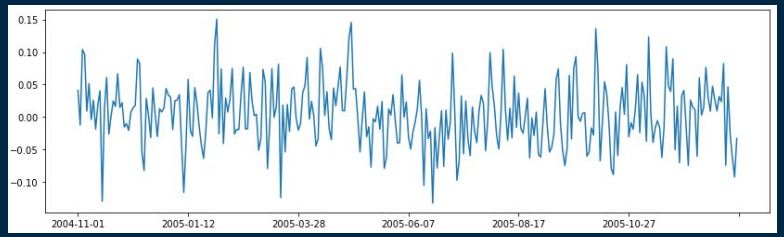
Actual Std: 0.250

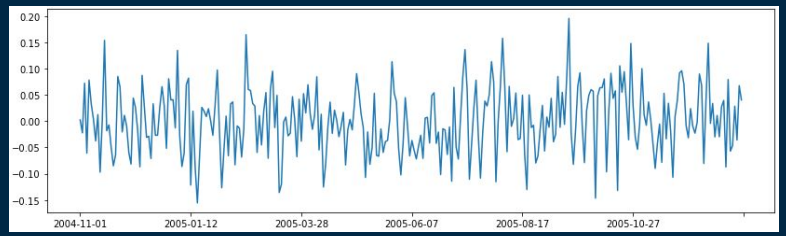
Recomposed Std: 0.135

EDA

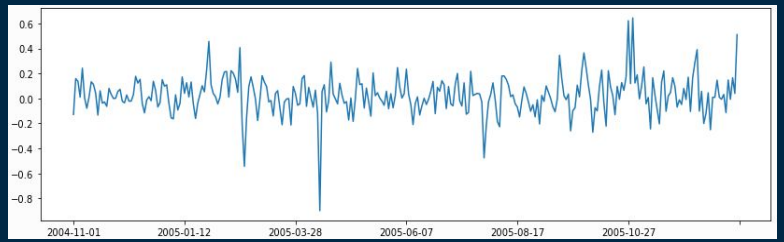
Day Factors

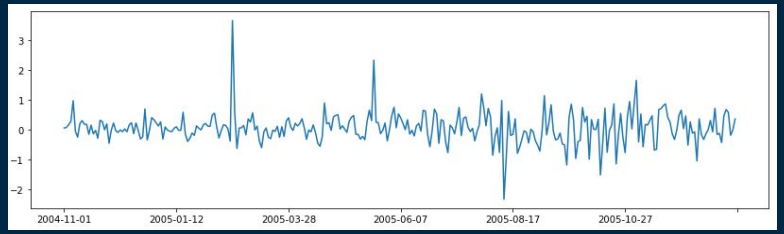


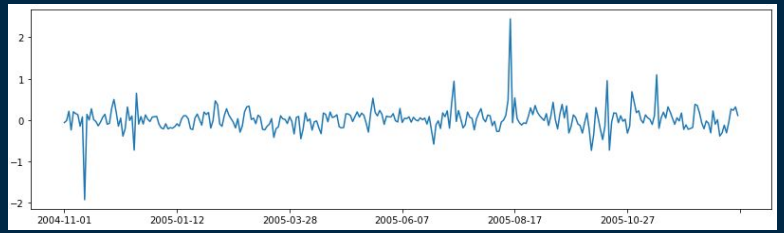




Stock Changes

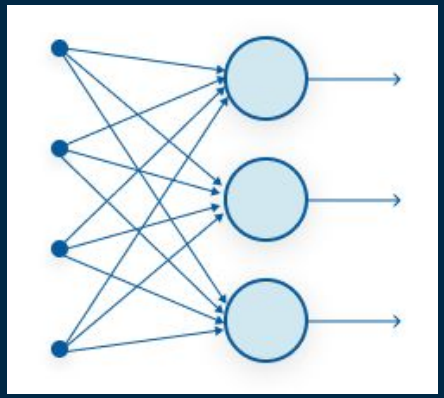




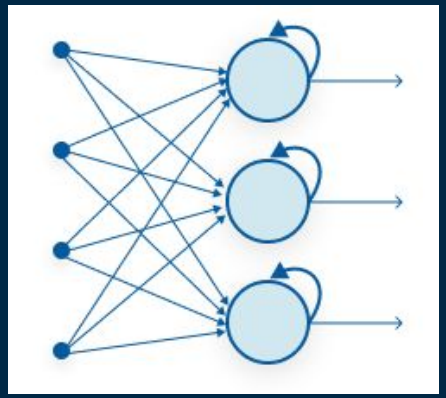


LSTM

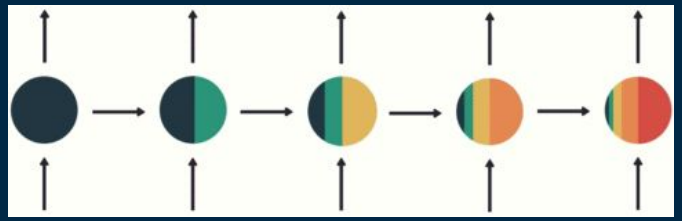
Standard Neural Network



Recurrent Neural Network

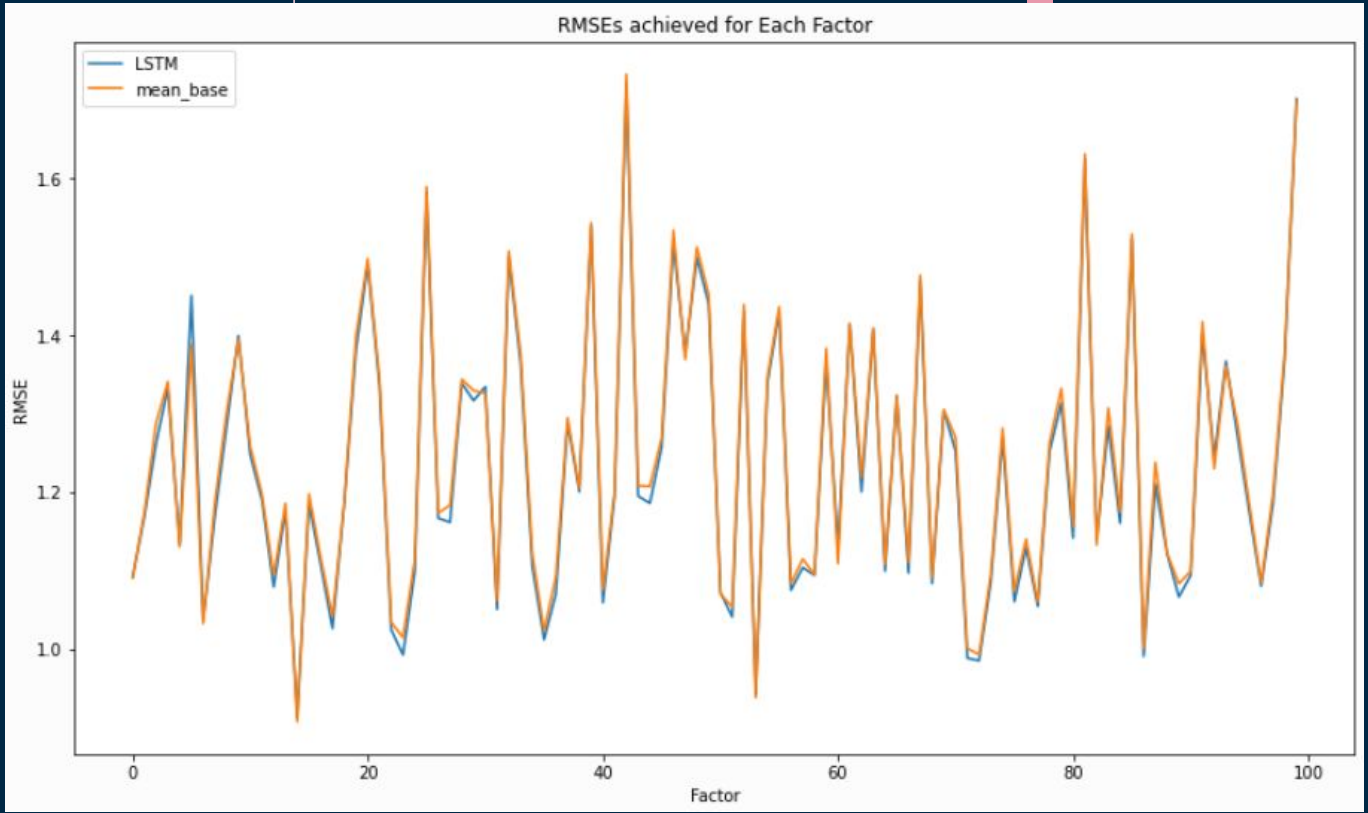


Each RNN Node



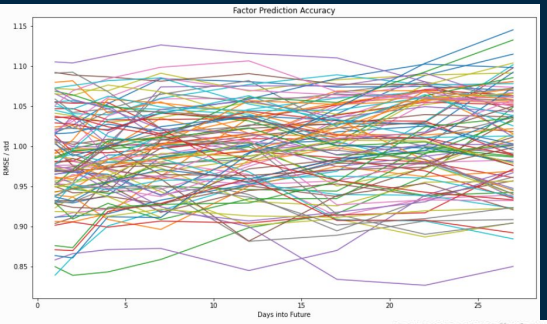
Iterations

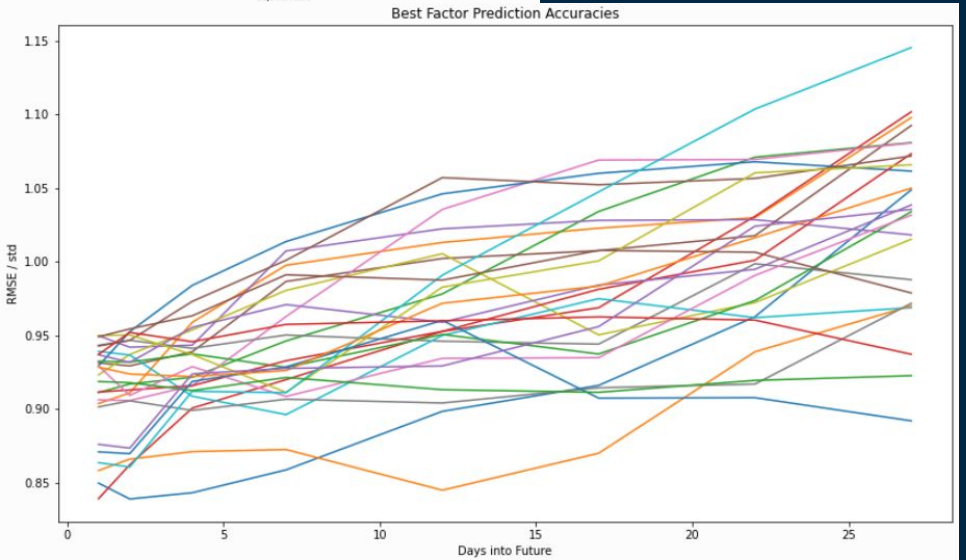
Results

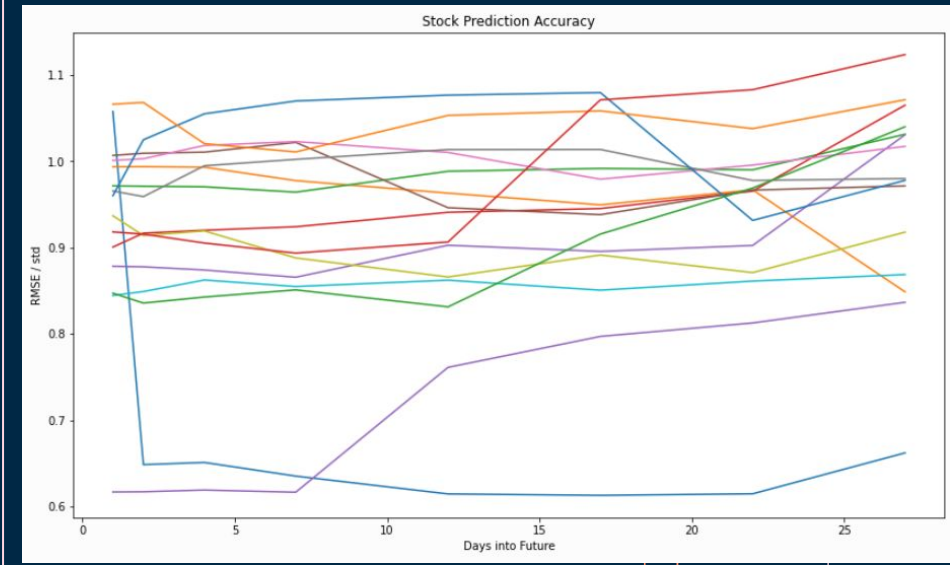

RMSEs achieved for Each Factor
LSTM
mean_base
RMSE
1.0
1.2
1.4
1.6
0
20
40
60
80
100
Factor

Comparison

Method 1: Divide RMSEs by standard deviations

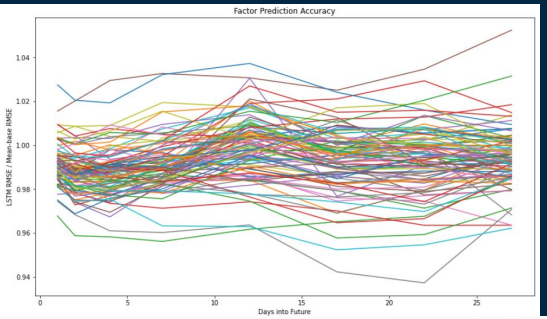


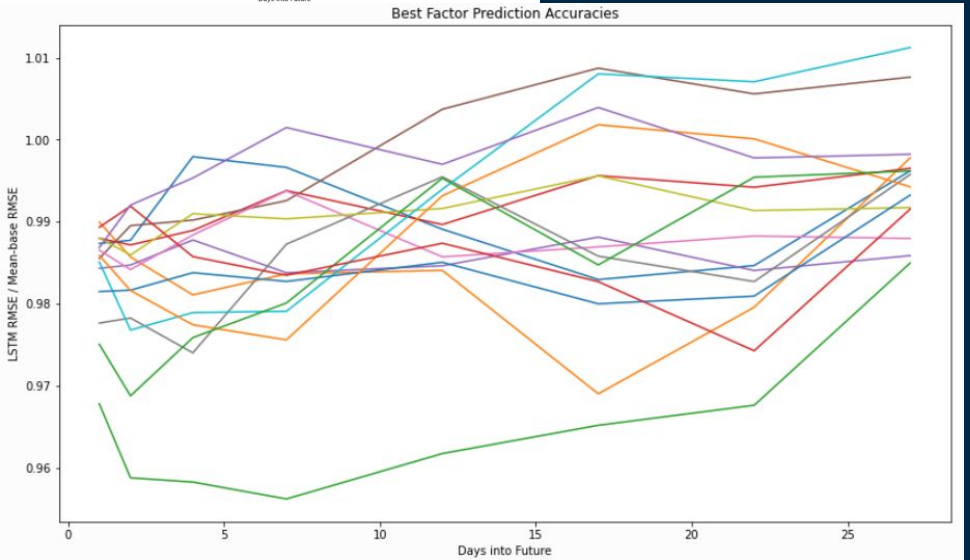


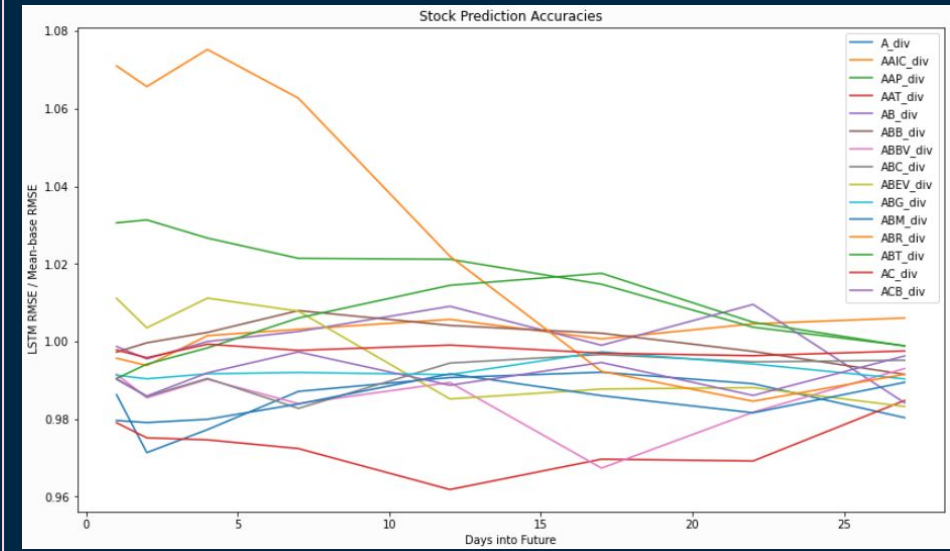


Comparison

Method : Divide LSTM RMSEs by mean-base RMSEs







Recommended Future Improvements

SVD:

Try SVD++ -slower

Increase the number of factors

-slower

LSTM:

More data: volume, absolute price

Method:

Assumption: Company interactions are static

Fix: Calculate Stock matrix in rolling 6-month window with the Dates matrix fixed

-To show companies changing over time

-Use to create a new day matrix

Thank you

Matthew Andrews

Github: https://github.com/Maltanno/Capstone_project/tree/main