Project Alpha: Exploring the Future of Trading

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Introduction

- Market participants aim to forecast future prices to make trading decisions
- Artificial Intelligence can help forecast future price of ETFs
- Explore the effect of macroeconomic factors on asset prices
- Compare results with OLS Regression

Methods

Pre-processing:

- Collect asset and macroeconomic data
- Align dates on the dataset
- Create dataframe

Model Creation & Data processing:

- Visualise data & statistics
- Establish a baseline regression model
- Create the LSTM Model
- Hyper parameter tune the LSTM Model

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Data & Analysis

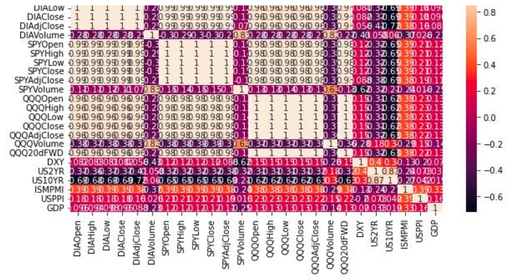

Figure 1: Correlation Matrix of Parameters

Model Comparison (RMSE)	
LSTM	0.047
OLS	0.012

Figure 2: RMSE comparison of models

LSTM Model

LSTM Model Parameters	
Neurons	64
Dropout Layer	0.2
Sequence Size	16
Loss	8.66×10^{-5}
Validation Loss	0.0027

Figure 3: LSTM Model Specifics

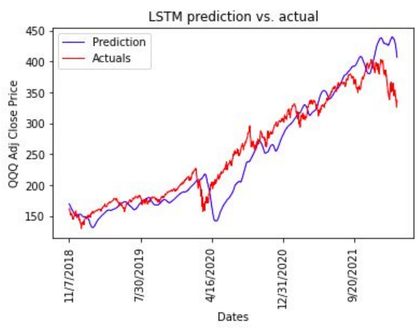

Figure 4: LSTM Model Prediction on QQQ ETF

Regression Model

	Coef.	Std.Err.	t	P>|t|	[0.025	0.975]
x1	-0.0556	0.1879	-0.2959	0.7673	-0.4240	0.3128
x2	-0.6242	0.2077	-3.0051	0.0027	-1.0314	-0.2169
x3	0.0648	0.2090	0.3101	0.7565	-0.3450	0.4746
x4	0.5515	0.2944	1.8732	0.0611	-0.0258	1.1287
x5	0.1189	0.3200	0.3716	0.7102	-0.5085	0.7462
x6	-0.0000	0.0000	-0.9303	0.3523	-0.0000	0.0000
x7	0.0992	0.1732	0.5725	0.5670	-0.2405	0.4389
x8	0.6377	0.1836	3.4728	0.0005	0.2777	0.9978
x9	-0.2200	0.1774	-1.2403	0.2150	-0.5678	0.1278
x10	-0.4784	0.2891	-1.6547	0.0981	-1.0454	0.0885
x11	-0.1291	0.3210	-0.4023	0.6875	-0.7585	0.5003
x12	0.0000	0.0000	2.3313	0.0198	0.0000	0.0000
x13	-0.1195	0.1280	-0.9332	0.3508	-0.3705	0.1316
x14	0.2901	0.1432	2.0258	0.0429	0.0093	0.5710
x15	0.1290	0.1189	1.0846	0.2782	-0.1042	0.3622
x16	-0.7932	0.6100	-1.3003	0.1936	-1.9894	0.4029
x17	1.5250	0.6895	2.2117	0.0271	0.1730	2.8770
x18	-0.0000	0.0000	-2.3371	0.0195	-0.0000	-0.0000
x19	-0.0320	0.0063	-5.0977	0.0000	-0.0443	-0.0197
x20	0.4511	0.1332	3.3876	0.0007	0.1900	0.7122
x21	0.5841	0.2203	2.6509	0.0081	0.1521	1.0162
x22	0.0928	0.0125	7.4475	0.0000	0.0683	0.1172
x23	-0.0617	0.0207	-2.9836	0.0029	-0.1022	-0.0211
x24	0.1286	0.0287	4.4871	0.0000	0.0724	0.1848

Figure 5: OLS Regression Results

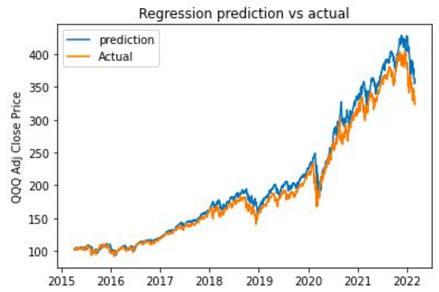

Figure 6: OLS Regression Model Prediction on QQQ ETF

Discussion

- AI model performed well but did not outperform the regression
- Macroeconomic data had a significant positive effect
- LSTM architecture may not work well with macro data frequency

Future Improvements

- Improve model by adding more macroeconomic & alternative data
- Try other AI model architectures to better match the nature of the problem
- Understand the black box more using libraries such as SHAP
- Further testing on other ETF assets

Acknowledgements

The Trinity College Computer Science Department and Travelers Insurance