

Stocks vs. Cryptocurrencies

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Introduction

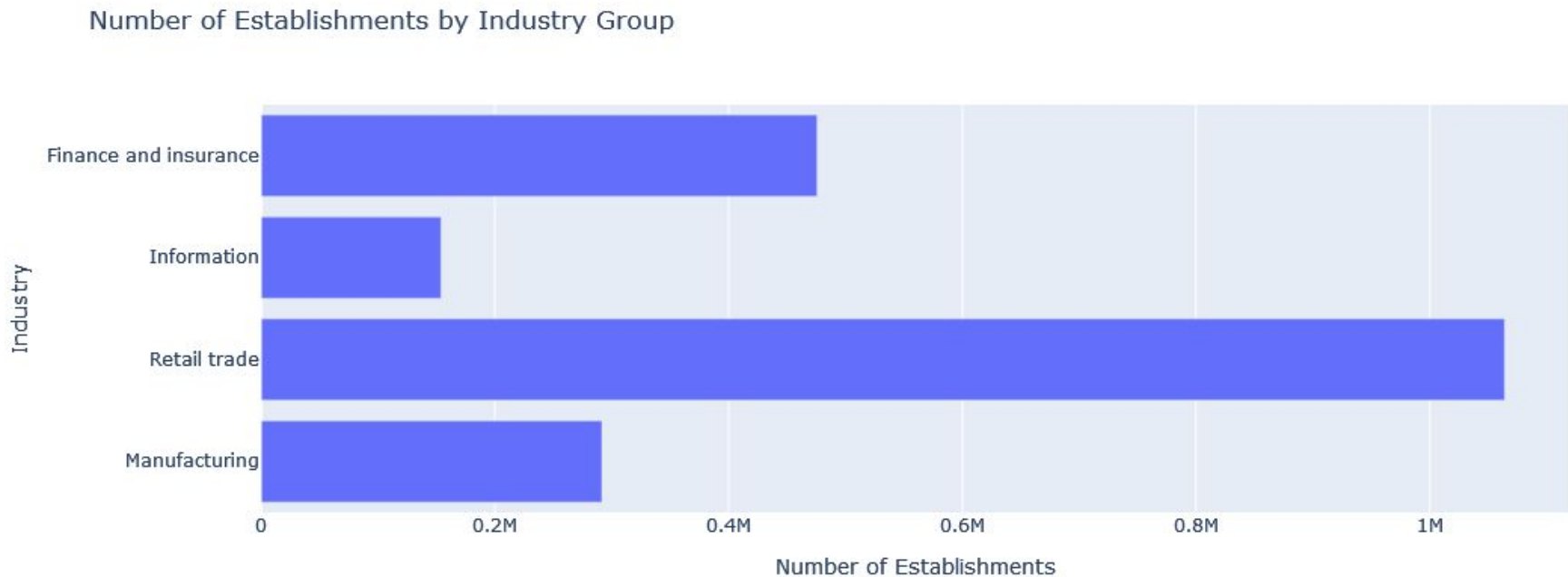
We were interested in the performance of stocks in different industries (finance, manufacturing, information, retail) and how they compared to economic data about those industries and to the performance of different cryptocurrencies.

Our goal was to create a mock client's investment portfolio and, based on our findings, make predictions and recommendations for that client.

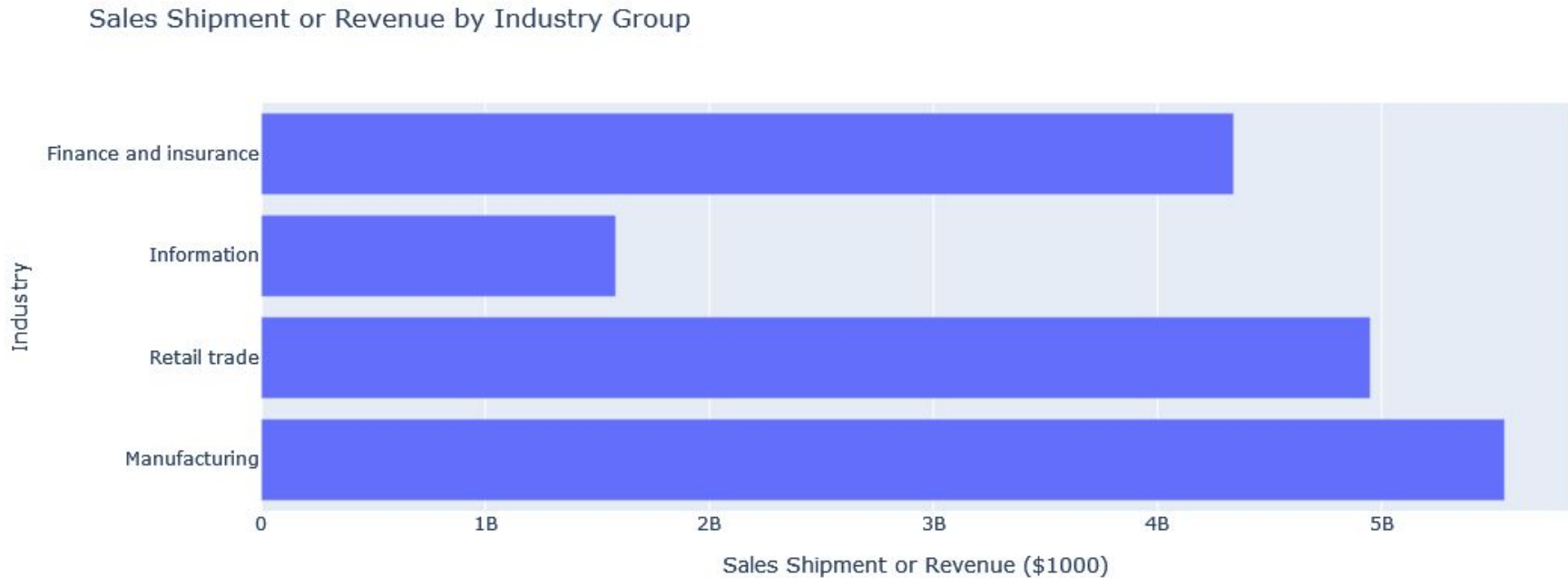
Introduction

- What is the economic picture for the industries in question?
- Is there a correlation between US Census economic data and stock performance?
- How would the mock portfolio we create perform on the market?
- Is stock or cryptocurrency data predictable with machine learning?
- Which would perform better for a client's portfolio: traditional stocks or the newer cryptocurrencies?

Economic Picture for Industries



Economic Picture for Industries



At-A-Glance Insight: *Revenue vs Establishments in Commercial Banking*



Performance of Portfolio Stocks on Market

MGP Ingredients Inc (MGPI)



Verizon (VZ)



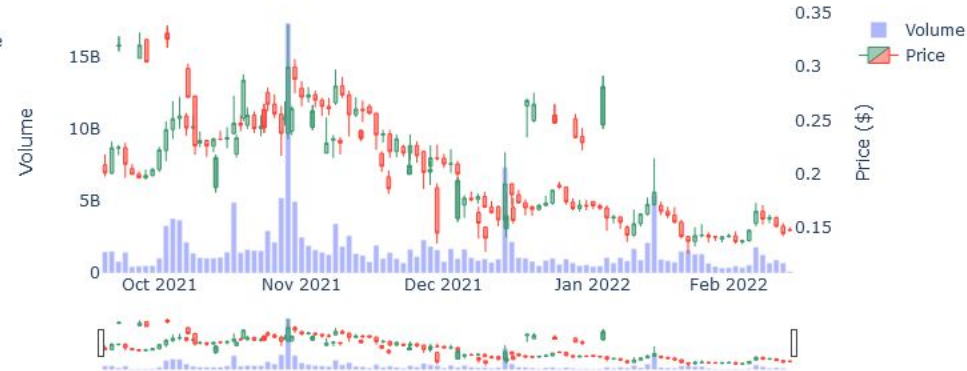
- Consistent, periodic appreciation
- Resistance to indefinite depreciation

Performance of Portfolio Cryptocurrencies on Market

Bitcoin (BTC)



Dogecoin (DOGE)

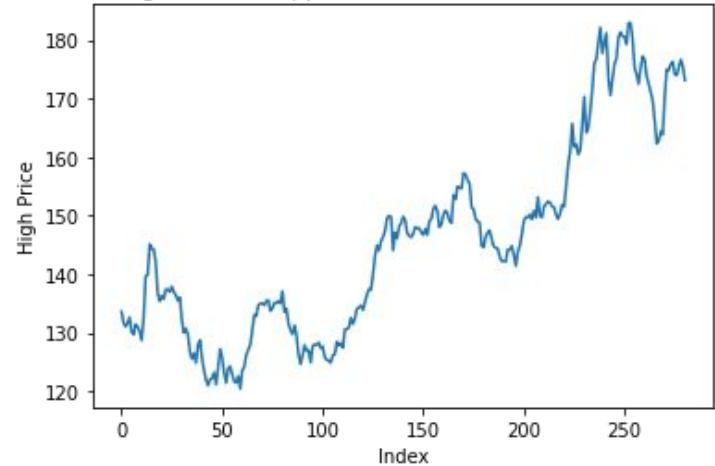


- Sustained depreciation
- Difficulty rebounding after value loss

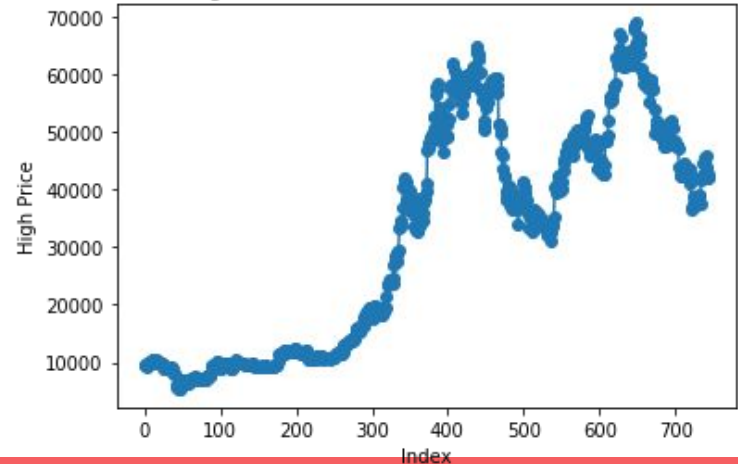
Machine Learning

- Historical Stock and Cryptocurrency data was used, necessitating the use of time series algorithms
- ARIMA and Autoregressive models are relatively straightforward to understand and well suited to time series forecasting
- Algorithm used indices of observations due to irregular dates in the historical data

High Price for Apple Inc. Stock, 2/1/2020 - 2/4/2022



High Price for Bitcoin, 12/1/2021 - 2/4/2022



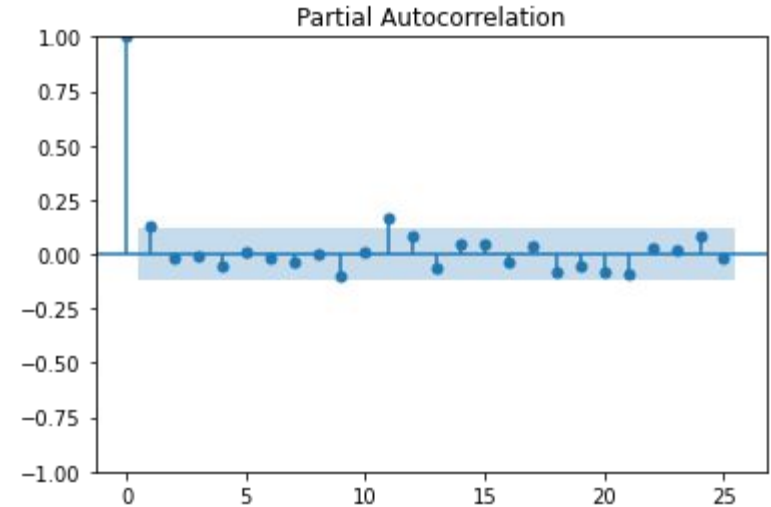
Machine Learning

Autoregressive Model:

- Uses previous points in time series to predict the next point
- Only one hyperparameter - lag or order used to specify how many past points to use. Lag is estimated by PACF plots

ARIMA Model:

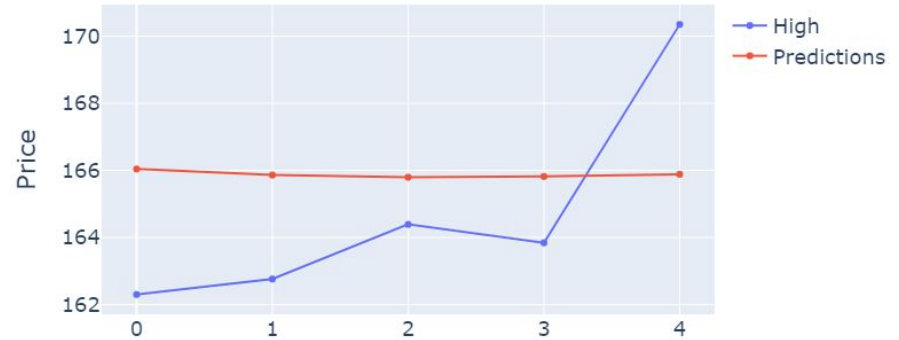
- Extends the AR model by incorporating integration and moving average techniques
- Potentially more suited to complex data, but requires greater computational resources



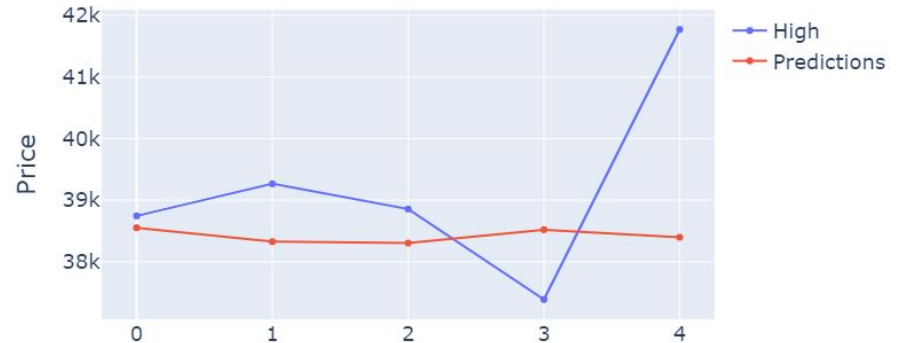
Machine Learning

- Grid Search was used to locate parameters which minimize inaccuracy
- Unfortunately, stock market and cryptocurrency data proved too volatile to provide the algorithms with a pattern to latch onto
- Attempted to experiment with order hyperparameters, but no significant change in results

AAPL Autoregressive Model Predictions



BTC ARIMA Model Predictions



Where to invest - Stocks or Crypto?

MGP Ingredients Inc (MGPI)



Bitcoin (BTC)



- Crypto less stable, floor value unknown
- Stocks show consistent rebound potential, more secure floor value
- Stocks offer external economy metrics from which to glean insights; crypto does not

Where to invest - Which Stocks?

Bank of America (BAC)



Apple (AAPL)



- *BAC* and *AAPL* shows a consistent upward trend with predictable recovery after value loss.
- Both are experiencing a depreciation currently, but the rebounding behavior is consistent, promising a predictable return on investment.

Conclusion

- Stocks within our portfolio offer more secure investment opportunity
- Crypto's period of weakness not showing immediate signs of relent
- Both offer difficulty when attempting to predict with conventional machine learning methods

Where to go from here?

- Further explore economic metrics for correlations with stock behavior
- Watch cryptocurrency for potential signs of further depreciation or rebounding
- Explore more powerful machine learning algorithms
 - Greater predictive capabilities could exist for multi-dimensional algorithms outside of time series

Data Sources

Finnhub API: <https://finnhub.io/docs/api>

AlphaVantage API: <https://www.alphavantage.co/documentation/>

US Census economic data:

[https://data.census.gov/cedsci/table?q=ECNNAPCSIND2017.EC1700NAPCSINDP
RD](https://data.census.gov/cedsci/table?q=ECNNAPCSIND2017.EC1700NAPCSINDP
RD)