Stocks vs. Cryptocurrencies

Group Members

Connor Buxton

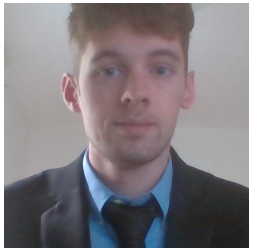
BS in Mathematics,
Clarkson University

Ben Hines

BS in Computer Science
Metropolitan State University

Sargis Abrahamyan

BS in Computer Science
University of Riverside



Lucas Stefanic

Master's in Mathematics,
University of Rochester

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.

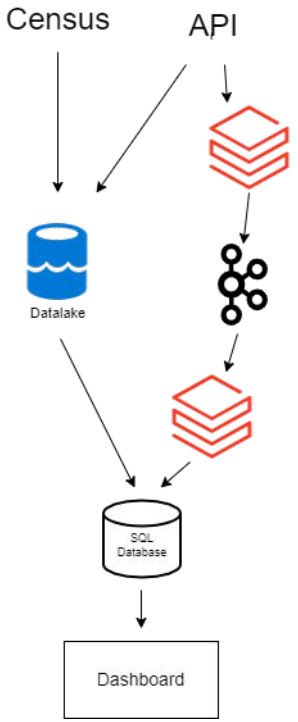
Our goal was to create a mock client's investment portfolio and, based on our findings, make predictions and recommendations for that client.

Introduction

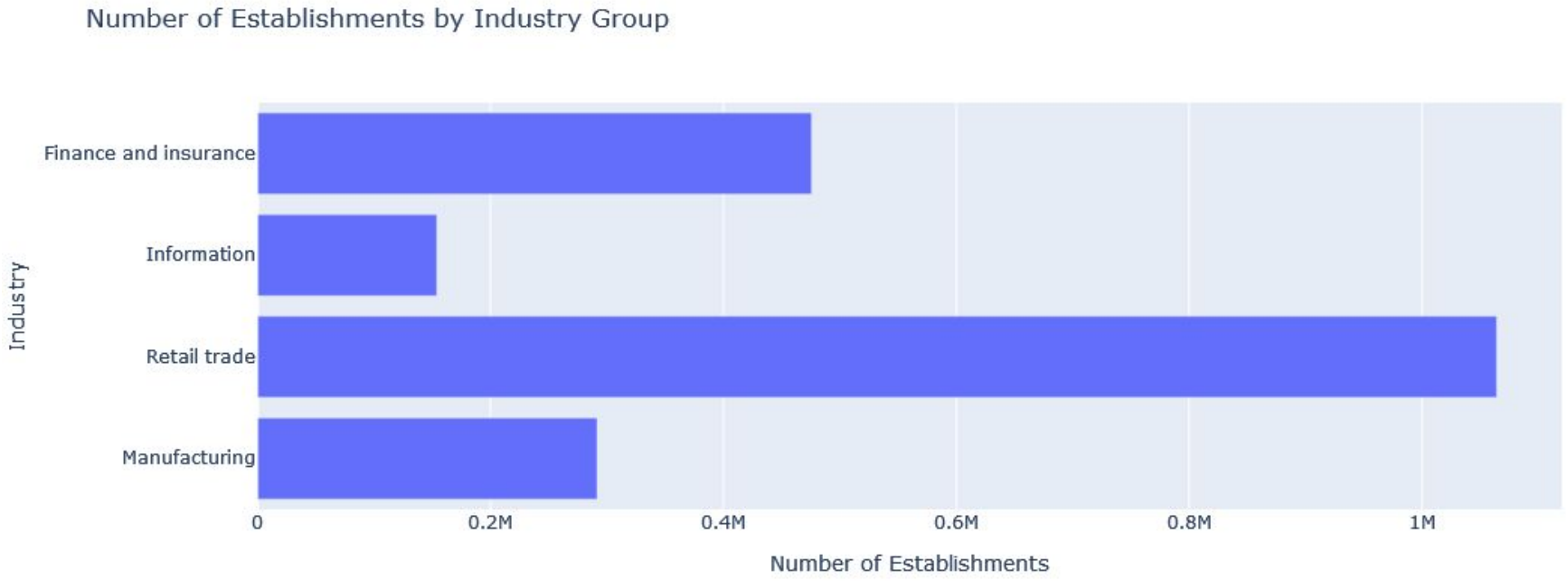
- What is the economic picture for the industries in question?
- Is there a correlation between US Census economic data and stock performance?
- How would the mock portfolio we create perform on the market?
- Is stock or cryptocurrency data predictable with machine learning?
- Which would perform better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

Data Handling

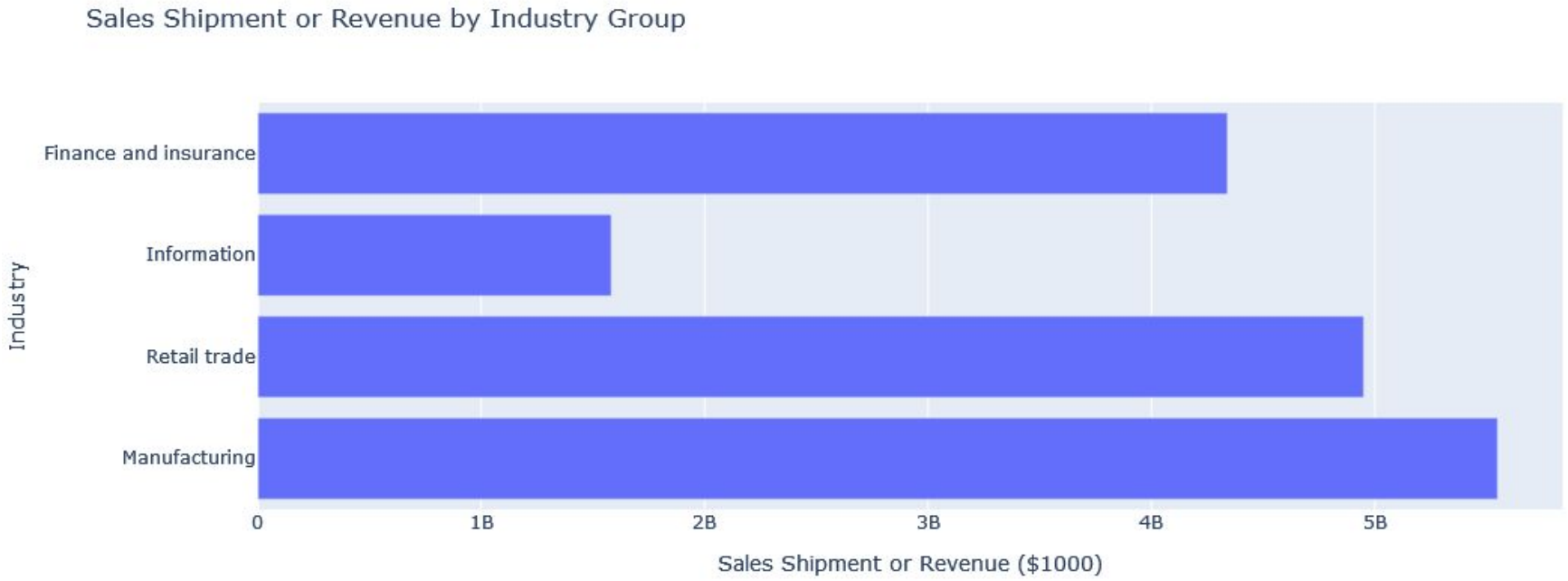
- Majority of data comes from API calls through Python, Census data was in CSV format
- Real-time data necessitated the use of data pipelines and cloud ETL, triggered every minute
- Historical API data and Census data required cleaning and loading into SQL database, retrieved for dashboard and machine learning through queries
- Static data was saved as backups in CSV format



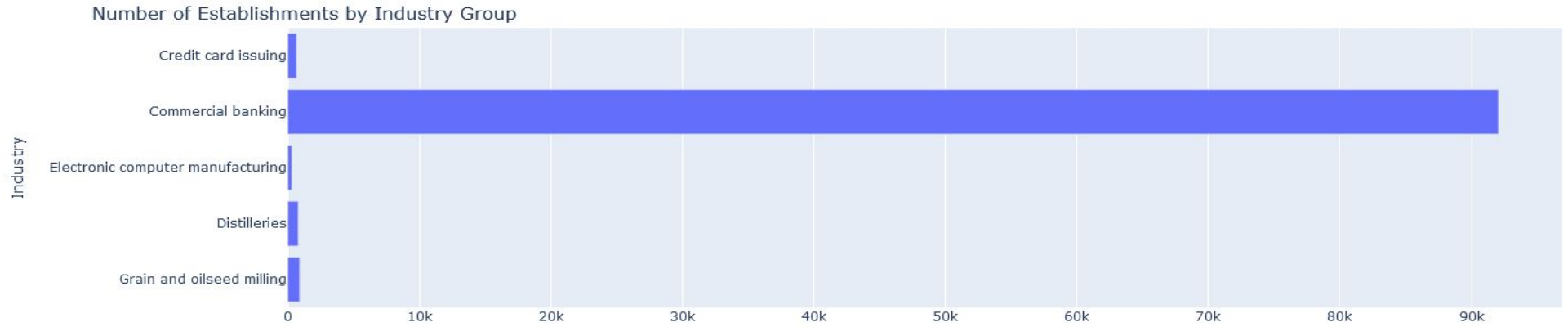
Economic Picture for Industries

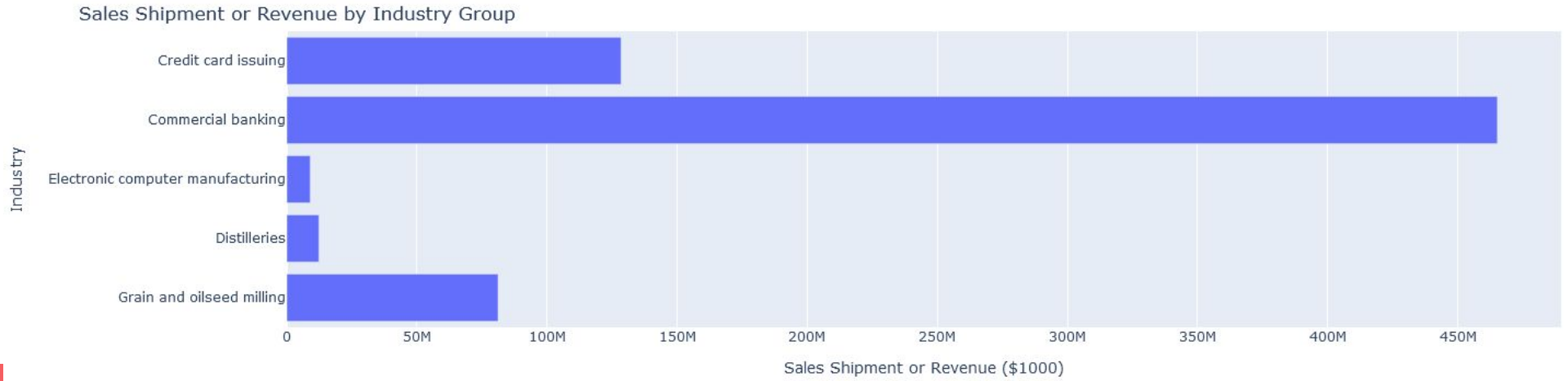


Economic Picture for Industries

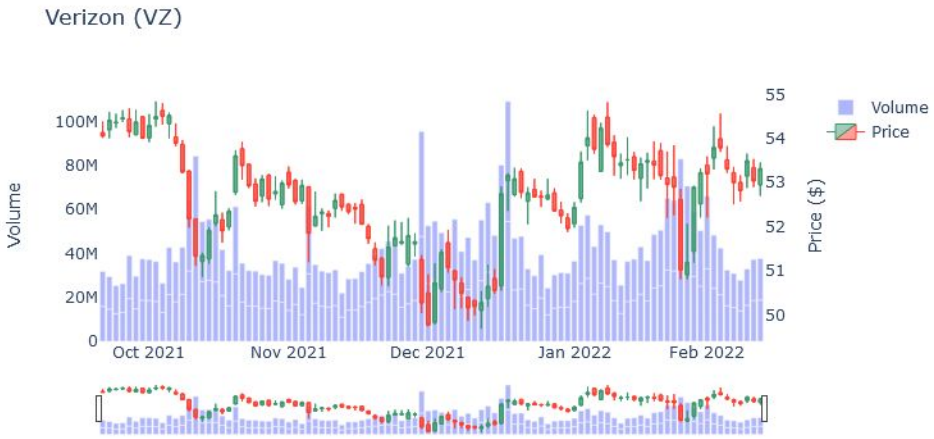


At-A-Glance Insight: *Revenue vs Establishments in Commercial Banking*





Performance of Portfolio Stocks on Market



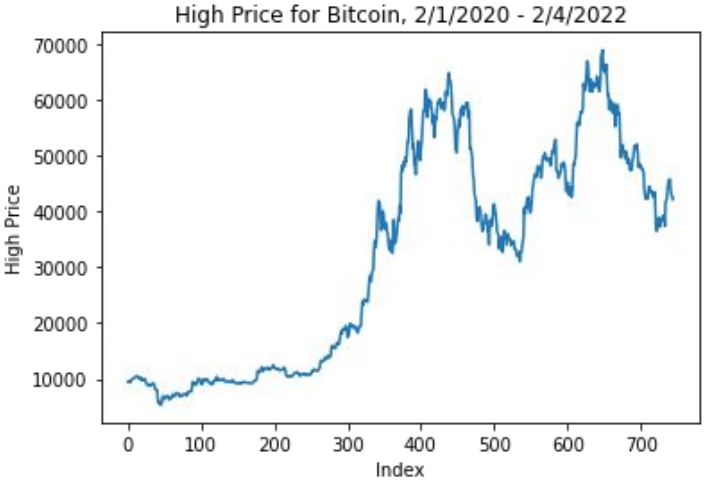
- Consistent, periodic appreciation
- Resistance to indefinite depreciation

Performance of Portfolio Cryptocurrencies on Market

- 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



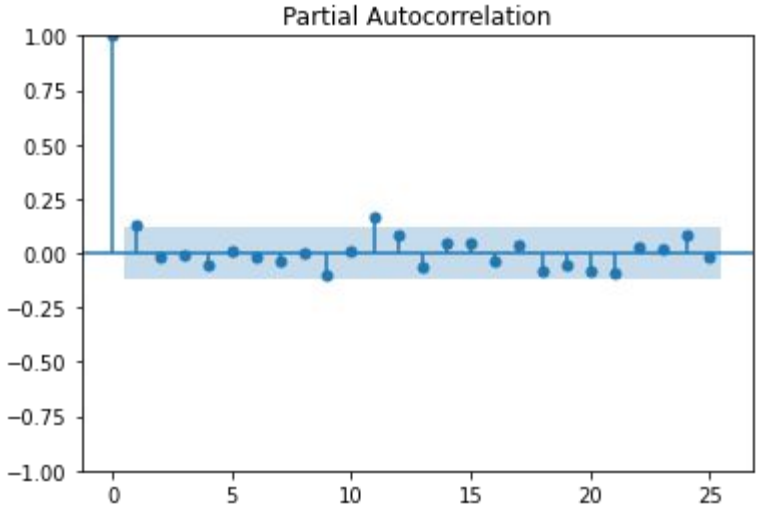
Machine Learning

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

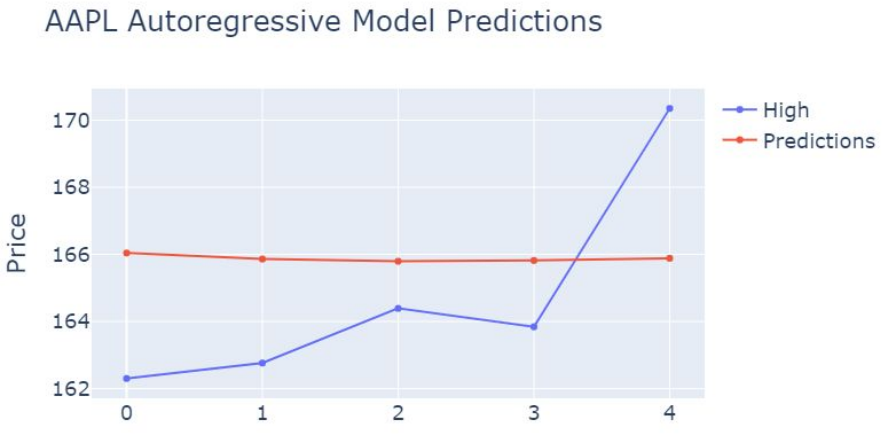
ARIMA Model:

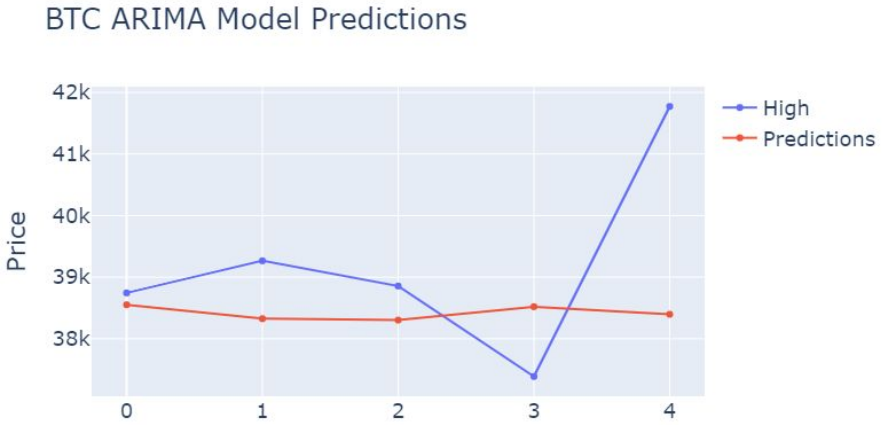
- Extends the AR model by incorporating integration and moving average techniques
- Potentially more suited to complex data, but requires greater computational resources



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

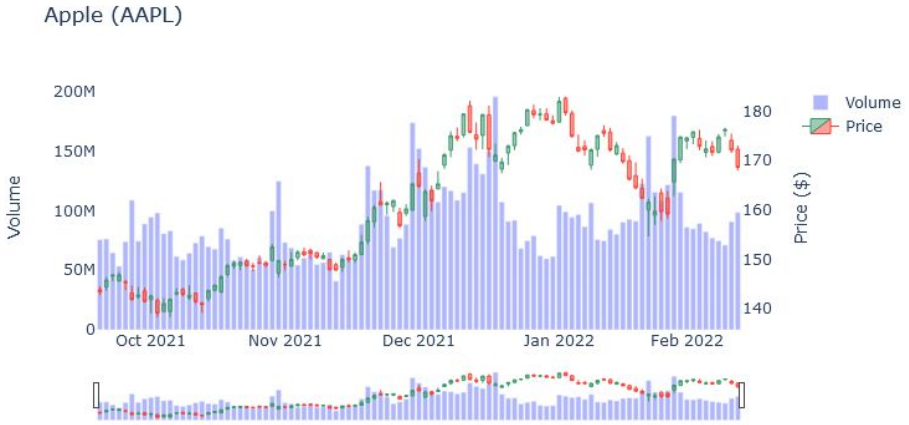




Where to invest - Stocks or Crypto?

- 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?



- *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.EC1700NAPCSINDPRD