# Forecasting Cryptocurrency Prices


Group 3

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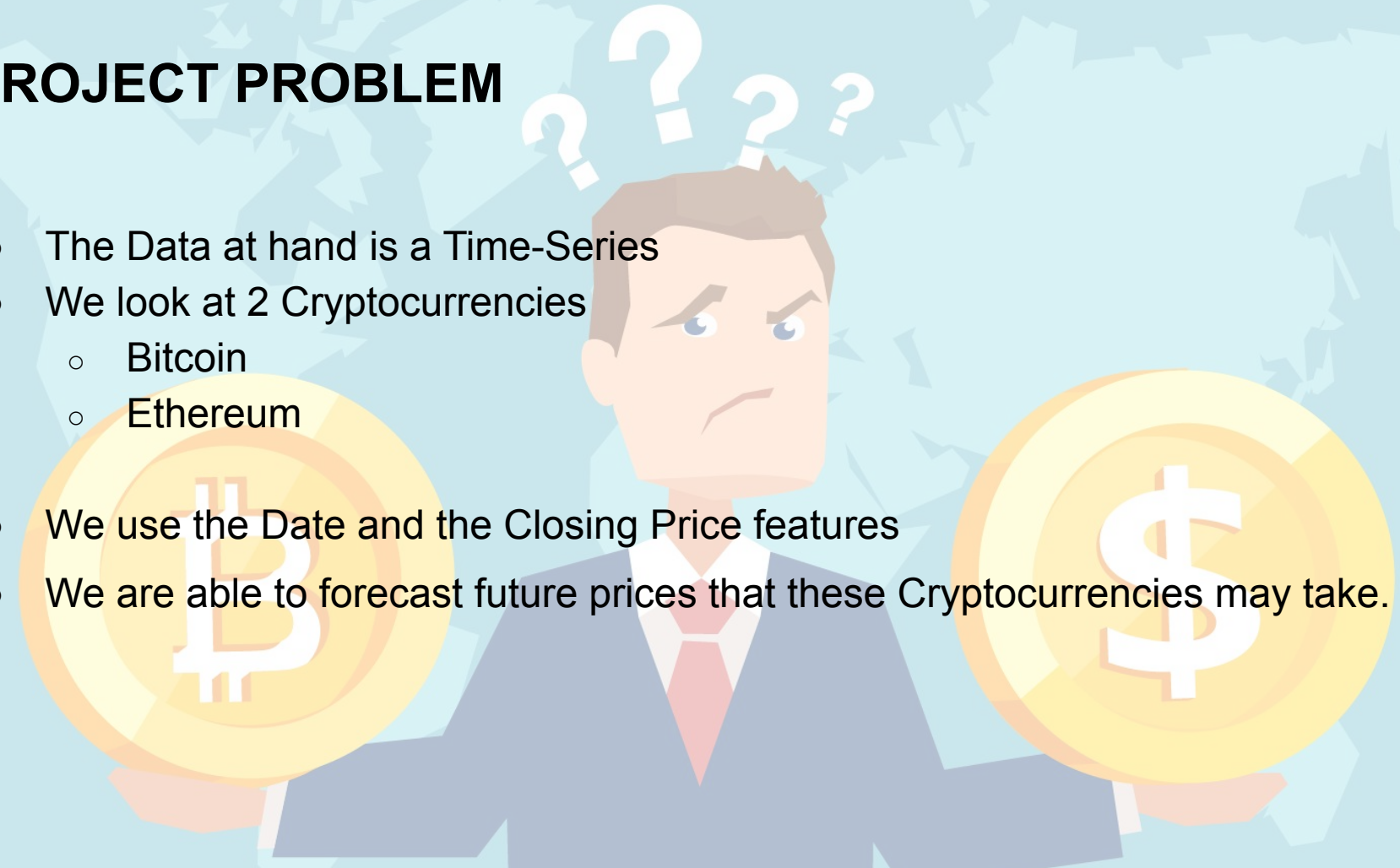
# PROJECT PROBLEM



- The Data at hand is a Time-Series
- We look at 2 Cryptocurrencies
  - Bitcoin
  - Ethereum

- We use the Date and the Closing Price features
- We are able to forecast future prices that these Cryptocurrencies may take.

# CRYPTOCURRENCY HISTORICAL DATASET

- This dataset has the historical price information of some of the top crypto currencies by market capitalization.
- The currencies included are Bitcoin (1517 rows) and Ethereum (928 rows)
- Daily data; spans from April 28, 2013 to February 20, 2018.
- Features:
  - **DATE:** Date of Observation
  - **OPEN:** Opening Price on the given day
  - **HIGH:** Highest Price on the given day
  - **LOW:** Lowest Price on the given day
  - **CLOSE:** Closest Price on the given day
  - **VOLUME:** Volume of the transaction on the given day
  - **MARKET CAP:** Market Capitalization in USD($)

# AUTOREGRESSIVE INTEGRATED MOVING AVERAGES

- **What is ARIMA?**
  - ARIMA is a class of models that explain a given Time-Series based on its own passed values, that is, its own lags and the lagged forecast errors, so that the equation can be used to forecast future values.
  - In layman terms it works by subtracting an observation from another observation at a previous time step in order to make the time series stationary, thus making it possible to forecast prices.

- **Why not Linear Regression?**
  - The main reason to not opt for regression for Time-Series Data is we are interested in predicting the future, which would be extrapolation (predicting outside the range of the data) for linear regression.

# RESULTS FOR HYPOTHESIS TESTING

To ideally run the ARIMA model we our Time-Series must be stationary.
The statistical test we run to determine whether a Time-Series is stationary or not is done by Dickey Fuller Test. The Dickey-Fuller Test tests:

- **Null Hypothesis:** A unit root is present in an Autoregressive model.
- **Unit Root Test:** Tests whether a time series variable is non-stationary and possesses a unit root. If a series has a unit root, its shows a systematic pattern.
- **Alternative Hypothesis:** The time series is stationary.

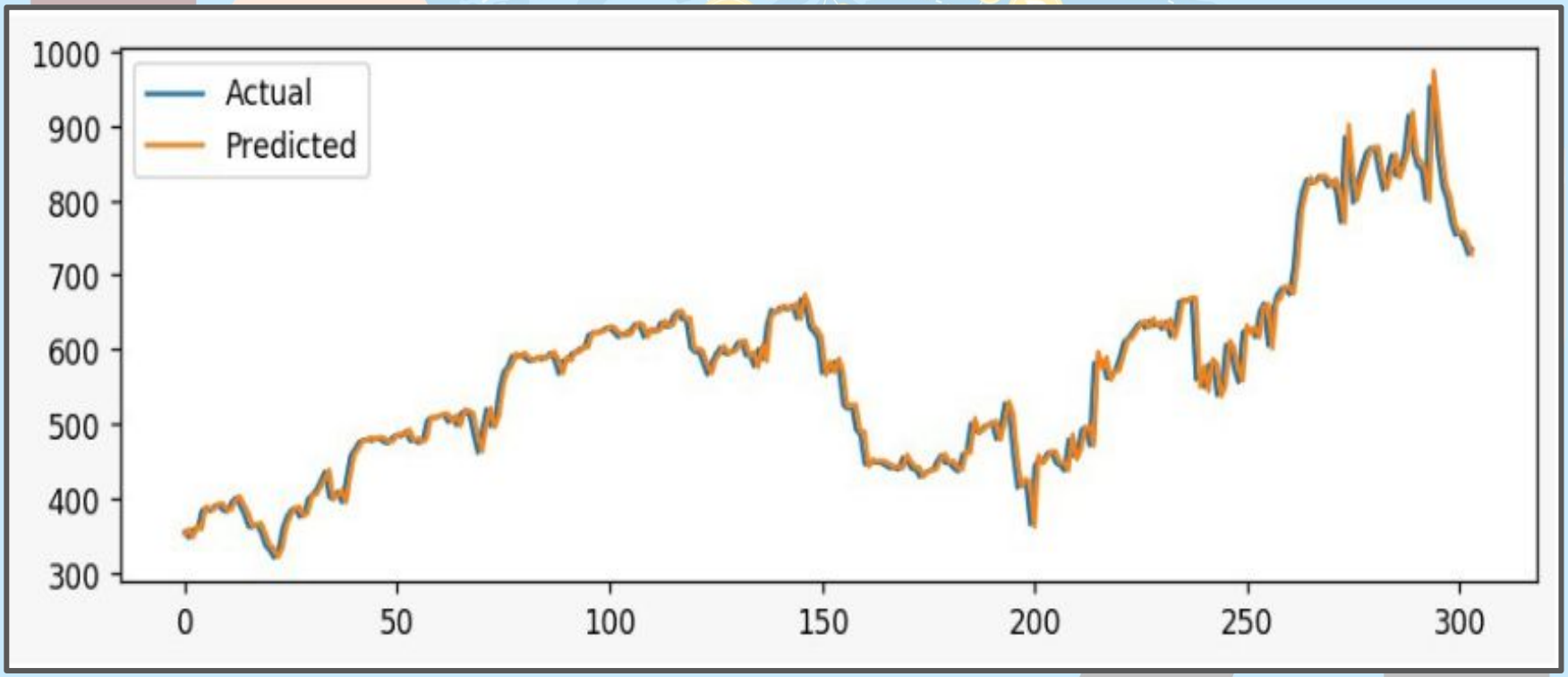
- In our test our **p-value < 0.05** thus we reject our Null Hypothesis, and run our model on our stationary data.

# RESULTS OF ARIMA MODEL

| | | | |
|---|---|---|---|
| Dep. Variable: | Close | No. Observations: | 1517 |
| Model: | ARMA(1, 3) | Log Likelihood | -10501.051 |
| Method: | css-mle | S.D. of innovations | 245.029 |
| Date: | Wed, 04 Dec 2019 | AIC | 21014.102 |
| Time: | 21:26:12 | BIC | 21046.049 |
| Sample: | 0 | HQIC | 21025.996 |

| | coef | std err | z | P>\|z\| | [0.025 | 0.975] |
|---|---|---|---|---|---|---|
| const | 1684.0996 | 3863.899 | 0.436 | 0.663 | -5889.003 | 9257.202 |
| ar.L1.Close | 0.9984 | 0.002 | 500.671 | 0.000 | 0.994 | 1.002 |
| ma.L1.Close | 0.1077 | 0.026 | 4.079 | 0.000 | 0.056 | 0.160 |
| ma.L2.Close | -0.0784 | 0.031 | -2.536 | 0.011 | -0.139 | -0.018 |
| ma.L3.Close | 0.0249 | 0.029 | 0.870 | 0.385 | -0.031 | 0.081 |

# RESULTS OF ARIMA MODEL



# PROJECT LEARNING

- Time Series Analysis Techniques
- AutoRegressive Integrated Moving Average
- Dickey Fuller Test
- Plotly Visualization
- Medium Articles