Cryptocurrency Market Analysis and Prediction

Problem statement

Cryptocurrencies such as Bitcoin, Ethereum, etc. generated significant attention in 2017. Cryptocurrencies have significant volalility as there is rampant speculation. Given the high variance in prices, can data science methods be used to model the market dynamics?

There are many directions this project could take.

Trading Strategy Can an effective trading strategy be found? Try exploring different strategies. Justify your strategy (such as backtesting, data augmentation, Hoeffding's inequality or another of your choice). We are looking for a demonstration of sound data science principles here.

Market Analysis Given there is now option trading on certain cryptocurrencies, is it possible to create a volatility index for cryptocurrencies such as VIX? Is variance of this market infinite and therefore not predictable? Are there any rational reasons for investing that you can justify using data science?

Arbitrage Given the number of different currencies and different markets, how efficient is the market? Are there arbitrage opportunities? Can evidence be found of arbitrage?

Your own find some other area that a team would like to explore. This could include using CNN's to analyze up-to-the-minute market plots to find interesting patterns, analysis of the ICO market, etc. Discuss with your TF before choosing a new direction. You will need to justify access to data, complexity, and expected hypotheses.

Project goal

Apply well-reasoned data science methods to analyze a specific aspect of the cryptocurrency space. There are *many* examples of simple attempts to throw deep learning models at cryptocurrency historical prices. The vast majority lack scientific rigor and analysis of variance. We are looking for you to go beyond these feeble attempts and take a rigorous approach to determine if this is a solvable problem and give justifications to your hypotheses.

Data Recources

1. **Kaggle Cryptocurrency Historical Prices**
   www.kaggle.com/sudalairajkumar/cryptocurrencypricehistory

   - Historical daily pricing data of the most common cryptocurrencies (Bitcoin, Ethereum, Ripple, etc.). Includes open, high, low, close, volume, market cap.

   - Data up to November 2017

- Can integrate other sources, such as Blockchain Info or Etherscan

2. **Bitcoin Trades to the minute**
   www.kaggle.com/mczielinski/bitcoin-historical-data

   - Minute by minute trading data on Bitcoin from various exchanges.

   - Data from January 2012 until January 2018.

   - Useful for trading strategies and perhaps arbitrage, but not recommended for long term market dynamics.

3. **Bitcoin Blockchain in BigQuery**
   cloud.google.com/blog/big-data/2018/02/bitcoin-in-bigquery-blockchain-analytics-on-public-data

   - All historical bitcoin transactions in an easy to query, very fast format using Google Cloud

High-level project goals

1. Analyze the trading data using traditional and novel market analysis metrics.

2. Build a series of models, including ideally a deep learning model such a RNN, to predict a specifc aspect such as pricing, volatility, market volume

3. Choose the best model, justify your choice, and describe strengths and limitations of the chosen model.

References

1. Financial forecasting with probabilistic programming and Pyro

2. Predicting Cryptocurrency Prices With Deep Learning

3. Learning to trade Cryptocurrencies with Reinforcement Learning