Interstellar Arbitrage Using APIs
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Summary

In this project, you will learn how to access the power of APIs (application programming interfaces) in python and use them to do things like making money through currency exchange (in this case arbitrage on cryptocurrency).

Difficulty Level

To progress through the following challenges, you should have a basic understanding of mathematics in python, have a basic understanding of downloading and using python packages from pypi and be able to look through the raw output to identify important information.

Challenges

1. Basic: Access API for another exchange () and compare the prices finding the difference between them ((V1-V2)/(V2+V2)/2)*100
2. Intermediate: Look at the depth of orders to avoid slippage (Try multiplying depth of order by the price difference.)
3. Advanced: Compare all bids to asks between exchanges` and alert the user when there is a large price difference

The Story

One day, space pirate from Pluto realized that he could plunder from the comfort of his computer in a totally legal way. The pirate used APIs to inform him of the prices people were willing to buy and sell space currencies for on different planets. With this information, he coded his space-dog to tell him when one planet wanted a space currency for more than another planet was willing to sell it for. He then bought that currency from the cheaper seller and upsold it to the more expensive buying making a profit. The pirate abandons his old ways turning instead to automated sales and making much more Jupiter-gold or for you real cryptocurrency in the process.

What You Will Learn

In this project, you will attempt to understand and use the urllib2 module which reads URLs within code to access the internet. You will learn what an API is and how writing code to use it. You will also learn how to process this information using the JSON parser to find the values that are needed. Using the idea of stock-exchange arbitrage you will apply your newfound skills and base in mathematics to create a program that informs you of price gaps between planets (or in our case cryptocurrency exchanges).

Links & Resources

https://www.investopedia.com/ask/answers/what-is-arbitrage/
https://stackoverflow.com/questions/383692/what-is-json-and-why-would-i-use-it
https://docs.python.org/2/howto/urllib2.html
https://www.finder.com/cryptocurrency-arbitrage

Walkthrough

A simple explanation of what arbitrage is: https://www.investopedia.com/ask/answers/what-is-arbitrage/

1. Basic: Access the API for another exchange and compare the prices finding the difference between them.

- `response = urllib2.urlopen('https://api.bitfinex.com/v1')` -- this module urllib extracts information from internet links. This information is structured in JSON as seen on the left. The JSON parser is used to read this information. The data displayed is the highest bid and the lowest ask on an exchanging the currencies bitcoin and litecoin.


```
{
    high: "3850.33000000",
    last: "3757.90",
    timestamp: "1546631412",
    bid: "3757.51",
    vwap: "3783.8",
    volume: "6794.64730502",
    low: "3732.38000000",
    ask: "3757.85",
    open: 3785.64
}
```


    - Your first task: Try to extract a different piece of information than the example code from this format.
    - Your second task: Use the given link or find your own cryptocurrency API from sights like Gemini, Bitstamp, Bittrex, Poloniex or others and extract the same information is from the other site, comparing ask on one exchange and bid on the other. To find the difference between the two, make the results a variable and compare the values to find a percentage difference (make sure to convert the values from string to float. To find percentage: ((V1-V2)/(V2+V2)/2)*100.

2. Intermediate: Look at the depth of orders to avoid slippage (Try multiplying depth of order by the price difference.)

- While a space pirate could make money on this percentage is it was high enough there might not be enough people willing to buy and sell for that initial price--there may only be someone willing to give much more than anyone else for a single cent worth of the other currency rather than the large amount a space pirate would need to make money. This is called slippage.
    - Your task: In order to avoid this try looking at another value (volume) and multiply that by the depth of order by the price to get the actual amount you can get.

3. Advanced: Compare all bids to asks between exchanges and alert the user when there is a large price difference

- Compare different coins such as Etherium or Dogecoin on different exchanges so that if there is a way to make money anywhere in the universe, you will be the first pirate to get it!
    - Your task: Try organizing these percentage differences by highest value so you know where to find the real percentage. Trillions of Jupyter-dollars await!