From: Piruz Alemi & Zhongping Yang
Subject: ETL Project (Extract, Transform, Load)
Date: Jan 29th, 2020

Team Effort

This project was conducted by the joint efforts of **Piruz Alemi** & **Zhongping Yang**

Project Proposal

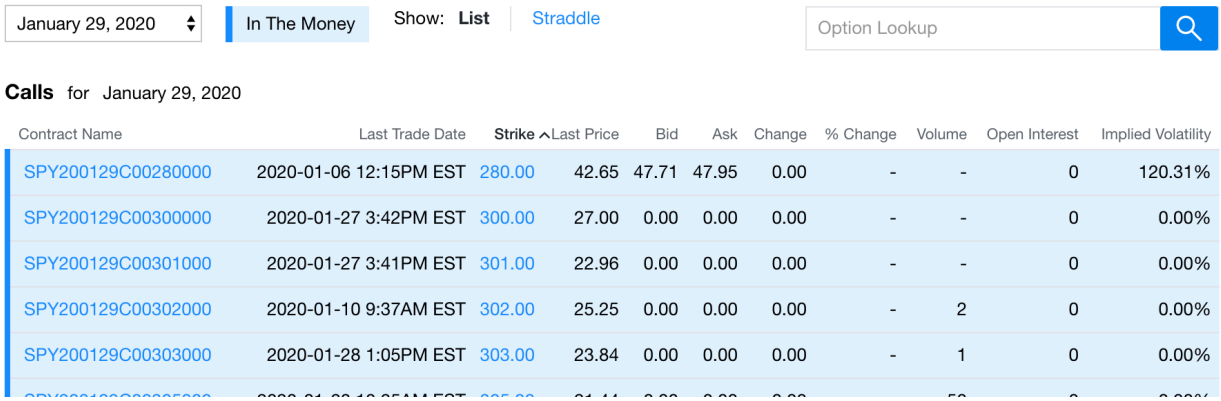
Before we started writing any code, we reached the conclusion to research the *Derivatives Market Option pricing*

Finding Data

The novelty of our project was that we used not only CSV data sources, but we were also able to **Scrape Option Prices of SPY** directly from the screens. We used the following sites to use as sources of data for our research including quantopian with its embedded Jupyter Notebook:

- data.world
- https://finance.yahoo.com/
- Kaggle
- https://finance.yahoo.com/quote/SPY/options?p=SPY
- https://www.quantopian.com/research

For SPY we accessed the CSV Stock Prices + the SPY Options on the Screen as in:



Contract Name	Last Trade Date	Strike	Last Price	Bid	Ask	Change	% Change	Volume	Open Interest	Implied Volatility
SPY200129C00280000	2020-01-06 12:15PM EST	280.00	42.65	47.71	47.95	0.00	-	-	0	120.31%
SPY200129C00300000	2020-01-27 3:42PM EST	300.00	27.00	0.00	0.00	0.00	-	-	0	0.00%
SPY200129C00301000	2020-01-27 3:41PM EST	301.00	22.96	0.00	0.00	0.00	-	-	0	0.00%
SPY200129C00302000	2020-01-10 9:37AM EST	302.00	25.25	0.00	0.00	0.00	-	2	0	0.00%
SPY200129C00303000	2020-01-28 1:05PM EST	303.00	23.84	0.00	0.00	0.00	-	1	0	0.00%

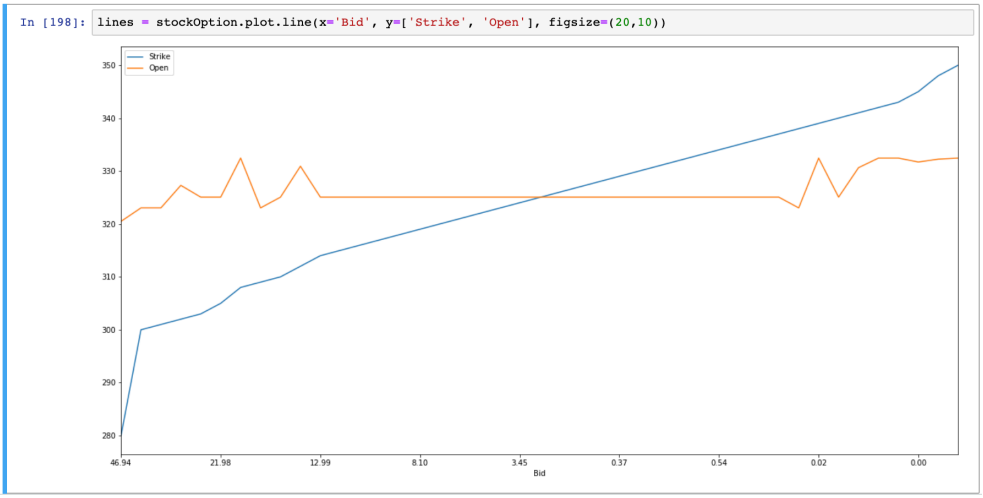
We scraped the data direct from the web screen!

Data Cleanup & Analysis

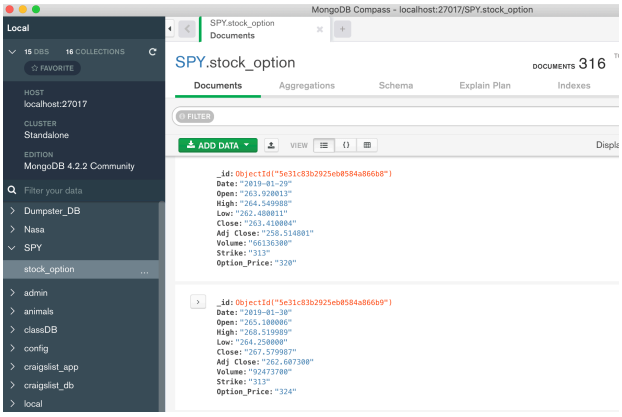
Once we have identified your datasets, we performed ETL on the data:

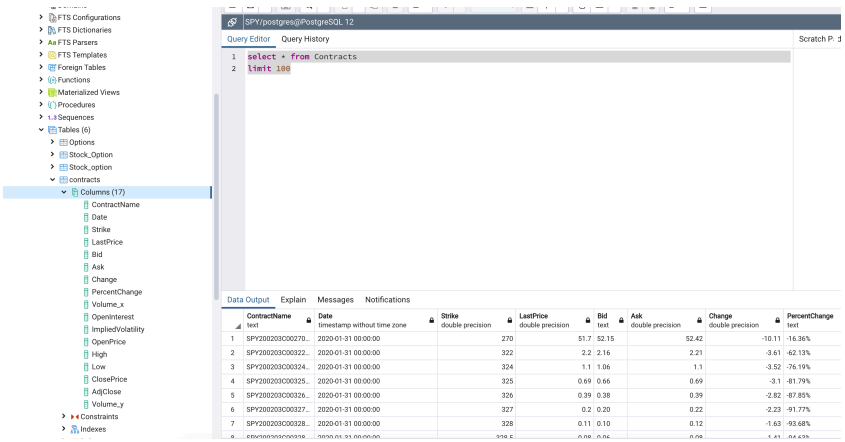
- The type of transformation needed for this data (cleaning, joining, filtering, aggregating, etc) were:
    - The history of Option prices is not available. We captured this data daily
    - Key variables of interest were the Contract Name, Strike price, Stock Price, Implied Volatility
    - Cleaning:
        - We cleaned IV, as the Implied Volatility included the data as a string in %
        - We stripped DateTime from its Time

        - We transformed strings in variables expecting floats to NaN, using Numpy Library as np
    - We joined the CSV file of historical prices of Stocks with our daily Screen Scrapings
    - We automated the latter task through a task manager
- We created a series of charts showing the relation of implied Volatility, Volume, Strike Price and Stock Price as it relates through time (Date) as a sample like the following. For brevity we have not included the full report here.



- We loaded our Joined data set into two production databases as both (relational AND non-relational).
- The final tables (SQL) and collections (MongoDB) may be used in the production database. For MongoDB as in:





We finalized by:

- **L**oading: the final database, tables/collections in both SQL & MongoDB. This was chosen, as Historical Option Prices is not available. We also needed the flexibility to add other types of data.
- **T**wo sets of data bases were used, to compare the "efficiency" of each database + coding. The Flexibility of MongoDB was preferential to coding vs. pre-defining each table & variable in SQL. However in the final analysis we understood the power of directly loading a Data frame into SQL – with a single command. So was also the power of a single line command for scraping Option prices. Clearly in terms of coding we prefer Pandas SQL interfacing.
- MongoDB offered us additional flexibility as we were dealing with a variable "Collection", including future correspondences and additions on Derivatives markets that could potentially be scraped from other Web pages. Furthermore, parts of our data was changing every 3 seconds, and parts on a daily basis and parts never changing.
- We also used https://cronitor.io/docs/using-cronitor-cli to schedule the task of scraping Options data daily and appending to a headless CSV file, except for the first day.

Please see our report on Github or follow our link on Bootcampspot!

Respectfully,

Team: Piruz Alemi & Zhongping Yang