Malicious Traders in Stock Exchange

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April 2, 2019

Problem Statement

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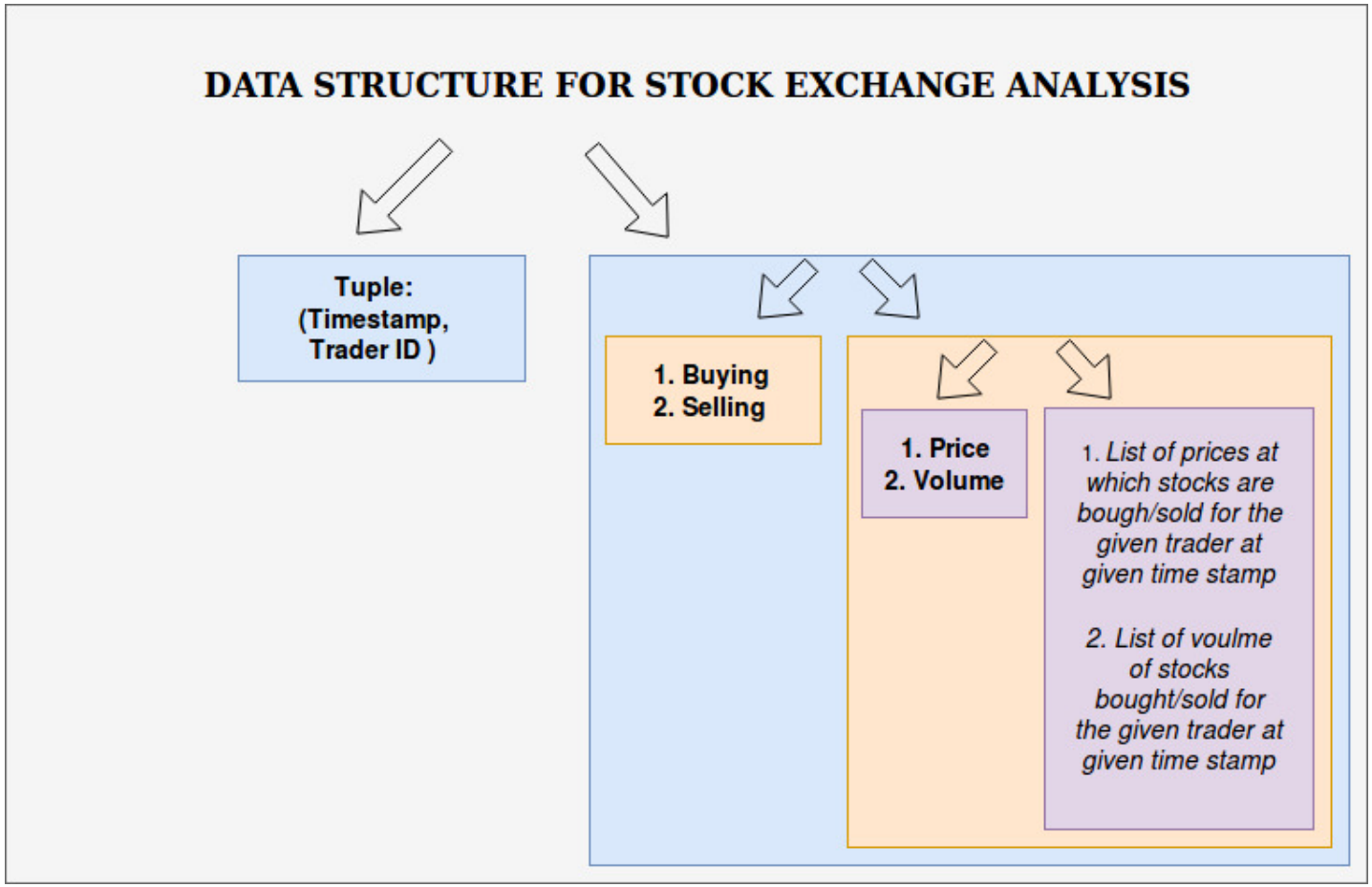
- A stock exchange is the market place for buying and selling of the stocks listed in the exchange. Trading firms and individual traders transact daily at the exchange.
- However the traders can involve in malpractice to manipulate the prices of the stock and gain huge profits. These malpractices may involve an individual trader or a group as whole and are termed as attacks.
- Pump and dump, Cross-Market Manipulation, Retaliatory Firing and Layering are few to name.
- Given the data of a days buy/sell bids and executed orders, the goal is to tag malicious traders at any point of time and identify any possible attack. Without any human intervention.

Timestamp-Trader Data Structure



- The input data is given as a csv file of the price and the volume of the stocks a given trader is buying or selling at a given time stamp.
- Hence using such a abstract generalized structure might prove to be helpful.

Feature Engineering

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We began with trying to identify the most important features that can help segregate anomalies. The idea was to compare plots of genuine and rogue traders across each feature and pick those features that seem promising.

The standard features for each trader across each second of the day we began with are

- Mean, Median, Max, Min, Standard Deviation of buying price, buying volume, selling price, selling volume.
- Number of buy and sell requests
- Number of executed orders and the number of different traders with whom requests were matched
- Number of partial and complete deletion of orders
- Moving Averages and cumulative sums are calculated for all the above features.
- Histograms for all the graphs are also plotted

Getting set of important Features

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We began with trying to analyse from the extracted data to get set of important Features.
We used two types of data sets and created graphs for various

- In all for each trader there are 157 graphs.

We have used 2 data sets
I) Completely pure with (non malicious data)
II) Mixed data with few malicious traders.

1) Trader T3 from pure data set.
2) Trader T1 who behaves as malicious from 2nd data set.
3) Trader T2 which is non malicious trader from mixed data set.
4) Trader T6 who behaves as malicious from 2nd data set.

Now we can analyze from differences in graphs and get the important features.

Getting set of important Features

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One of the example of features from the initial small data set which we can analyze few points is as follows -