INTRODUCTION

The stock Market and its data it is a BIG data source to run some analysis projects. At this slide presentation I will be showing the first steps of a Complex Network approach on how to understand this Market.
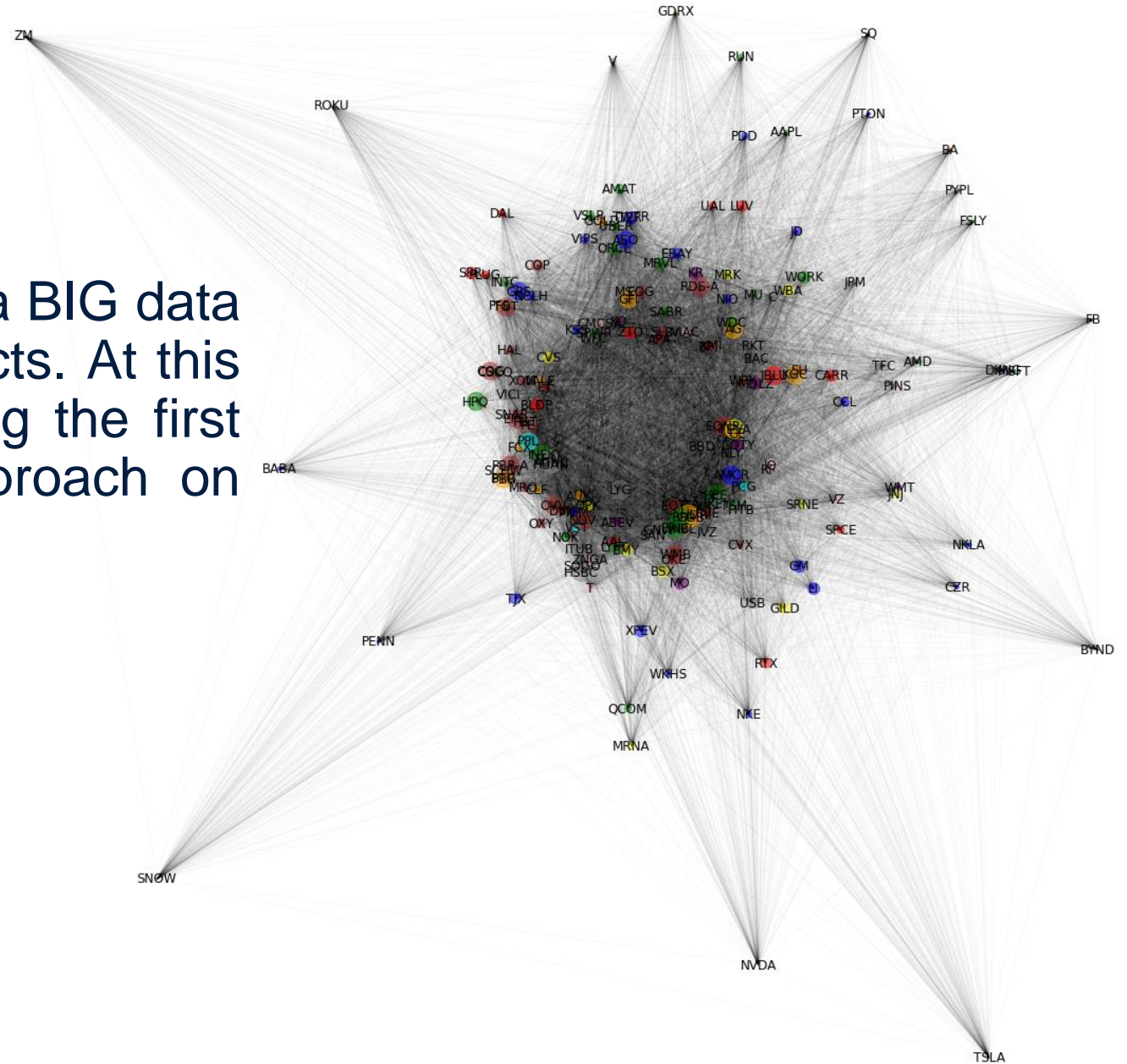
OBJECTIVE

The objective is to compare the movements between multiple Stoks Symbols, in order to see how strong is the correlation among them. Drawing a complex network, where the most correlated Stocks are binded together, and the more unique ones are settled farway from the rest of the Market. Essentially, diving into a deeper Stock Market Analysis.

THE DATA

When extracting the data, each Stock Symbol provides its own data set, in this schema:

date.

open.

high.

low.

close.

volume.

date	1. open	2. high	3. low	4. close	5. volume
2020-09-28 20:00:00	115.49	115.50	115.46	115.50	17542.0
2020-09-28 19:59:00	115.45	115.49	115.45	115.49	8225.0
2020-09-28 19:58:00	115.42	115.49	115.40	115.45	6198.0
2020-09-28 19:57:00	115.46	115.46	115.42	115.42	2935.0
2020-09-28 19:56:00	115.47	115.47	115.44	115.44	6183.0
...	...	...	...	...	...
2020-09-15 04:05:00	116.55	116.64	116.54	116.64	2388.0
2020-09-15 04:04:00	116.47	116.65	116.47	116.57	4058.0
2020-09-15 04:03:00	116.50	116.65	116.20	116.25	7128.0
2020-09-15 04:02:00	116.25	116.50	116.25	116.50	3407.0
2020-09-15 04:01:00	116.54	116.54	116.11	116.38	6096.0

THE DATA

A few transformations are made in order to create candle sticks.

Then, further, movent analysis can be done.

date	aapl
2020-09-28 20:00:00	0.01
2020-09-28 19:59:00	0.04
2020-09-28 19:58:00	0.03
2020-09-28 19:57:00	-0.04
2020-09-28 19:56:00	-0.03
...	...
2020-09-15 04:05:00	0.09
2020-09-15 04:04:00	0.10
2020-09-15 04:03:00	-0.25
2020-09-15 04:02:00	0.25
2020-09-15 04:01:00	-0.16

9216 rows × 1 columns

date	msft
2020-09-28 20:00:00	0.00
2020-09-28 19:59:00	-0.03
2020-09-28 19:58:00	-0.04
2020-09-28 19:57:00	0.00
2020-09-28 19:55:00	0.00
...	...
2020-09-15 04:30:00	0.00
2020-09-15 04:29:00	0.00
2020-09-15 04:27:00	0.00
2020-09-15 04:25:00	0.05
2020-09-15 04:01:00	0.00

6844 rows × 1 columns

date	msft	aapl
2020-09-28 20:00:00	0.00	0.01
2020-09-28 19:59:00	-0.03	0.04
2020-09-28 19:58:00	-0.04	0.03
2020-09-28 19:57:00	0.00	-0.04
2020-09-28 19:55:00	0.00	-0.02
...	...	...
2020-09-15 04:30:00	0.00	0.01
2020-09-15 04:29:00	0.00	-0.01
2020-09-15 04:27:00	0.00	-0.05
2020-09-15 04:25:00	0.05	0.02
2020-09-15 04:01:00	0.00	-0.16

6791 rows × 2 columns

THE NETWORK

- Depending on how similar are the movents between some two stocks, a distance is defined to the edge that bind their nodes.

- And them we can create a network.
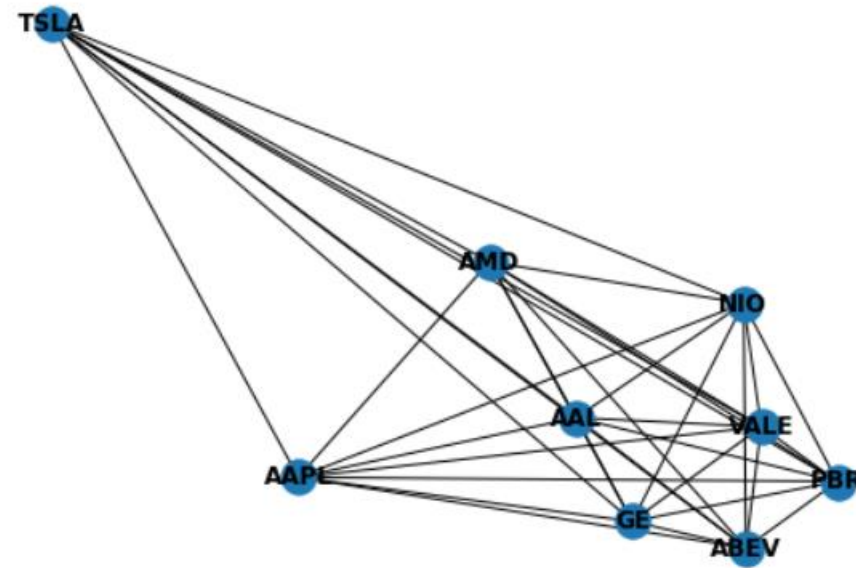
APPROACH

- Back there is a small look at the Market relations.

- With same principle its possible to drawn a Bigger Picture.

```
symbolList=['NIO','AAPL','SRNE','GE','AMD','TSLA','AAL','PTON','BAC','F','WFC','ABEV','DKNG',
'SPCE','NKLA','OXY','VALE','WPX','MU','T','DVN','UAL','PBR','NOK','WKHS','CZR','MRO','CCL','PCG',
'ITUB','BBD','C','MSFT','BYND','PLUG','BA','FB','INTC','XOM','SIRI','UBER','CSCO','SNAP','SLB','CLF','NVDA','ZM','ZNGA',
'BP','DAL','SPWR','NCLH','FCX','TWTR','HAL','NBL','APA','KSS','NLY','JPM','PFE','MGM','VIPS','GOLD','SABR','KO',
'PINS','PENN','SQ','SOGO','CMCSA','VIAC','MS','OPK','AUY','GDRX','COTY','ET','VZ','CVE','CVX','WMT','FSLY','SAN',
'IVZ','VST','SU','KMI','VICI','SIUIF','BMY','JBLU','INFY','NKE','RF','KGC','BABA','HPQ','AG','DIS','VER',
'PE','NOV','GPS','LYG','WMB','RDS-A','MO','EBAY','EOG','HPE','GM','CARR','RKT','JNJ','PYPL','VSLR',
'EQT','WORK','GGB','HL','KR','EQNR','HSBC','GILD','GNW','HST','AGNC','MRK','RTX','MDLZ','PDD','MRNA','KEY',
'WDC','MRVL','SCHW','ROKU','EPD','COP','TSM','BLDP','LI','TJX','PBR-A','RUN','ZTO','BSX','LYFT','JD',
'FHN','XPEV','BB','OKE','CVS','GFI','HBAN','QCOM','V','COG','ERIC','ORCL','PPL','BTG','TPR','AMAT',
'OVV','FITB','IQ','SNOW','LUV','USB','TFC','SPR','TOT','AMCR','WBA','AEO','TEVA']
```

RESULT

Added a few features on the network to better vizualization

- The color, green to the more unique ones, and yellow to the more correlated ones
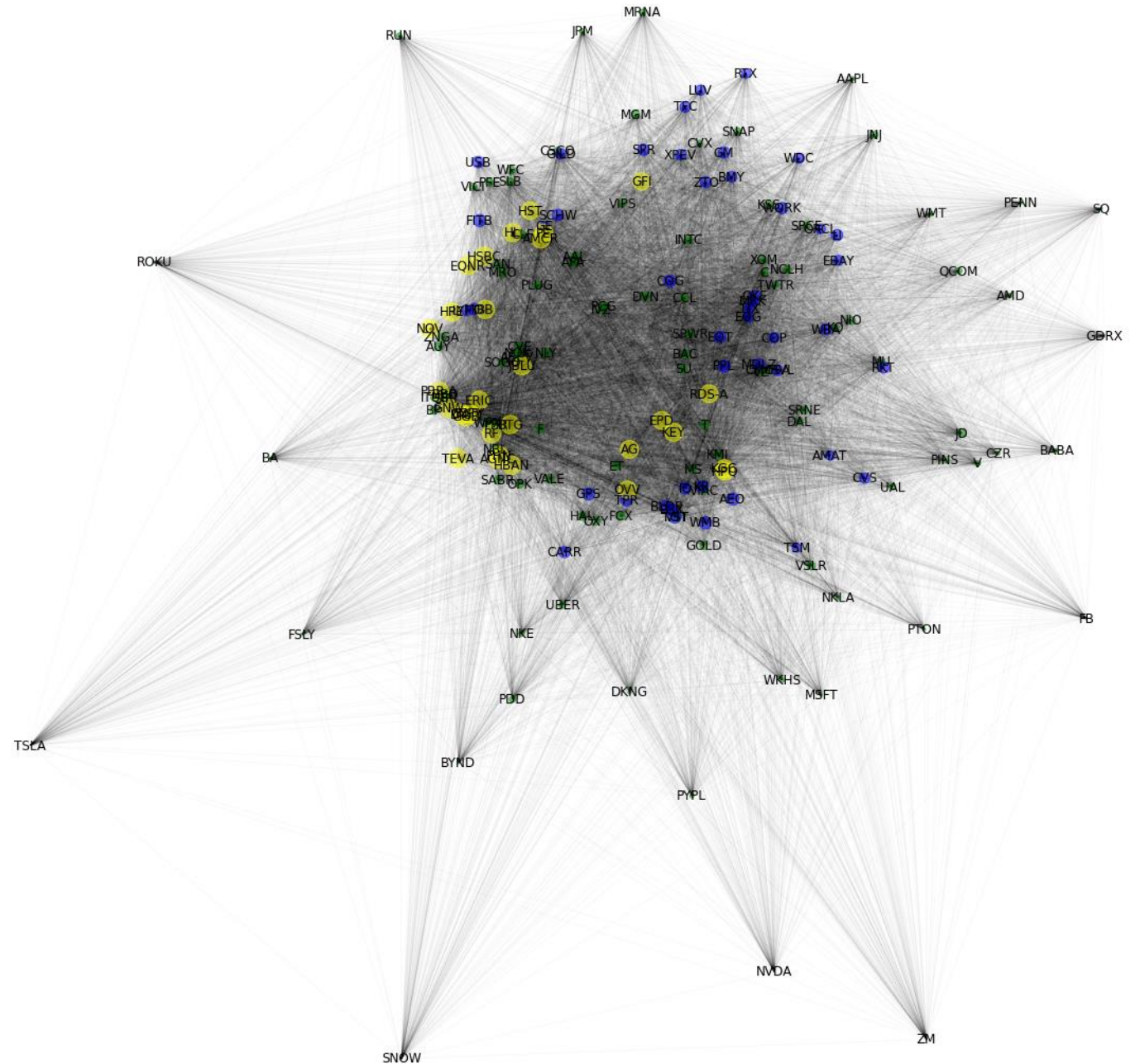
RESULT

- The size, on how unique or correlated the sotck is

- The color, depending on witch sector the Stock is

```
sector_dict['Consumer Cyclical']='blue'
sector_dict['Technology']='green'
sector_dict['Healthcare']='yellow'
sector_dict['Industrials']='red'
sector_dict['Financial Services']='gray'
sector_dict['Consumer Defensive']='purple'
sector_dict['Energy']='brown'
sector_dict['Basic Materials']='orange'
sector_dict['Communication Services']='pink'
sector_dict['Utilities']='aqua'
sector_dict['Real Estate']='gray'
```