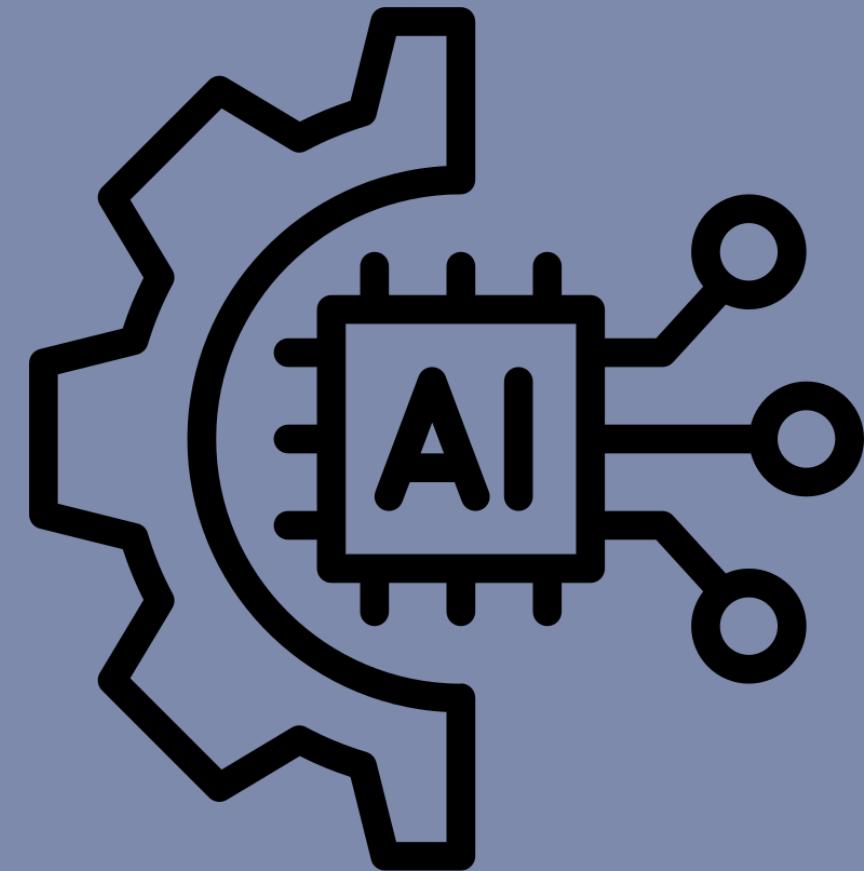




Data and AI in Economics

Insider Trading

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Joško Kristić
Keunwoo Kim



Topics of presentation

Definition of Insider Trading

Regulations of Insider Trading

Data Sources

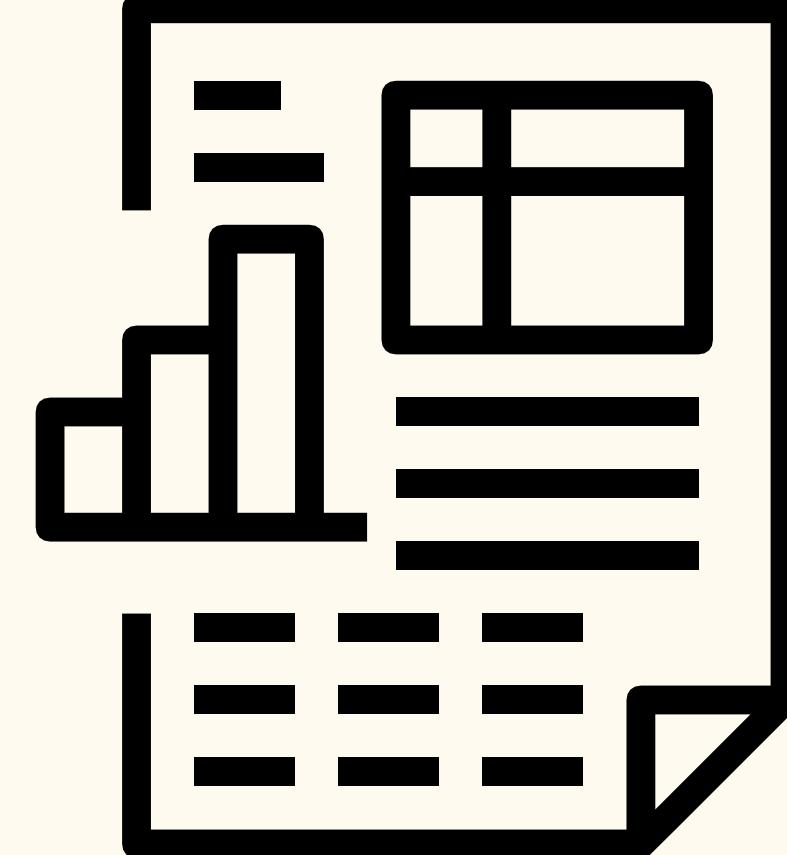
Look into the Dataset

Scoring insider Trades

Copy-Trading Strategies

Analysis of chosen strategy

Conclusion



Insider Trading

Insider trading involves buying or selling securities using non-public, privileged information obtained through a position within the company or a privileged relationship

Difference between Legal and illegal Insider Trading

Legal Insider Trading: Transactions by company insiders (executives, board members, major shareholders) publicly disclosed as per regulations.

Illegal Insider Trading: Buying or selling securities based on non-public, material information, including tipping others who trade on it.



Reporting Process



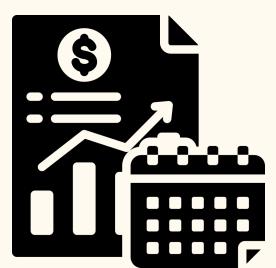
Initial Declaration

When a person is an insider, they must declare their initial holdings.



Transaction Reporting

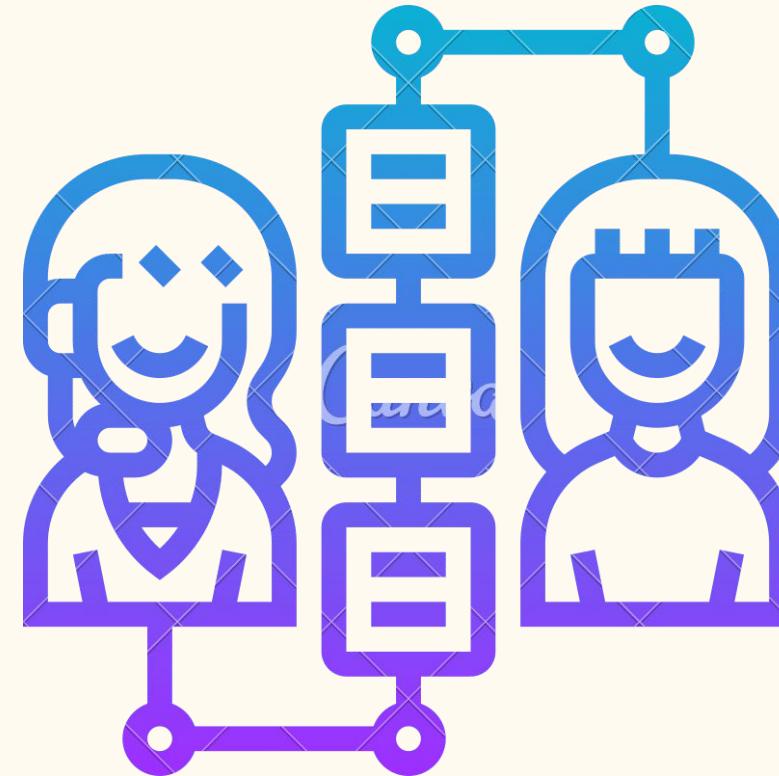
Reporting each specific transaction, submitted within two business days of the transaction.



Periodic Reports

Certain transaction may require additional periodic reports.

- SEC: The Securities and Exchange Commission - [SEC Official Website](#)



Regulatory Bodies

Regulatory Body

Insider trading is regulated by the Securities and Exchange Commission (SEC), which ensures the fairness and transparency of financial markets and takes action against illegal insider trading



Regulatory Bodies and Insider Trading Laws



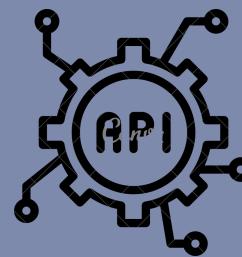
Laws and Regulations

The main laws include the Securities Exchange Act of 1934, which established the SEC, and rules such as Rule 10b-5, which prohibits fraud and manipulation in securities transactions.



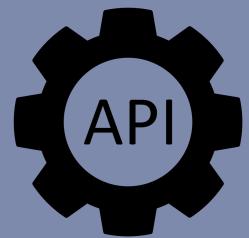
- Securities Exchange Act of 1934: Full Text
- Rule 10b-5: SEC Rule 10b-5

Data sources



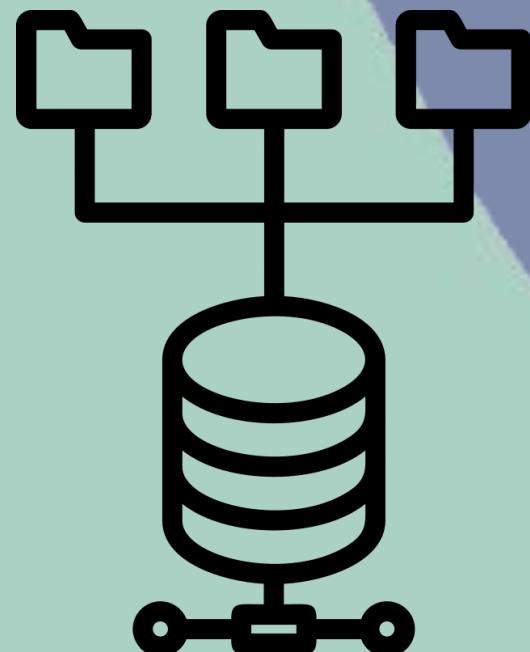
Insider trading API by
sec-api.io

To get reported insider trades



Mapping API by sec-
api.io

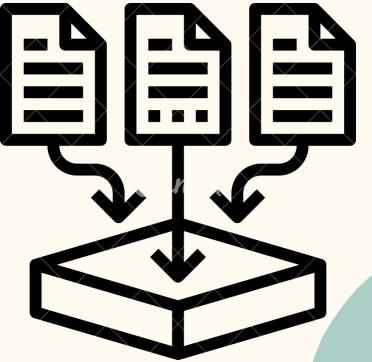
To get information about
sector and industry for specific
stock



Yahoo finance

To get historical stock prices



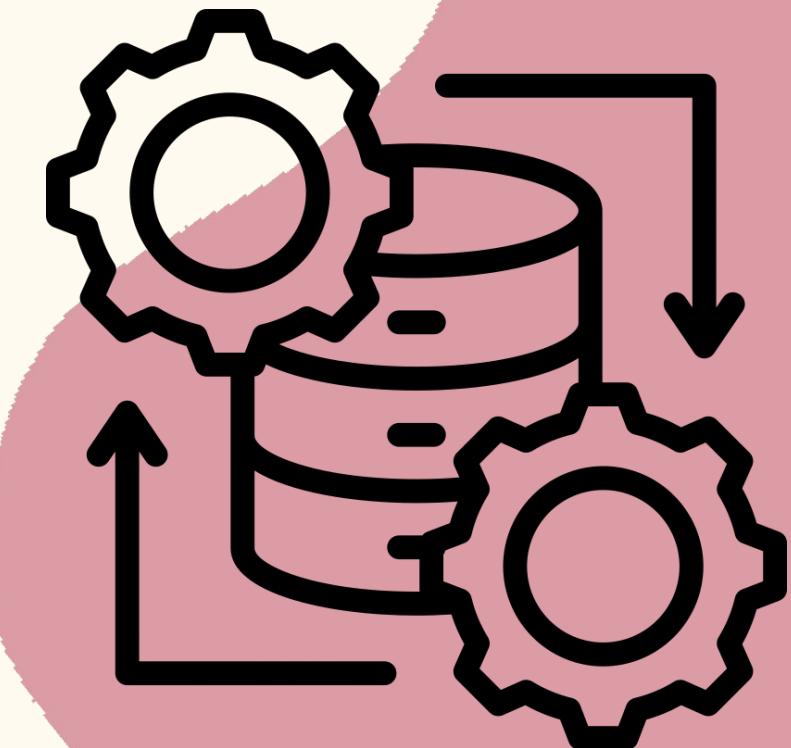


Transforming data from SEC filings data into appropriate Pandas dataframe format

Adjusting share prices in SEC filings for stock splits using historical stock info

- Keeping only non-derivative trades after 01.01.2019.

Preprocessing



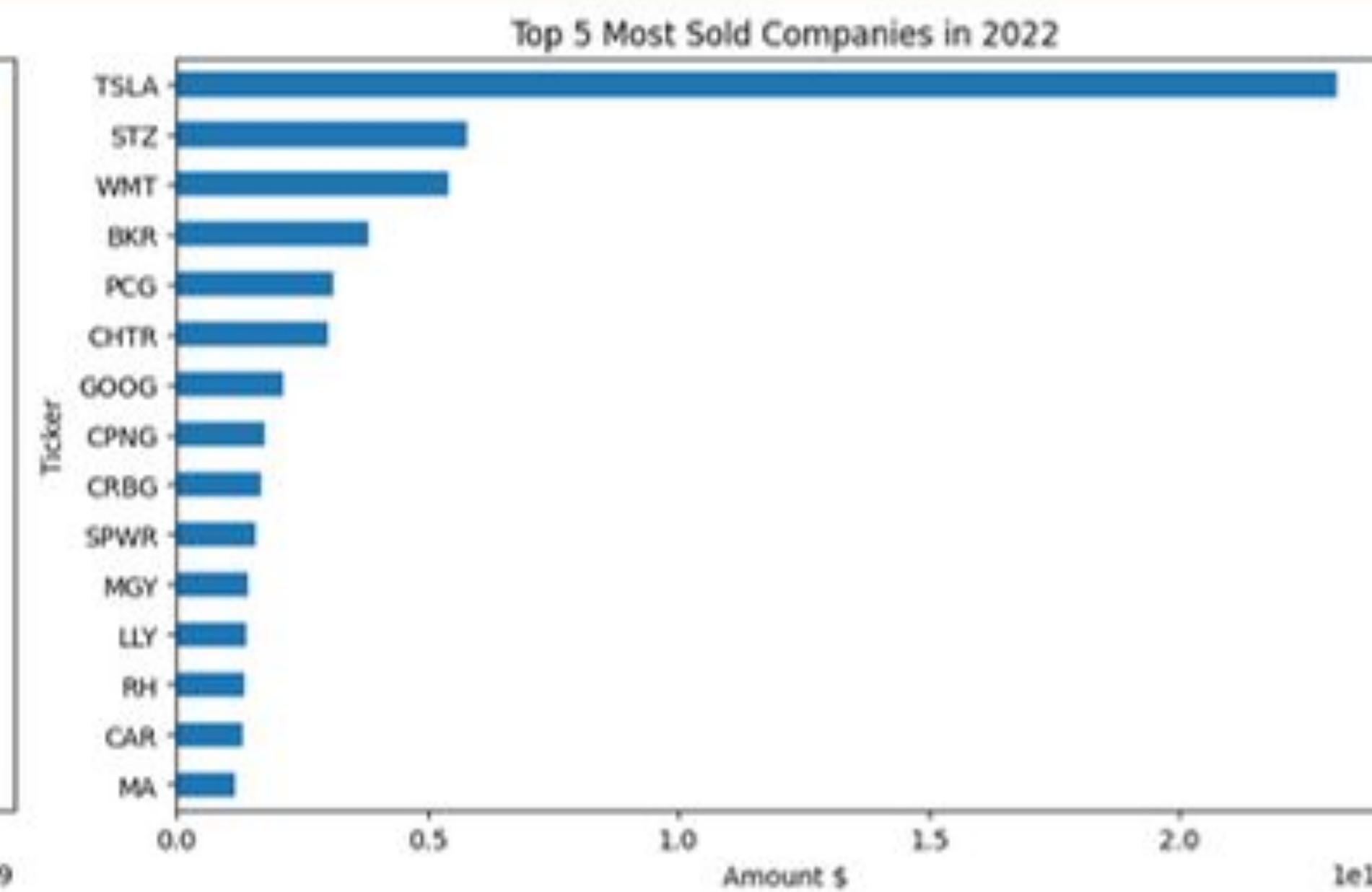
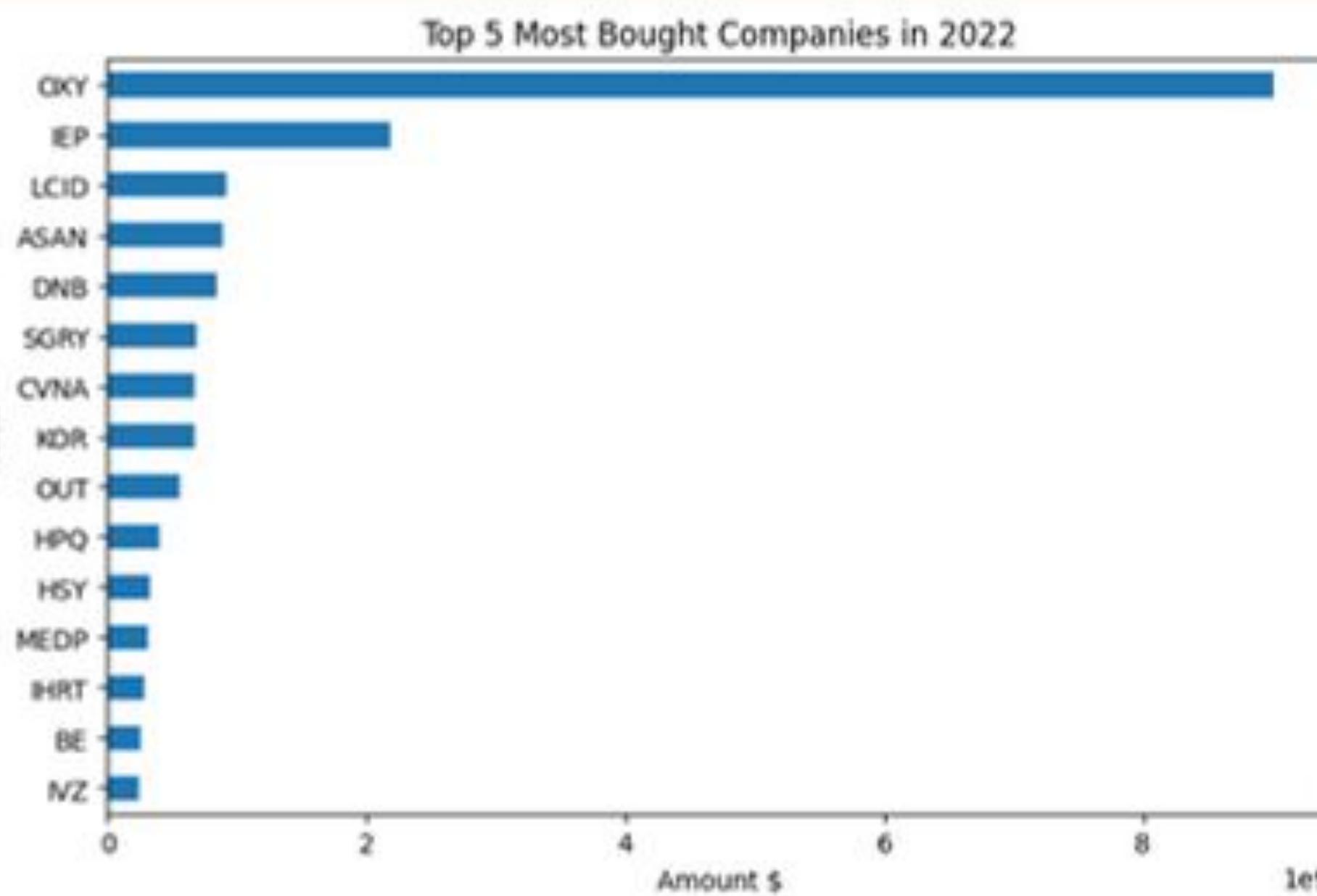
Exploratory data analysis





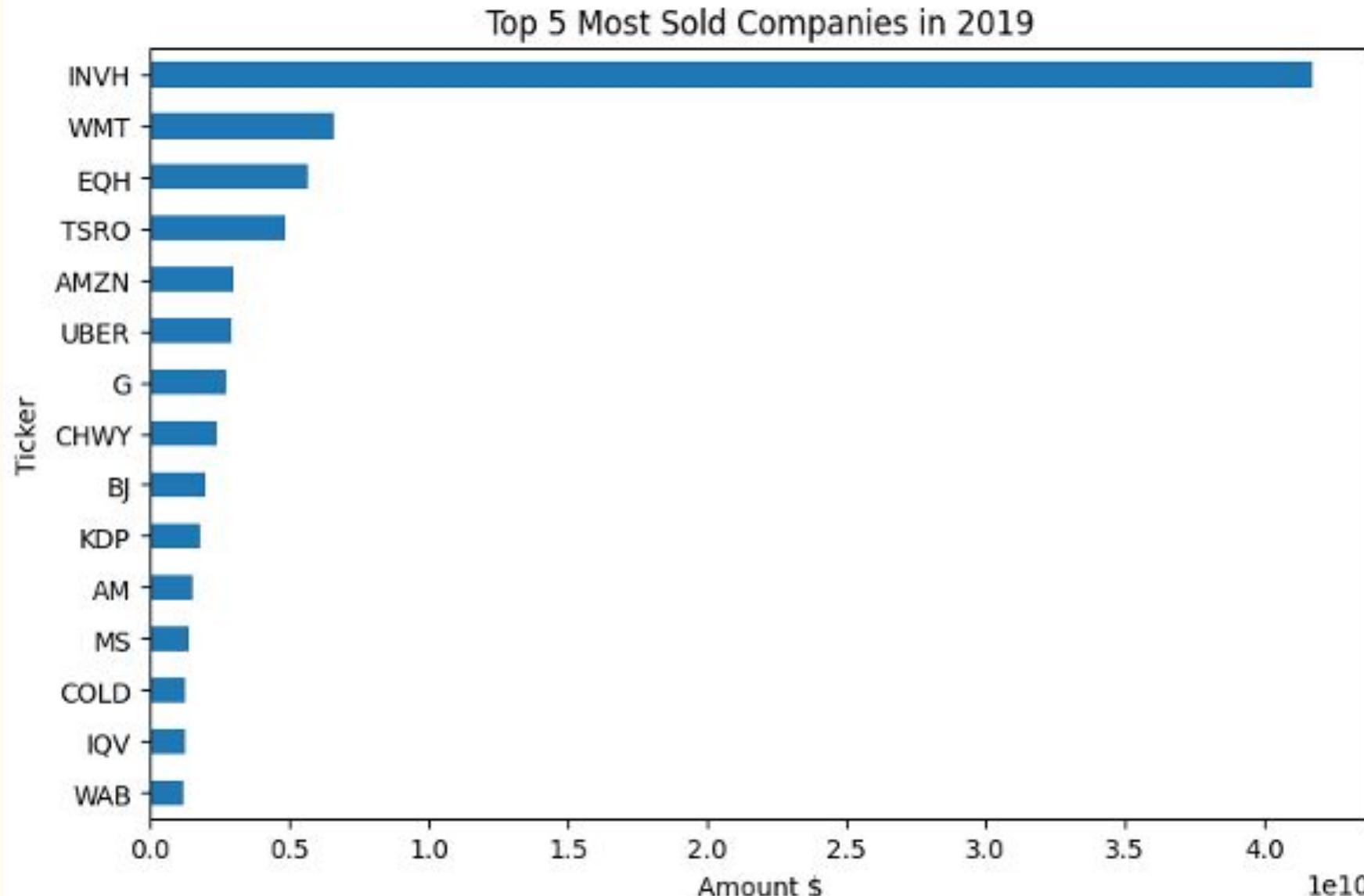
Top 5 stocks that most buy/sell for each years

- OXY - BERKSHIRE HATHAWAY INC is the insider trader who bought 99% of insider trading in 2022 of OXY
- TSLA - From April through December in 2022, Musk sold \$22.9 billion worth of Tesla stock in unscheduled sales to help fund his \$44 billion purchase of Twitter that year



Top 5 stocks that most buy/sell for each years

INVH- We can see some insider trades look exactly same. Possible outlier.



reportingPersonName	
BREP IH6 Holdings LLC	5936625018
BREP VII-NQ Side-by-Side GP L.L.C.	5936625018
Blackstone Holdings II L.P.	5936625018
Blackstone Real Estate Partners VII.TE.8-NQ L.P.	5936625018
IH1 Holdco L.P.	5936625018
IH3 Holdco GP LLC	5936625018
Invitation Homes 6 Parent L.P.	5936625018
STERNLICHT BARRY S	129956111
Tanner Dallas B	3289912
FREEDMAN ERNEST MICHAEL	1813054
Young Charles D.	1157854
SOLLS MARK A	1138195
Norrell Kimberly K	182271
BLAIR BRYCE	41641
Name: total, dtype: int64	

Insiders who traded most in INVH in 2019

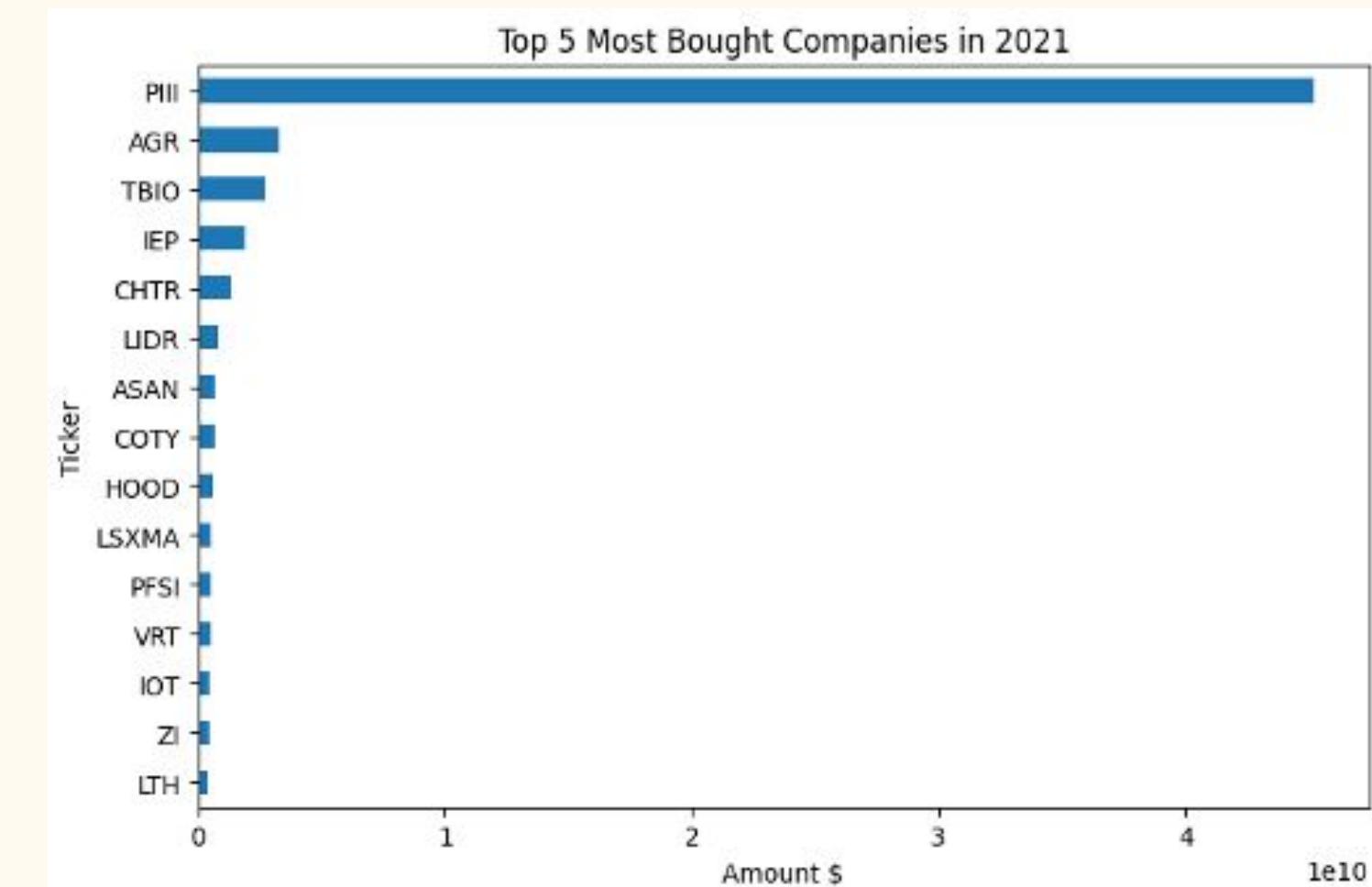


Top 5 stocks that most buy/sell for each years

- PIII- There was stock merge on 03 DEC 2021. This can be the reason that the data looks outlier.



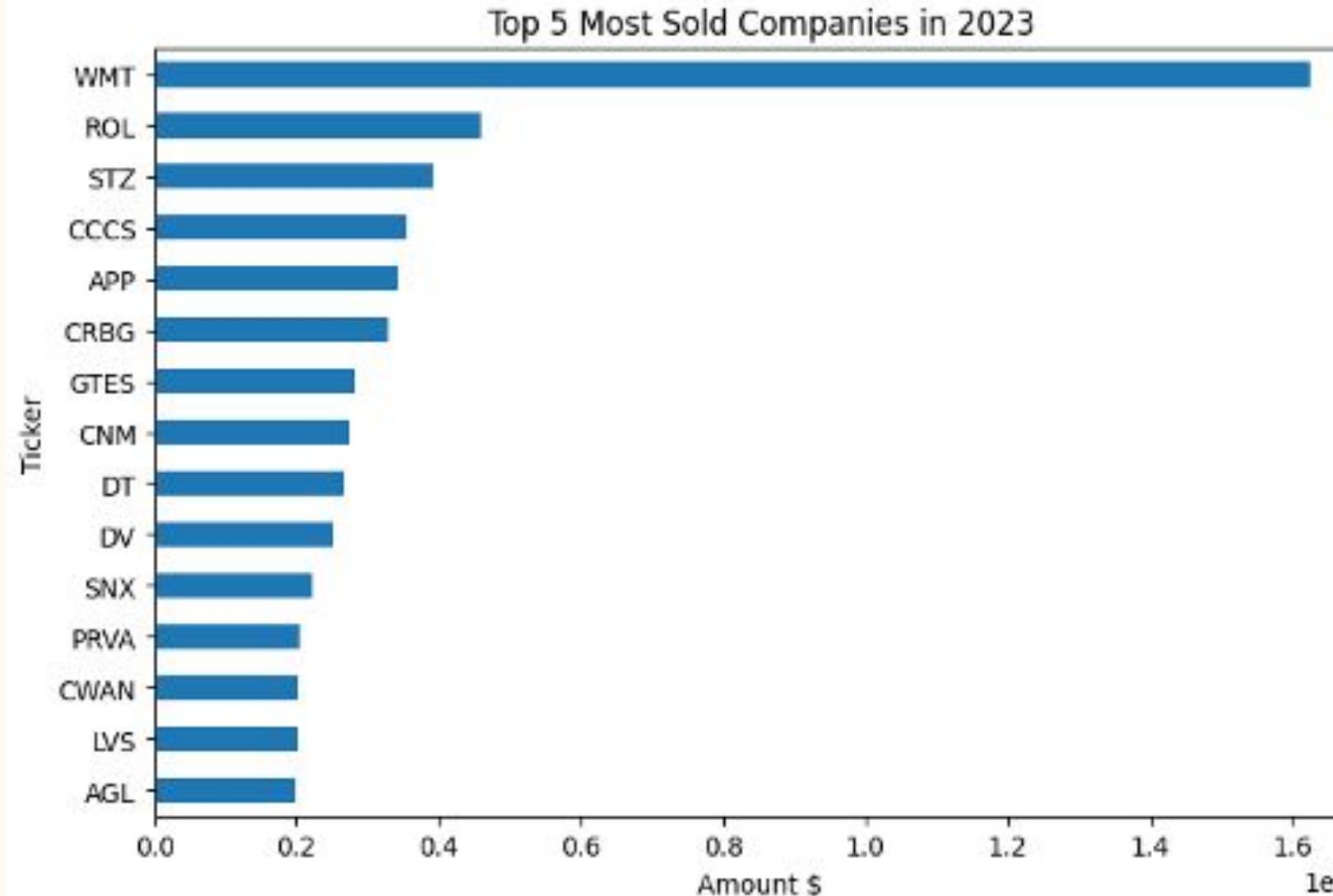
sharePrice looks different even in same day



Date	ticker	reportingPersonName	securityTitle	acquiredDisposed	shares	sharePrice	total
2021-12-03	PIII	Bacchus Amir	Class V Common Stock	A	15032528.0	1503.25	22597647716
2021-12-03	PIII	Bacchus Amir	Class V Common Stock	A	3758130.0	375.81	1412342836

Top 5 stocks that most buy/sell for each years

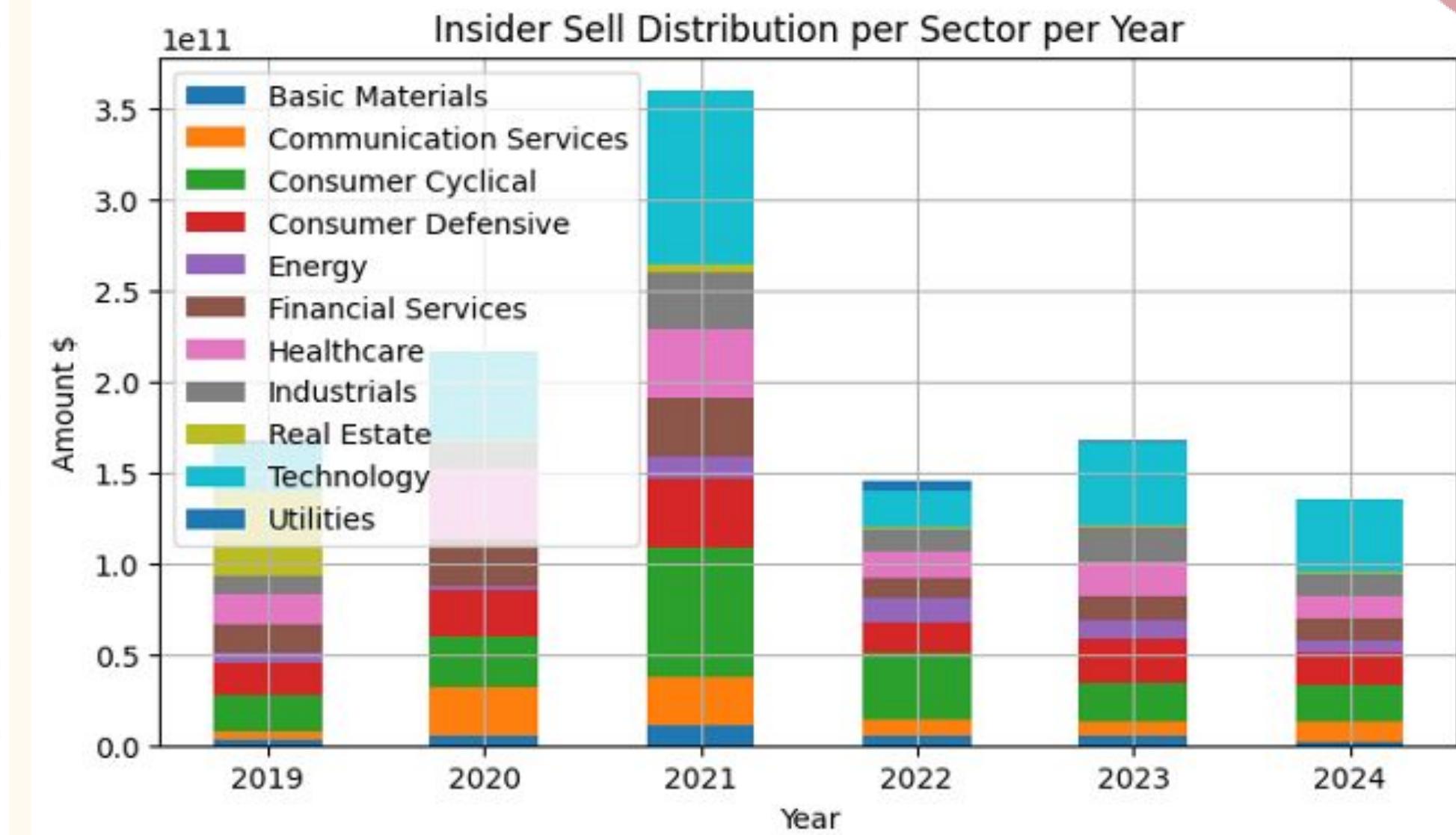
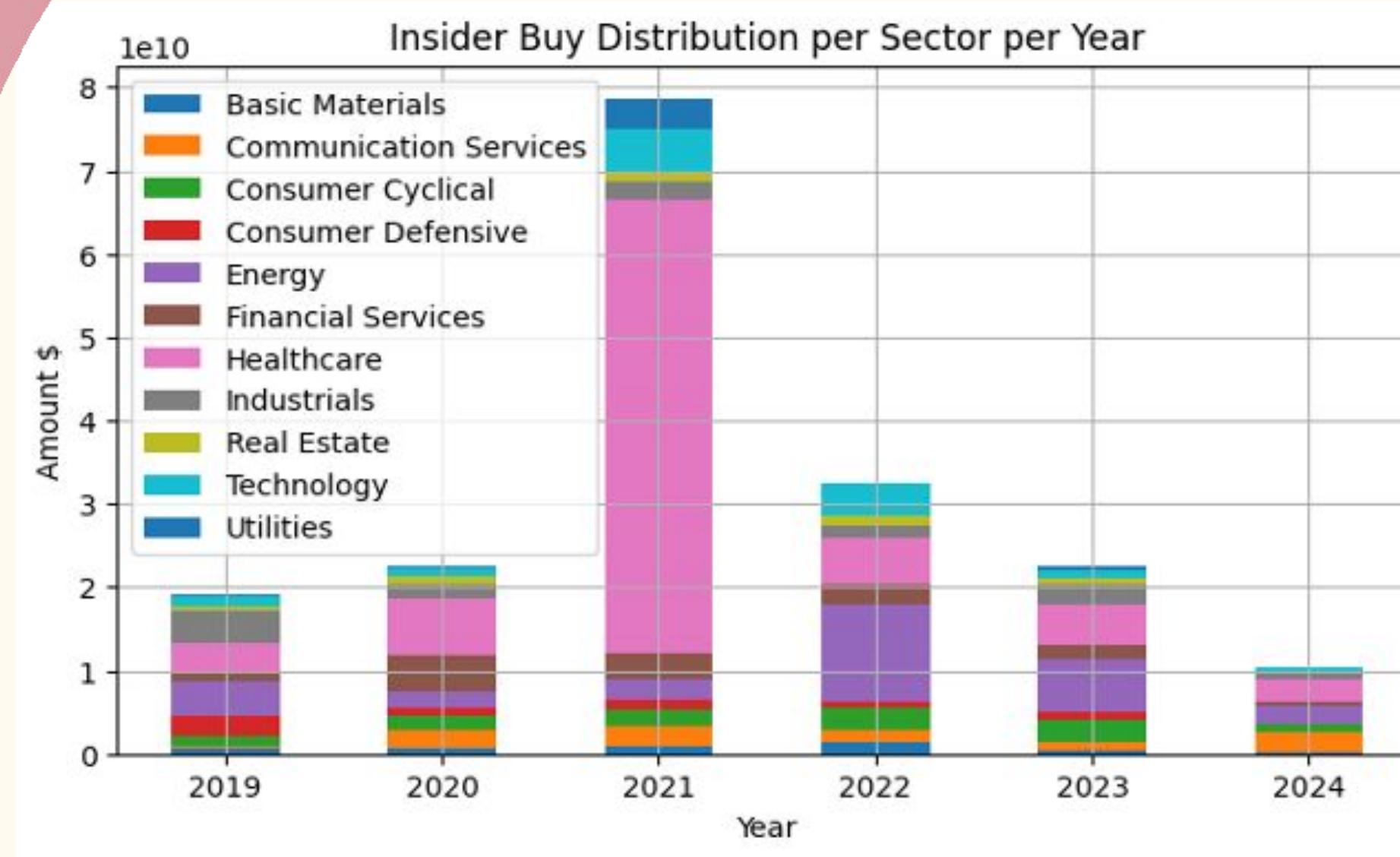
- WMT- Those Insider trading of three Walton looks same. Possible Outliers.



reportingPersonName	
WALTON ALICE L	5388440974
WALTON JIM C	5388440974
WALTON S ROBSON	5388440974
McMillion C Douglas	27558809
Furner John R.	12804173
Rainey John D	7664620
Kumar Suresh	6914001
Brand Rachel L	6224192
McKenna Judith J	5089491
McLay Kathryn J.	5057368
Biggs M. Brett	4793651
Bartlett Daniel J	2514232
Chojnowski David	1409879
STEPHENSON RANDALL L	1000168
Nicholas Christopher James	350130
Morris Donna	179581
Name: total, dtype: int64	

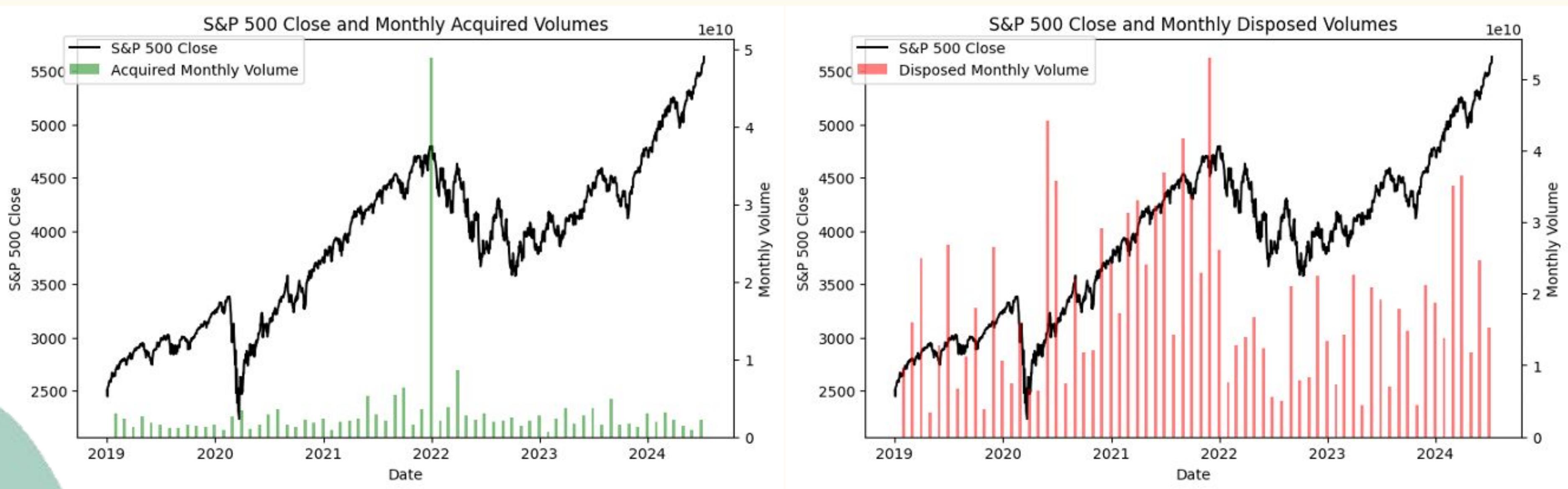
Insider traded of WMT in 2023

Portion of each sector for each years



In 2021, huge amount in Health care. This amount is because of ‘PIII’, the possible outlier. From 2019 to 2021 the insider buy or sell both increased. But, nowadays, insider trading volume is smaller than those period.

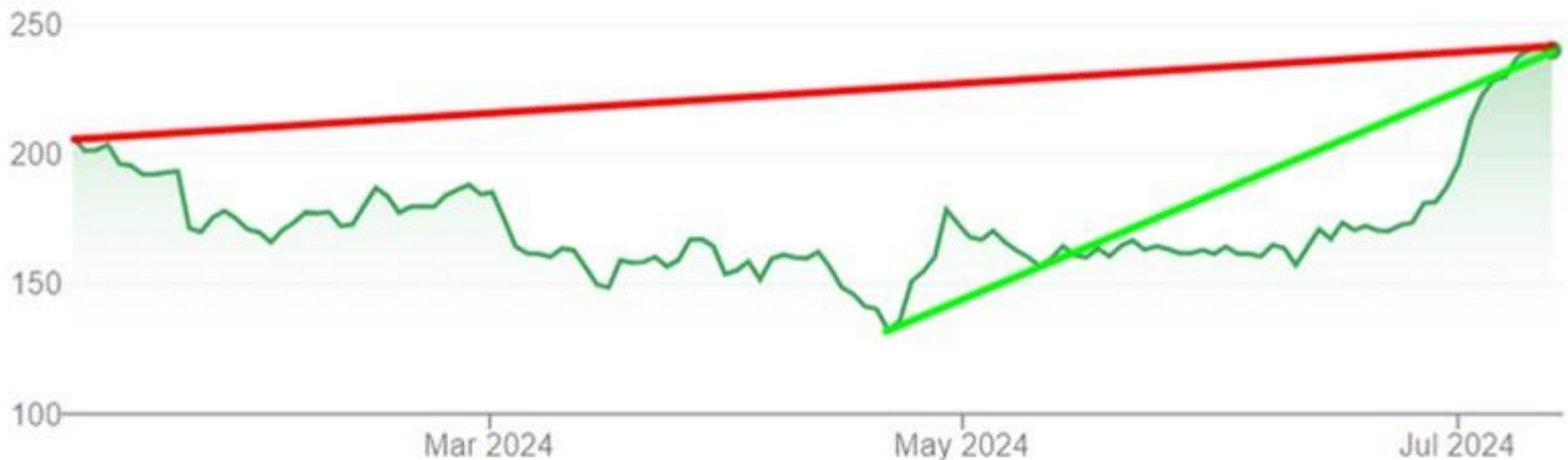
- Volume of insider buys&sells together with S&P500 movement through time
 - There is long green line around 2022, which is because of ‘PIII’
 - Disposed volume was a lot in COVID-19 era.



Defining good trades

We want to conclude whether insider trade was good or bad, not how the stock performed

Return of every insider trade will be highly correlated with stock performance

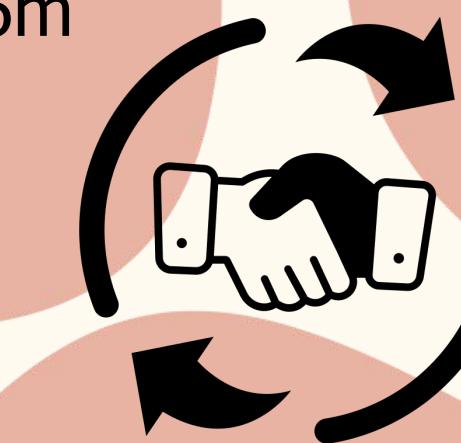


Scoring trades

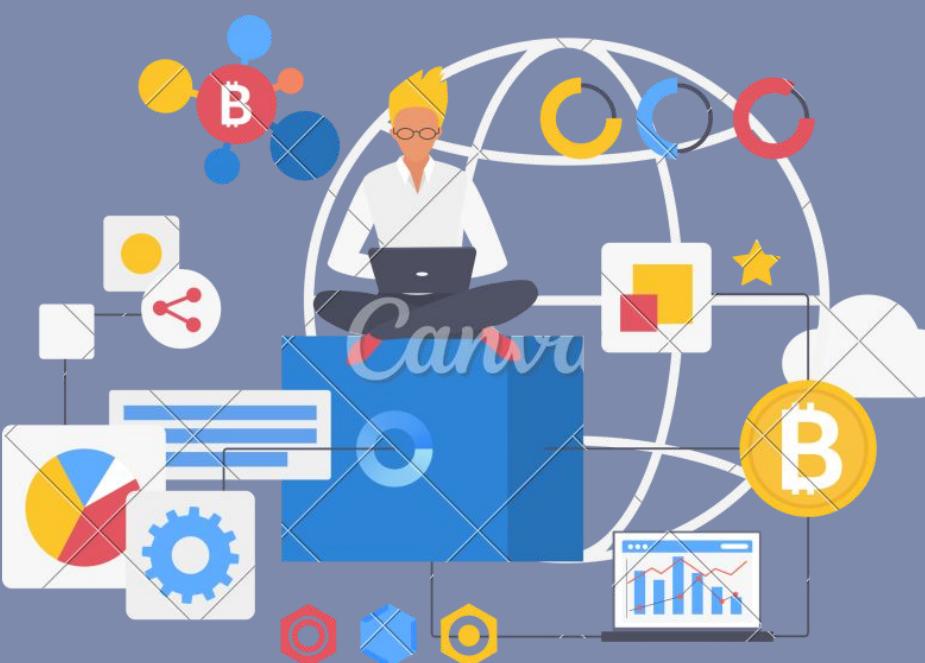


Focusing on specific point in future after the trade like 1 week, 1 month, 3m and 6m

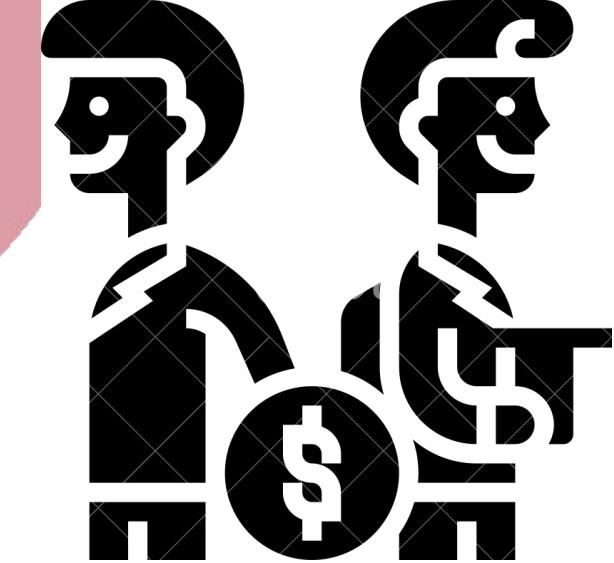
Return between the average future price and price at the moment of insider trade



Standardizing this return with yearly performance of that stock and volatility

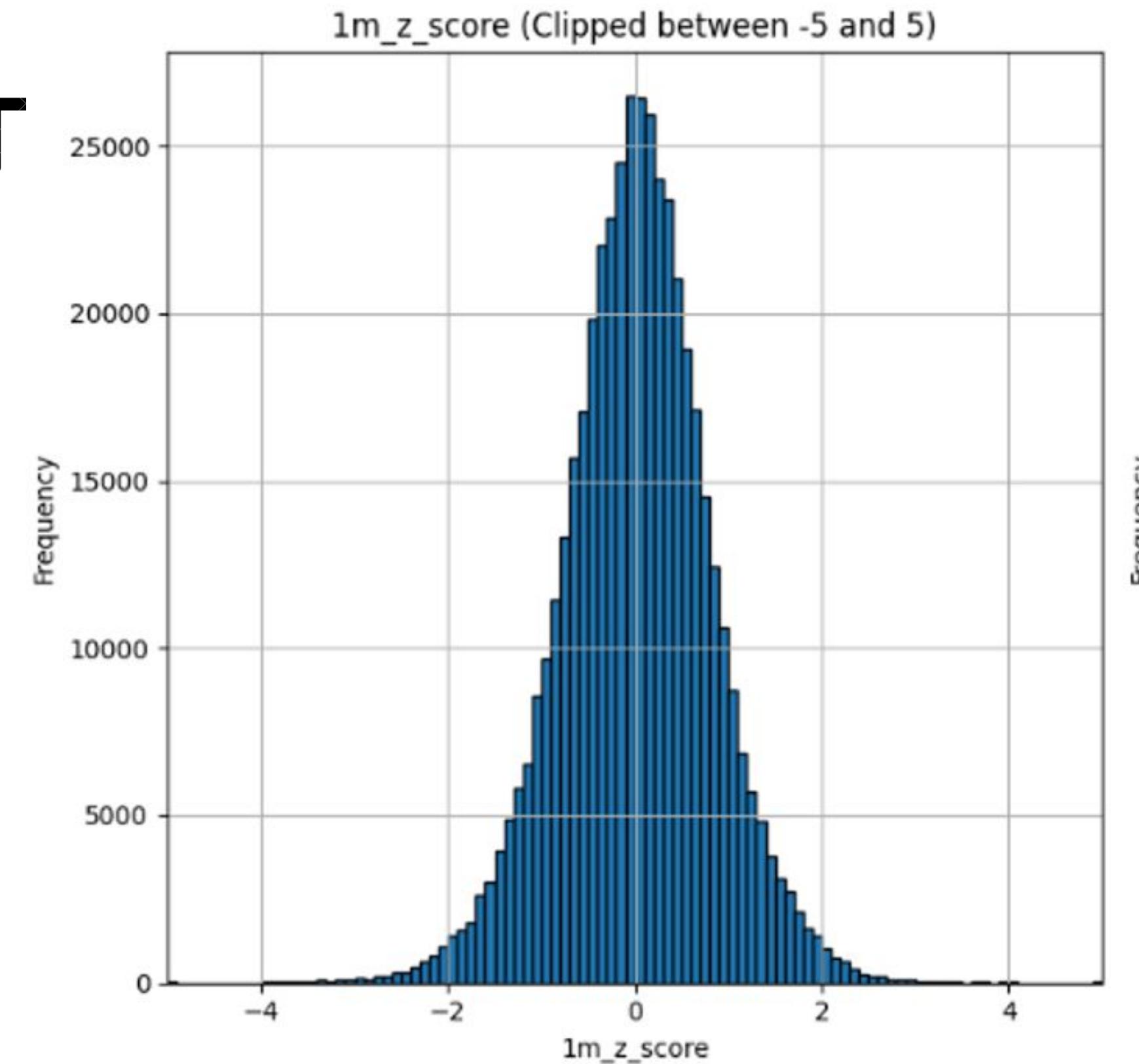


Distribution of scores



Expecting normality to get probabilistic meaning

All 4 time periods show Satisfying distributions



Mean z-scores

	1 week	1 month	3 months	6 months
Buys	0.101441	0.073218	0.020717	-0.103653
Sells	0.012185	-0.012612	-0.068996	-0.092063

Buys outperform sells

Probably biased by constantly increasing market



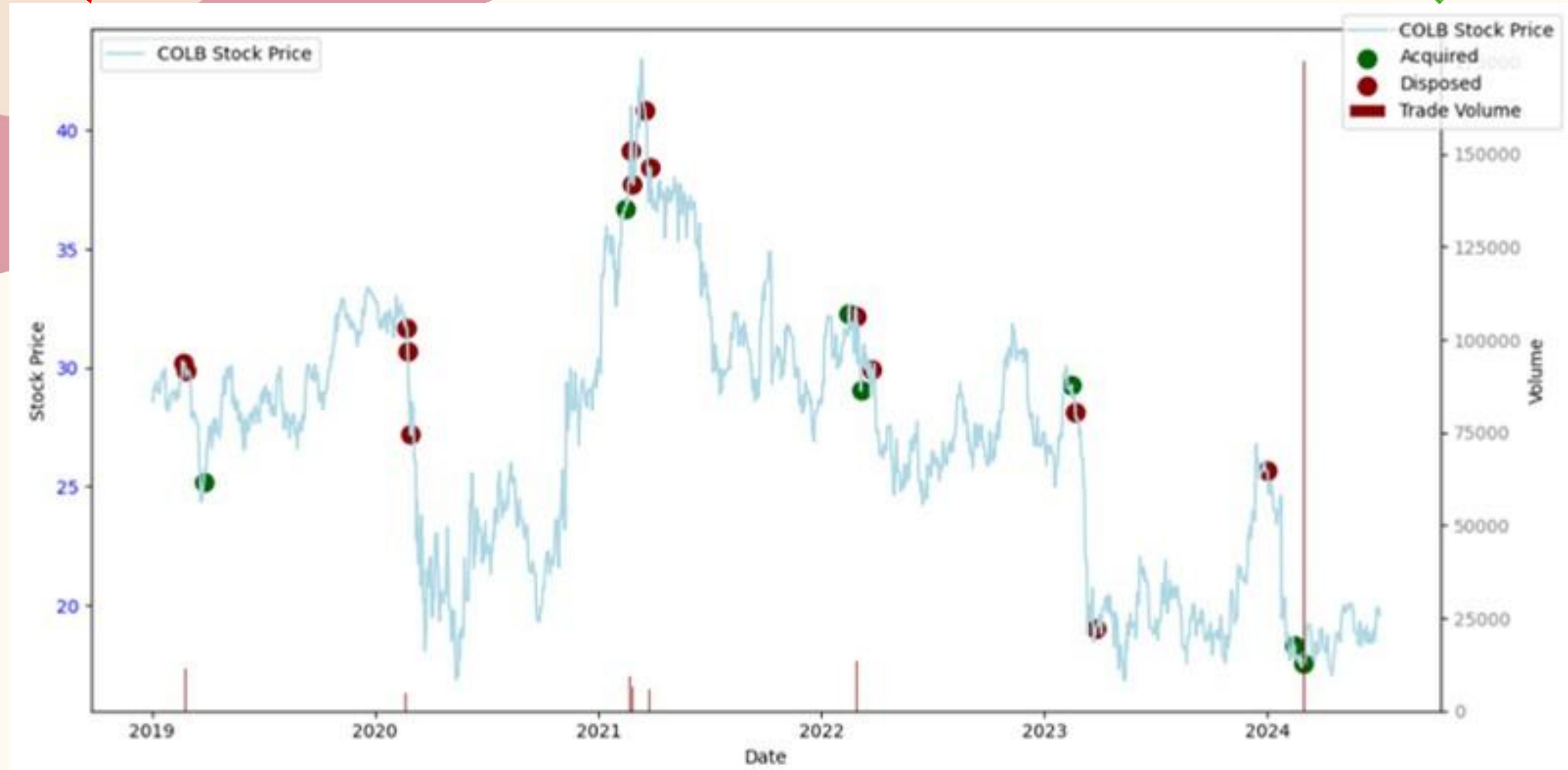


Simple copy-trading strategy



- ★ 1 Identifying top performers by average z-score on 1 month period from 01.01.2019. - 01.01.2023
- ★ Copy-trading them during year 2023.
- ★ Keeping it simple and assuming every trade is done with same amount of capital and closed exactly 1 month later.
- ★ Ran on both buys and sells.
- ★ We also tried identifying only top buyers and top sellers but this worked out better.

Example of one of the top performers



Performance of strategy





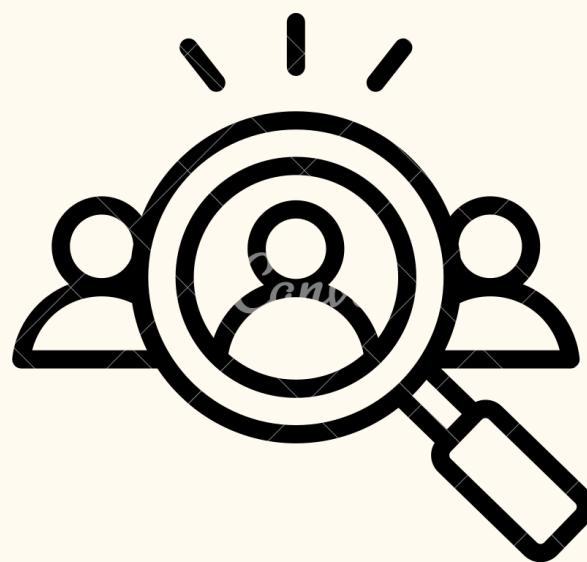
Analysis of chosen strategy

chosen



Got 'Top 100' insiders, calculated by mean_z score,during train period.

Chosen Strategy



Train Period: 2019.01 ~ 2022.12

Test Period: 2023.01~2023.12

Simply followed them during test period with \$100 per trade.

Calculated P&L and statistics of test period.

Number of Trades

Train Period: 2019.01 ~ 2022.12

Test Period: 2023.01~2023.12

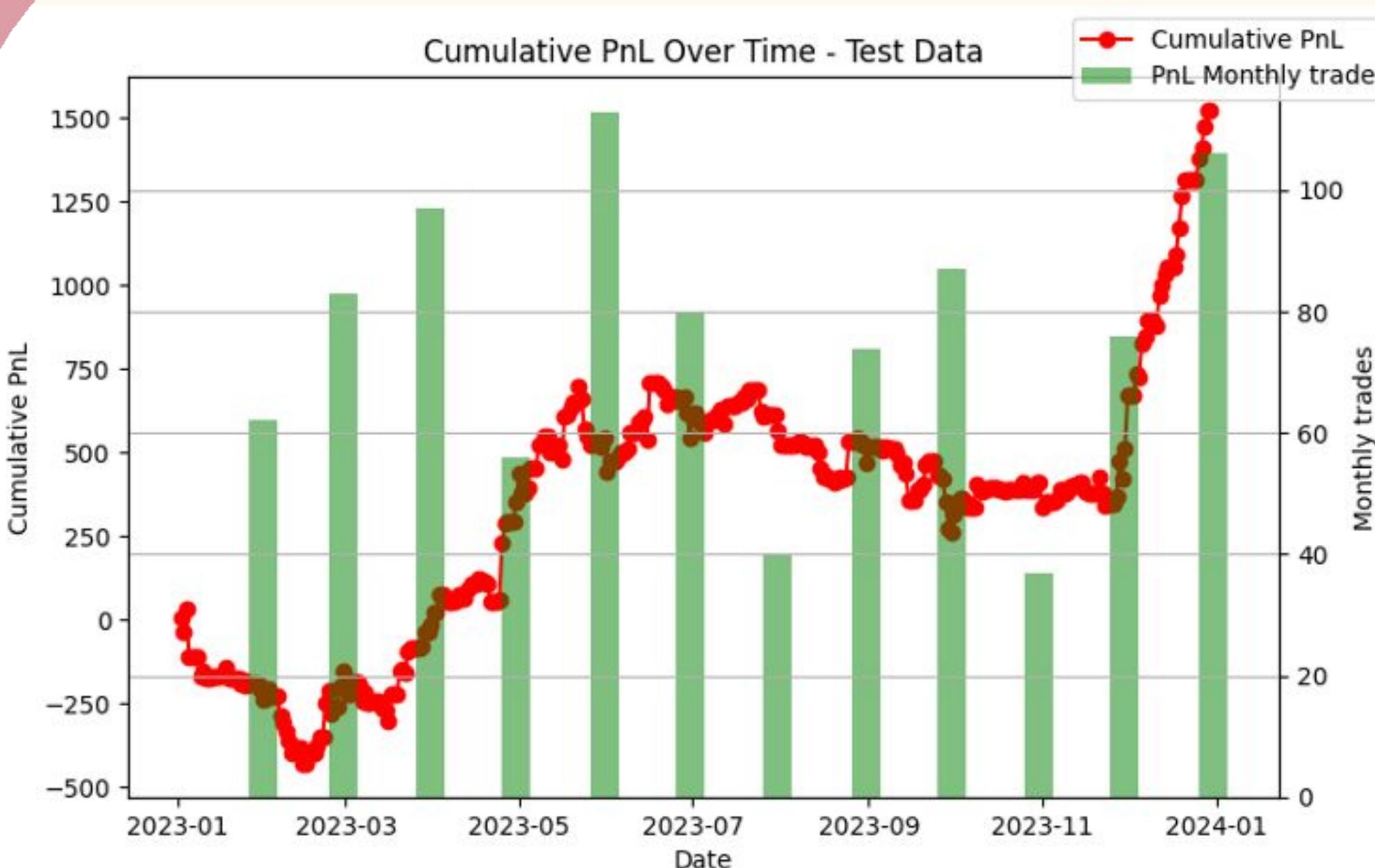


total insider trades happened: 91,575 trades
total trades followed by our strategy: 911

Total trades: 911
-buy trades: 528
-sell trades: 383



Cumulative PnL

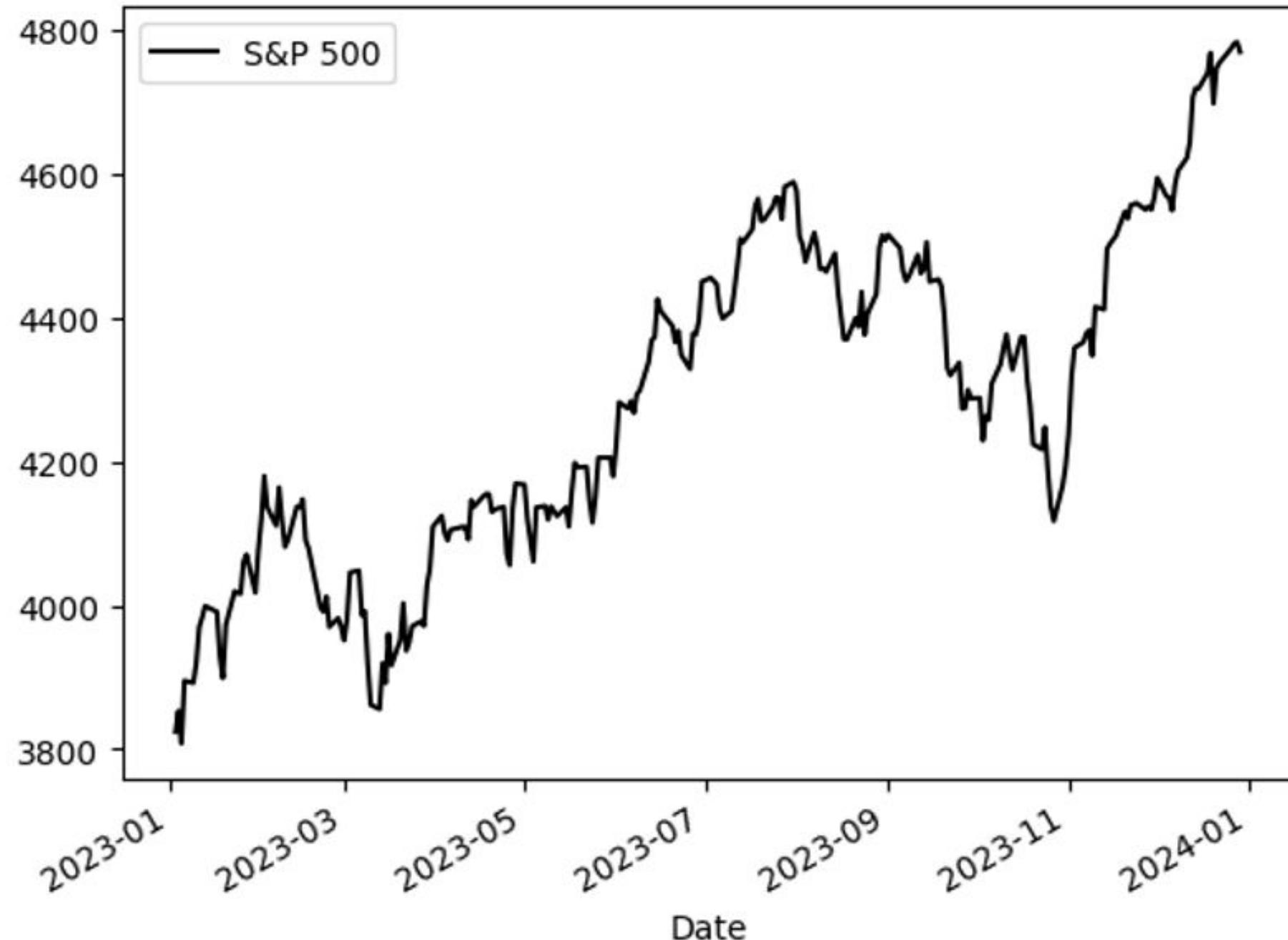


Avg annualized ROI per trade: 22.05%
Avg number of trades per month: 75.92

Best performer: Buller Benyamin with PnL: 462.68
Worst performer: AULT MILTON C III with PnL: -588.27



Cumulative PnL



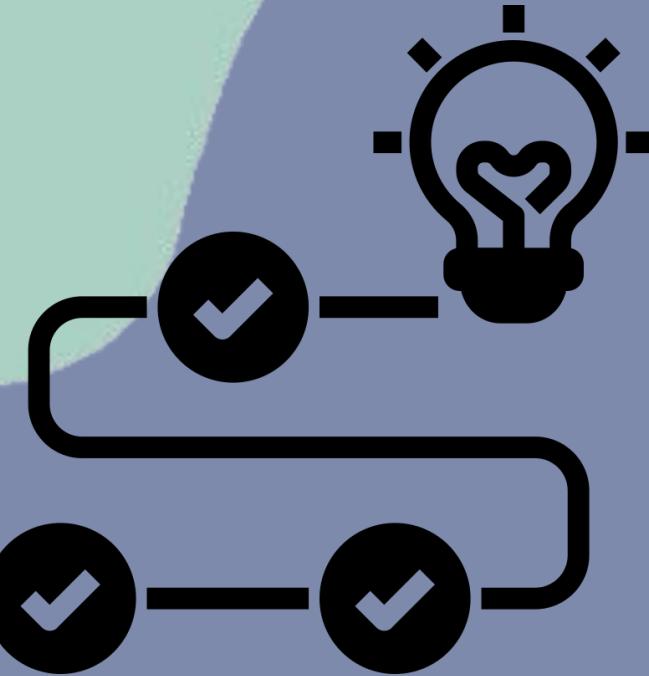
Benchmark - S&P 500

Initial investment: 10000
Size per trade: 100

Alpha: 0.00057
Beta: 0.02556
Mean daily return: 0.06%
Mean return per trade: 1.67%
Sharpe ratio: 0.08
Sortino ratio: 0.12
Maximum drawdown: -5%
Per trade volatility: 20.43%
Volatility: 0.0042%



Conclusion



sec-api provides rich and substantial datasets that give opportunities to investigate potential illegal insider trading and create trading strategies

Strategy did not show significant edge over benchmark, but achieved almost 0 Beta value which bring market neutrality and opportunities to hedge against systematic risk

Maximum drawdown of 5% of the initial investment through the year shows desirable level of risk management



Future works could include advanced machine learning algorithms used to detect unusually good trades.





Thank you!

Do you have any questions for us?"

