

Can Technical Indicator-based Stock Trading Strategies Perform Better than Top-performing Mutual Funds?



Dataset

- The dataset is collected from Yahoo Finance from 2013 to 2023(current date) for 10 stocks which are in the Mutual Fund TDB908.
- The stocks are : Microsoft(MSFT), Apple(AAPL), Tesla(TSLA), Nvidia(NVDA), Amazon(AMZN), Meta(META), Google(GOOG), Goog(GOGL), Broadcom Inc(AVGO), Pepsico Inc(PEP).

Technical Strategies

1. Relative Strength Index(RSI)
2. Bollinger Bands (BB)
3. Simple Moving Average (SMA)
4. Golden Crossover (GC)
5. Moving Average
Convergence/Divergence(MACD)



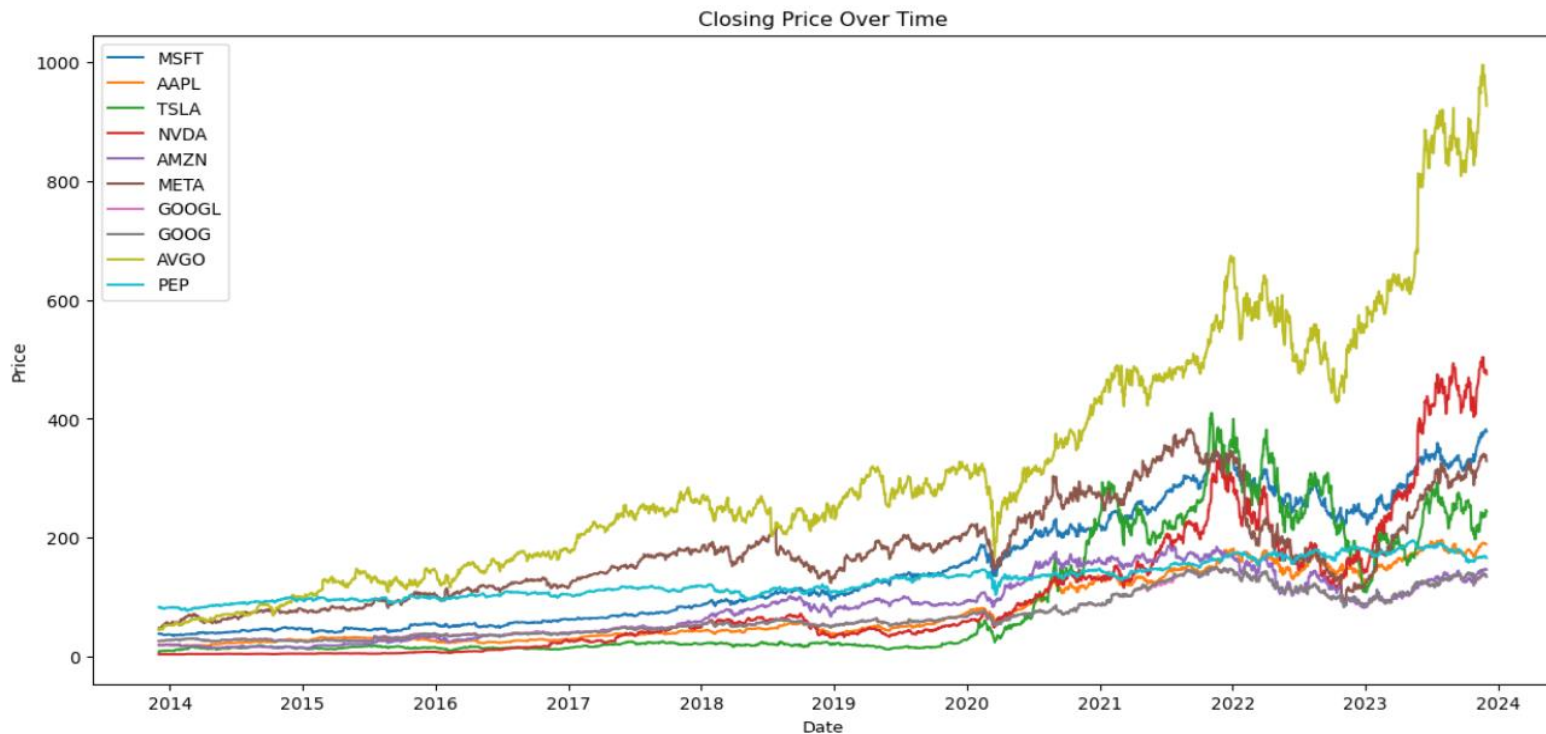
Data Cleaning and Preprocessing

- The data collected from Yahoo Finance for all the stocks contains columns like Open, High, Low, Close , Adj Close and Volume.
- We removed the columns which were unnecessary for our analysis like Volume and Adjusted Close Price.
- No null values were found in the dataset.
- We have saved the output in an excel file for further analysis.




Exploratory Data Analysis (EDA)

Closing Price of all stocks



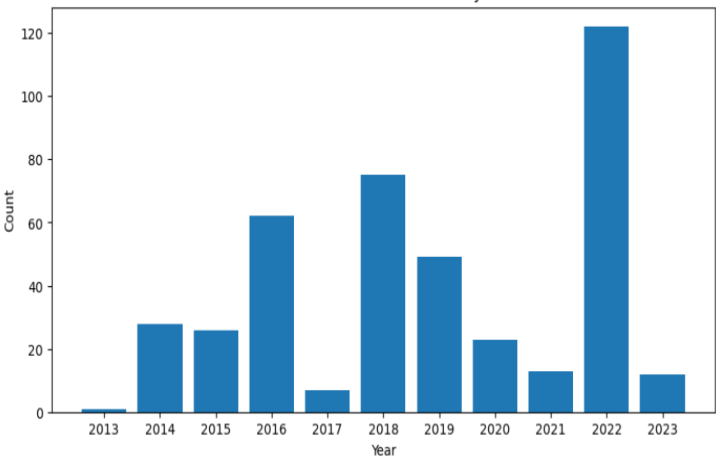
RSI -Sum of Returns Year Wise



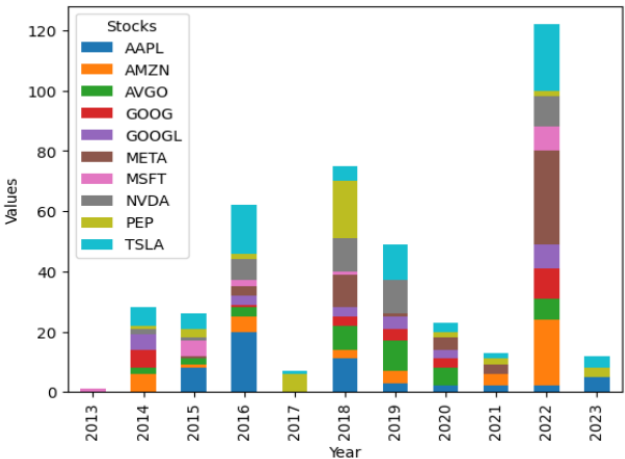
Ticker	AAPL	AMZN	AVGO	GOOG	GOOGL	META	MSFT	NVDA	PEP	TSLA	Grand Total
Year											
2014	0.14	0.70	0.93	0.58	0.46	NaN	NaN	0.39	0.07	0.71	3.98
2015	-0.25	0.29	0.65	NaN	NaN	0.24	1.15	0.18	0.24	0.83	3.33
2016	2.36	0.98	0.78	0.15	0.33	0.34	0.24	1.83	0.17	3.87	11.05
2017	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.46	0.15	0.61
2018	1.38	0.41	1.24	0.38	0.37	1.06	0.23	1.65	1.17	1.17	9.06
2019	1.04	0.30	2.08	0.80	0.76	0.24	NaN	2.29	NaN	3.52	11.03
2020	0.42	NaN	2.42	1.09	1.08	1.19	NaN	NaN	0.33	3.97	10.50
2021	0.26	-0.51	NaN	NaN	NaN	-0.84	NaN	NaN	0.20	0.82	-0.07
2022	0.29	3.54	0.86	-0.42	0.03	-3.93	1.12	-0.60	0.38	3.51	4.78
2023	0.38	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.25	2.14	2.77
Grand Total	6.02	5.71	8.96	2.58	3.03	-1.70	2.74	5.74	3.27	20.69	57.04

EDA Analysis of RSI

RSI Number of Trades Overall By Year



RSI Number of Trades Per Stock



The highest number of holding period is 477 days.

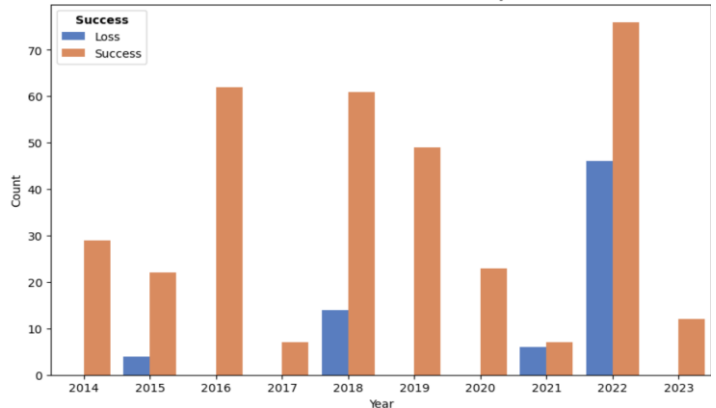
Successful Trades

Unsuccessful Trades

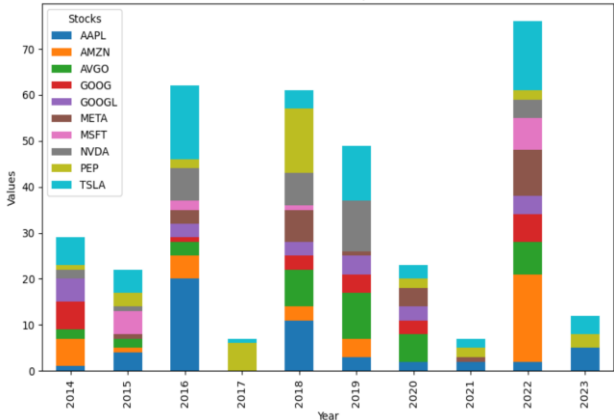
348

70

RSI Number of Successes and Losses by Year



RSI No of Successes per Stock



Success Rate (%)

Loss Rate(%)

83.25%

16.74%

Strategy 1 : RSI

Candlestick and RSI chart for TSLA

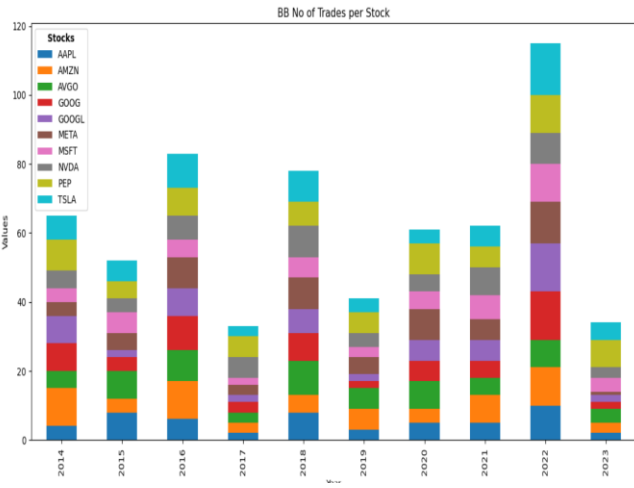
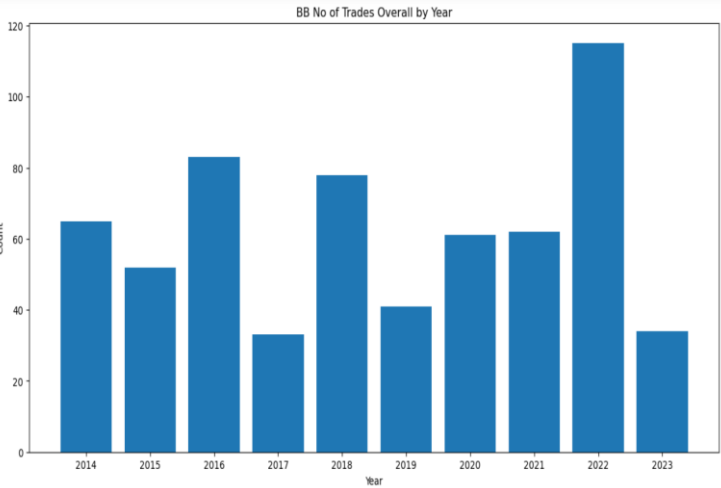


BB -Sum of Returns Year Wise



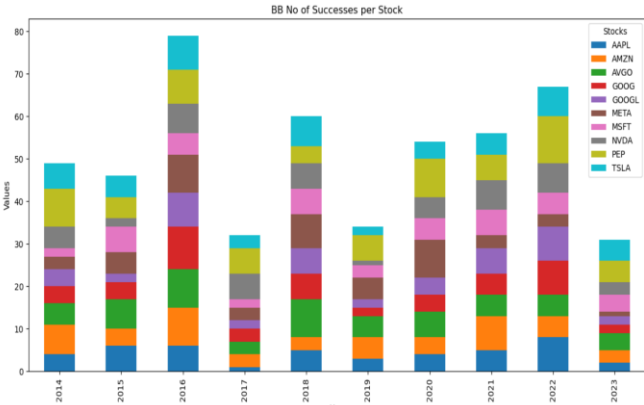
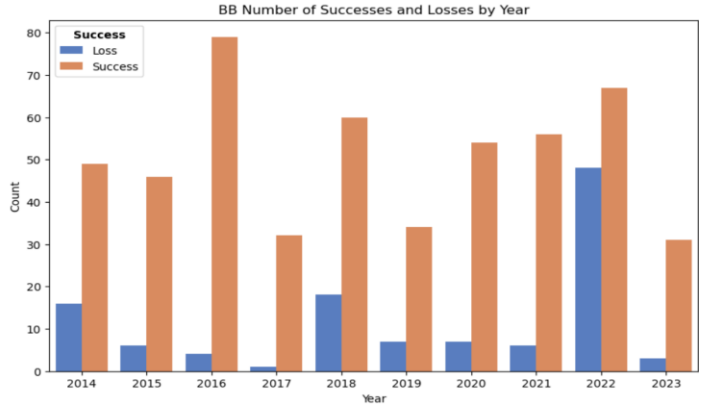
Ticker	AAPL	AMZN	AVGO	GOOG	GOOGL	META	MSFT	NVDA	PEP	TSLA	Grand Total
Year											
2014	0.20	0.37	0.52	-0.02	0.07	0.24	0.08	0.53	0.47	0.57	3.03
2015	0.20	0.51	0.53	0.30	0.22	0.34	0.27	0.15	0.16	0.34	3.02
2016	0.22	0.49	0.67	0.60	0.50	0.76	0.27	0.70	0.31	1.45	5.97
2017	0.01	0.26	0.25	0.11	0.09	0.22	0.11	0.99	0.18	0.17	2.39
2018	-0.05	0.29	0.91	0.49	0.42	0.97	0.48	-0.02	0.05	0.43	3.97
2019	0.44	0.45	0.30	0.19	0.29	0.58	0.24	0.01	0.43	-0.06	2.87
2020	0.69	0.61	1.92	0.32	0.33	1.37	1.22	1.25	1.11	1.58	10.40
2021	0.17	0.49	0.46	0.26	0.41	-1.16	0.34	0.86	0.30	0.77	2.90
2022	0.61	-0.39	0.22	0.01	-0.09	-1.59	0.43	0.96	0.72	-0.79	0.09
2023	0.16	0.28	0.33	0.20	0.20	0.17	0.42	0.49	-0.04	0.69	2.90
Grand Total	2.65	3.36	6.11	2.46	2.44	1.90	3.86	5.92	3.69	5.15	37.54

EDA Analysis of Bollinger Bands



The highest number of holding period is 302 days.

Successful Trades	Unsuccessful Trades
508	116

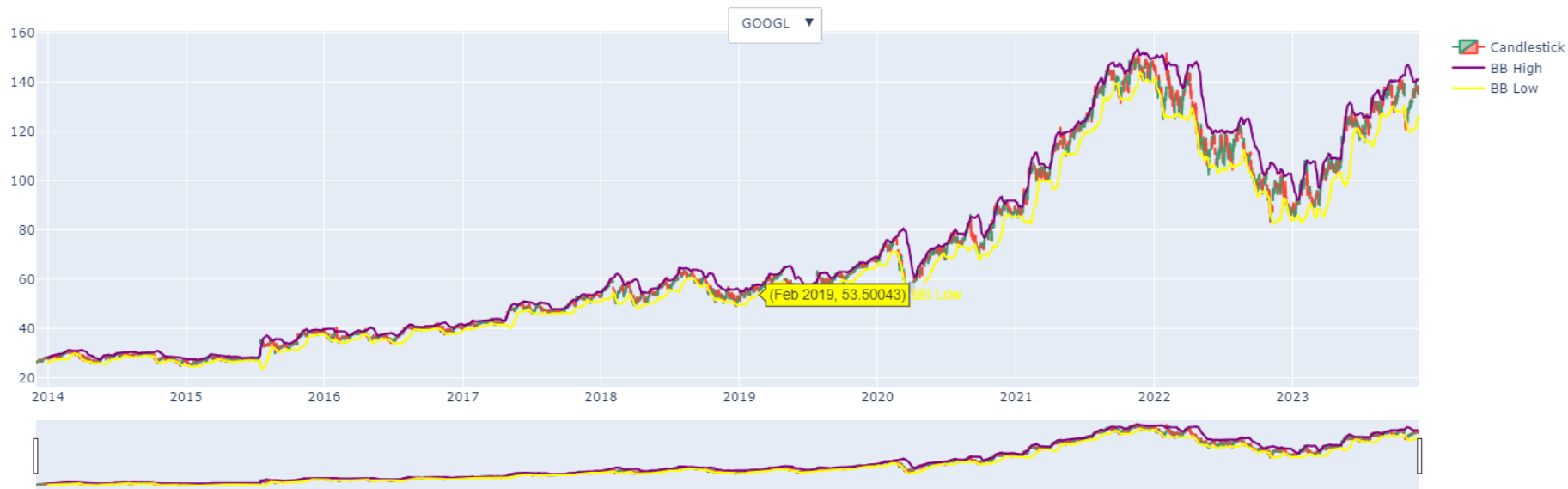


Success Rate (%)	Loss Rate(%)
81.41%	18.54%

Strategy 2- Bollinger Bands



Candlestick and Bollinger Bands chart for GOOGL

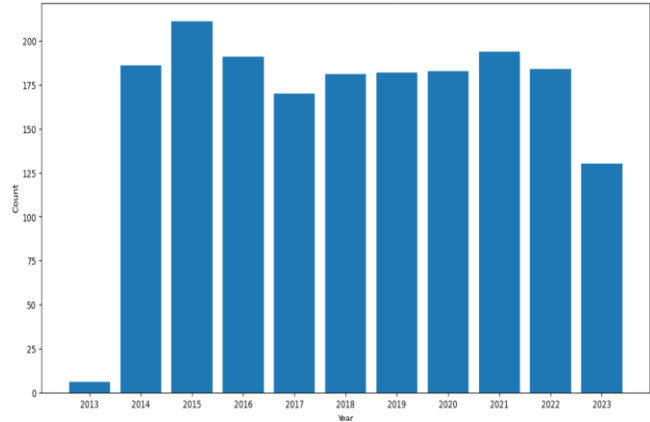


SMA-Sum of Returns Year Wise

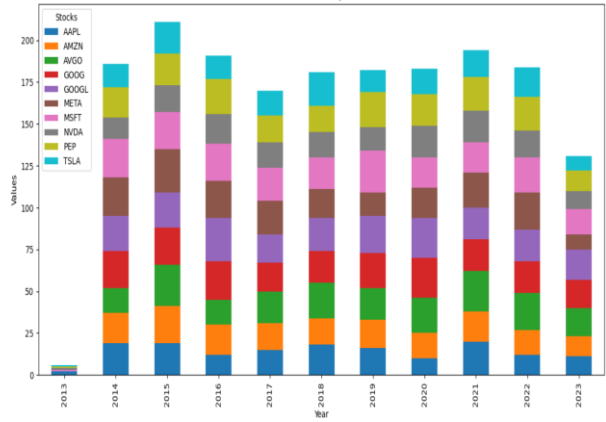
Ticker	AAPL	AMZN	AVGO	GOOG	GOOGL	META	MSFT	NVDA	PEP	TSLA	Grand Total
Year											
2013	-0.041	NaN	NaN	NaN	NaN	NaN	-0.014	NaN	0.006	-0.029	-0.078
2014	0.042	-0.341	0.562	-0.159	-0.150	-0.044	0.086	0.162	0.042	0.173	0.373
2015	-0.117	0.513	-0.032	0.147	0.097	-0.012	0.075	0.210	-0.006	-0.209	0.666
2016	0.226	0.082	0.259	-0.046	-0.109	-0.156	-0.087	0.561	-0.028	0.685	1.387
2017	0.270	0.187	0.193	0.107	0.121	0.193	0.119	0.431	0.070	0.090	1.781
2018	-0.082	0.144	-0.094	-0.135	-0.079	-0.347	0.036	-0.057	0.041	-0.250	-0.823
2019	0.559	0.237	0.088	-0.063	-0.054	0.432	0.128	0.580	0.033	1.520	3.460
2020	0.681	0.421	0.273	0.020	-0.001	0.046	0.117	0.486	0.015	1.917	3.975
2021	0.198	0.034	0.056	0.219	0.215	-0.011	0.230	0.813	0.045	0.164	1.963
2022	0.006	-0.132	-0.262	-0.405	-0.396	-0.324	-0.344	0.042	-0.046	-0.182	-2.043
2023	0.217	0.290	0.371	0.263	0.250	0.488	0.337	1.024	0.038	0.930	4.208
Grand Total	1.959	1.435	1.414	-0.052	-0.106	0.265	0.683	4.252	0.210	4.809	14.869

EDA Analysis of SMA

SMA No of Trades Overall by Year



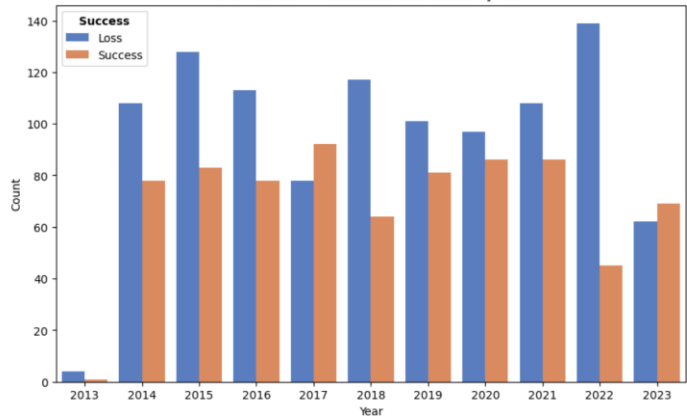
SMA No of Trades per Stock



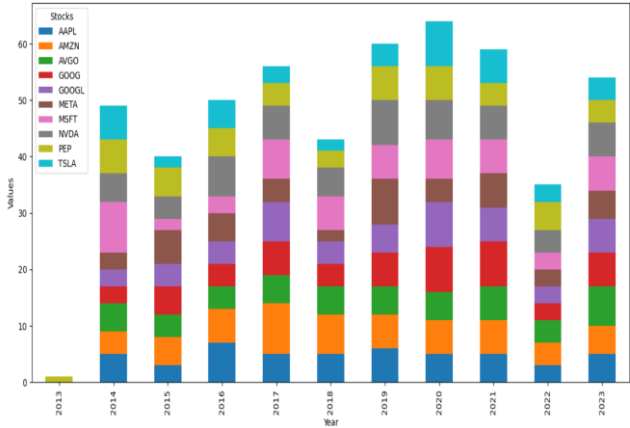
The highest number of holding period is 108 days.

Successful Trades	Unsuccessful Trades
763	1055

SMA Number of Successes and Losses by Year



SMA No of Successes per Stock



Success Rate(%)	Loss Rate(%)
41.56%	58.03%

Strategy 3- Simple Moving Average



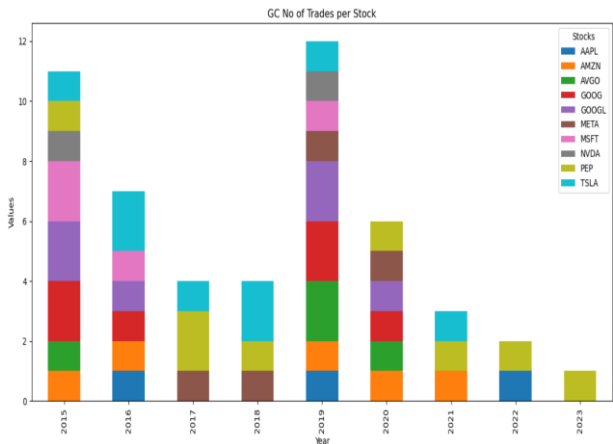
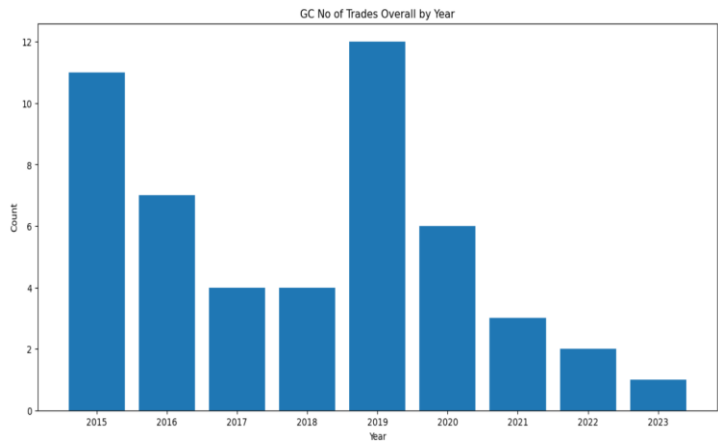
Candlestick and SMA chart for MSFT



GC-Sum of Returns Year Wise

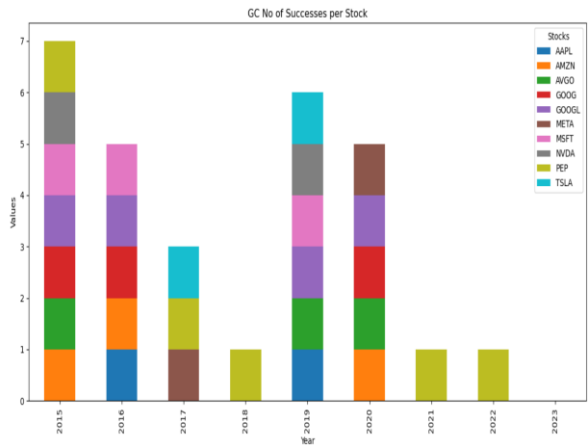
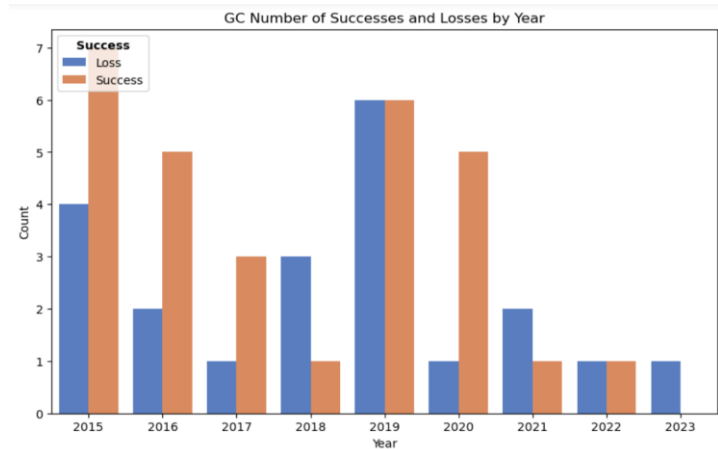
Ticker	AAPL	AMZN	AVGO	GOOG	GOOGL	META	MSFT	NVDA	PEP	TSLA	Grand Total
Year											
2015	NaN	0.53	0.75	0.01	0.21	NaN	0.03	7.69	0.05	-0.16	9.11
2016	0.46	1.64	NaN	0.36	0.34	NaN	0.79	NaN	NaN	-0.16	3.43
2017	NaN	NaN	NaN	NaN	NaN	0.26	NaN	NaN	-0.04	0.35	0.57
2018	NaN	NaN	NaN	NaN	NaN	-0.14	NaN	NaN	0.03	-0.31	-0.42
2019	1.87	-0.10	-0.33	-0.05	0.02	-0.10	1.53	4.01	NaN	9.35	16.20
2020	NaN	0.65	0.58	0.83	0.84	0.43	NaN	NaN	-0.02	NaN	3.31
2021	NaN	-0.19	NaN	NaN	NaN	NaN	NaN	NaN	0.16	-0.03	-0.06
2022	-0.08	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.01	NaN	-0.07
2023	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	-0.07	NaN	-0.07
Grand Total	2.25	2.53	1.00	1.15	1.41	0.45	2.35	11.70	0.12	9.04	32.00

EDA Analysis of GC



The highest number of holding period is 1155 days.

Successful Trades	Unsuccessful Trades
29	21



Success Rate (%)	Loss Rate(%)
58%	42%

Strategy 4-Golden Crossover

Candlestick Golden Cross Chart for MSFT



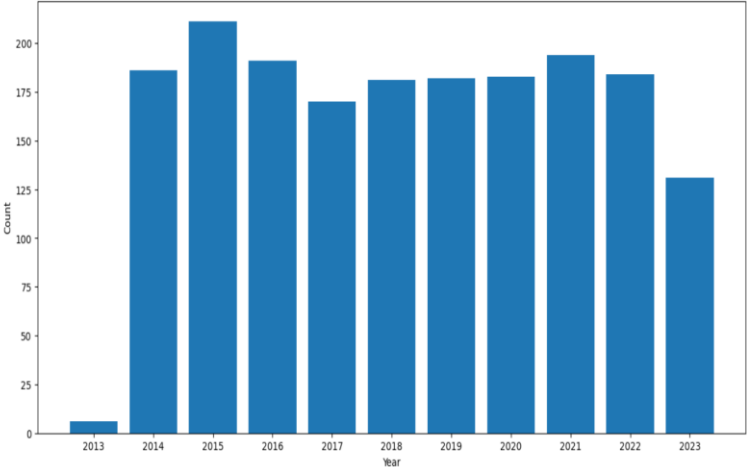
MACD - Sum of Returns Year Wise



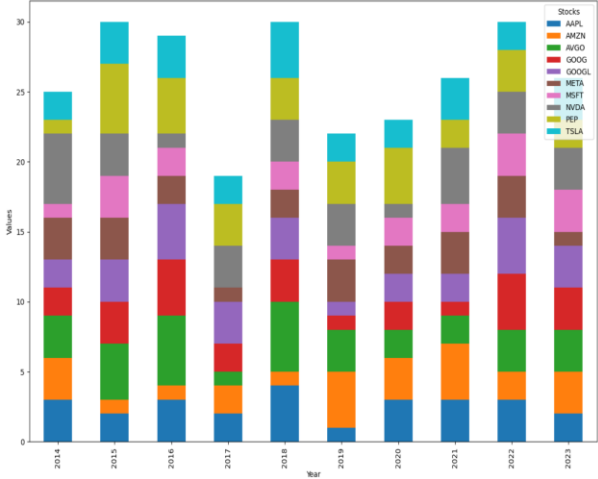
Ticker	AAPL	AMZN	AVGO	GOOG	GOOGL	META	MSFT	NVDA	PEP	TSLA	Grand Total
Year											
2014	0.218	0.090	0.574	0.014	0.043	0.057	0.056	0.312	0.062	0.181	1.607
2015	0.188	0.220	0.259	0.331	0.131	0.056	0.403	0.179	0.060	0.217	2.044
2016	0.256	0.037	0.369	0.190	0.221	0.006	0.171	0.168	0.009	0.757	2.184
2017	0.175	0.039	0.090	0.025	0.127	0.113	NaN	0.645	0.098	-0.008	1.304
2018	0.189	0.055	0.230	0.024	0.021	0.077	-0.003	0.004	0.170	0.296	1.063
2019	0.098	0.142	0.106	0.040	0.073	0.359	0.007	0.233	0.123	0.153	1.334
2020	0.244	0.199	0.060	0.354	0.390	0.428	0.194	0.151	0.165	0.948	3.133
2021	0.261	0.154	-0.011	0.067	-0.039	0.098	0.245	0.896	0.108	0.074	1.853
2022	0.216	0.303	0.246	-0.014	-0.036	0.011	0.076	0.367	0.158	0.352	1.679
2023	0.211	0.284	0.343	0.183	0.184	-0.002	0.218	0.349	0.046	1.120	2.936
Grand Total	2.056	1.523	2.266	1.214	1.115	1.203	1.367	3.304	0.999	4.090	19.137

EDA Analysis of MACD

MACD No of Trades Overall by Year



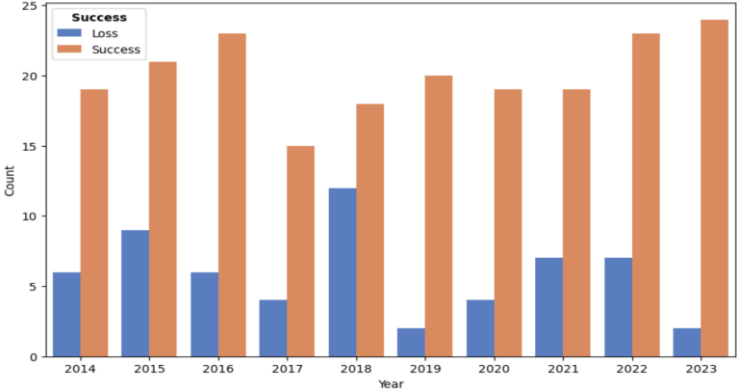
MACD No of Trades per Stock



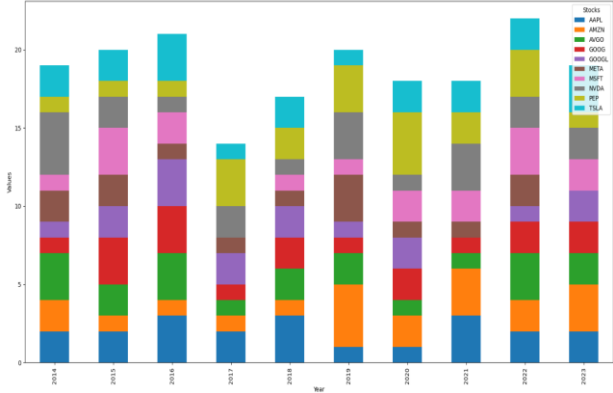
The highest number of holding period is 77 days.

Successful Trades	Unsuccessful Trades
201	59

MACD Number of Successes and Losses by Year



MACD No of Successes per Stock



Success Rate (%)	Loss Rate(%)
77.30%	22.69%

Strategy 5 - MACD

Candlestick and MACD chart for META

META ▼

- Candlestick
- MACD
- MACD Signal
- MACD Histogram



Average and Actual Returns For All Strategies

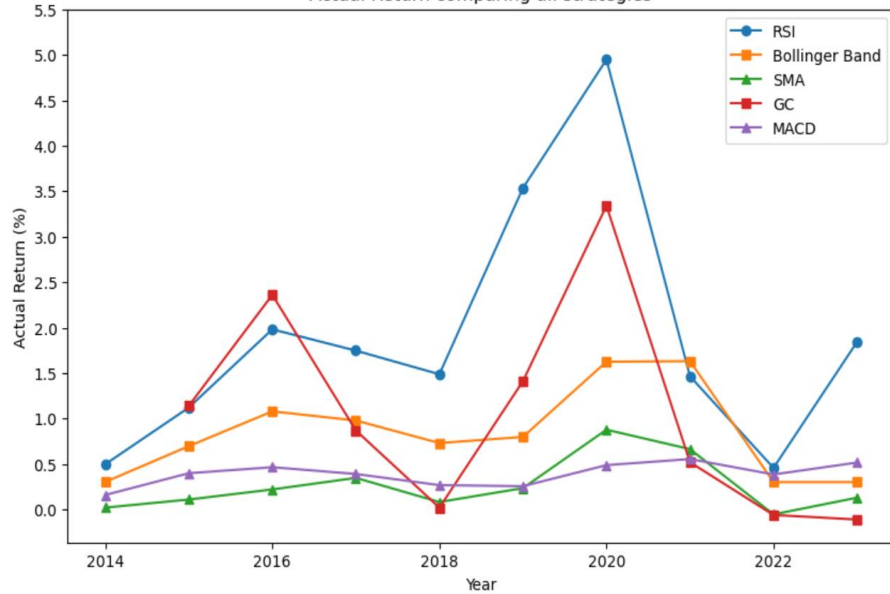


Year	Average Return_RSI	ActualReturn_RSI	Average Return_BB	ActualReturn_BB	Average Return_SMA	ActualReturn_SMA	Average Return_GC	ActualReturn_GC	Average Return_MACD	ActualReturn_MACD
2014	0.50	0.50	0.30	0.30	0.04	0.02	NaN	NaN	0.16	0.16
2015	0.42	1.13	0.30	0.69	0.07	0.11	1.14	1.14	0.21	0.40
2016	1.10	1.98	0.60	1.08	0.14	0.22	0.57	2.36	0.22	0.48
2017	0.30	1.73	0.24	0.98	0.18	0.35	0.19	0.87	0.14	0.39
2018	0.91	1.48	0.40	0.74	-0.08	0.09	-0.14	0.02	0.11	0.27
2019	1.38	3.55	0.29	0.81	0.35	0.24	1.80	1.41	0.13	0.25
2020	1.50	4.95	1.04	1.63	0.40	0.89	0.55	3.34	0.31	0.48
2021	-0.01	1.48	0.29	1.63	0.20	0.68	-0.02	0.52	0.19	0.56
2022	0.48	0.47	0.01	0.30	-0.20	-0.04	-0.04	-0.06	0.17	0.39
2023	0.92	1.84	0.29	0.30	0.42	0.14	-0.07	-0.11	0.30	0.52

Actual Return vs TD Mutual Fund -TDB908



Actual Return comparing all strategies



Key Insights



- The highest Success Rate for trades was for RSI Strategy for 10 years which was 83%.
- The highest Loss Rate for Trades was for SMA strategy for 10 years which was 58%.
- The highest holding period for Golden Crossover was of 1155 days with very low success rate.
- Actual return for all 10 years was highest for RSI Strategy which was around 19% and the lowest was SMA with 2.7%