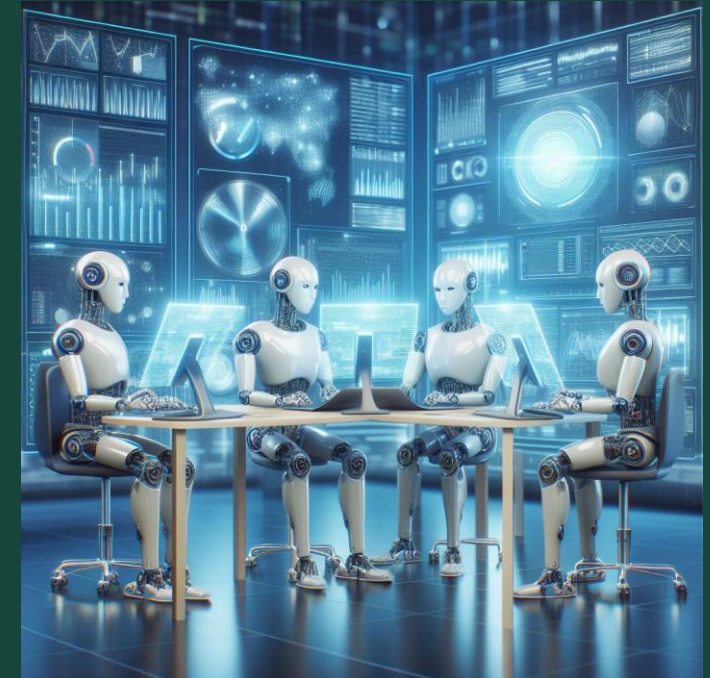


AI Boot Camp **Project 1**

Correlating Google Trends & Stock Data



Prophet Mob:
Jasmine Harper, Jordan Yuhasz, Sean Kavanagh, Vineet Duggi



Project Overview

Project Purpose / Description



- This project aims to explore the potential correlation between Google search trends and the stock performance of selected companies.
- By analyzing the search behavior of users on Google, we seek to identify patterns and trends that may influence stock prices.
- This project involves data collection, analysis, and the application of machine learning models.
- When is the best time to invest in certain companies?
- Can we make accurate predictions on when to invest and when to sell.
- Insights that may be valuable for investors, analysts, or researchers in understanding the impact of online search behavior on stock markets.

Project Overview

Goals/Questions to be addressed



- Is there a correlation between Google Trends data and stock data for related companies?
- If there is a correlation, can we find a trading algorithm that outperforms the S&P 500?
- Is there a certain time of year that is better to advertise certain products?

Project Overview



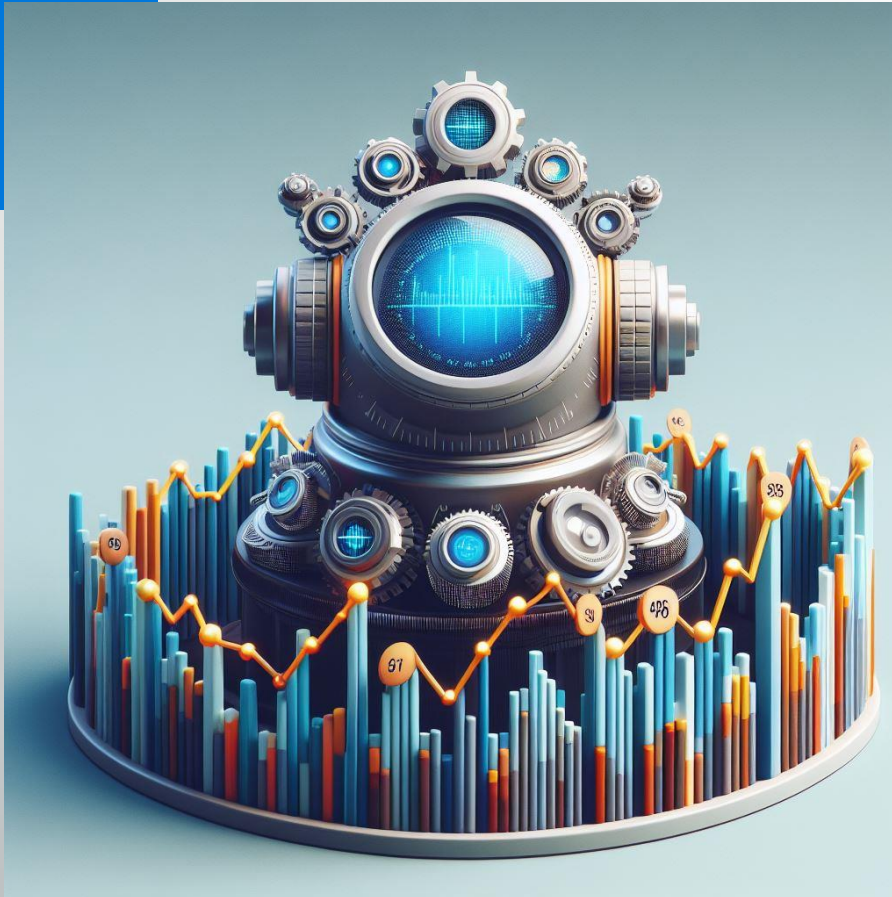
Overview of data collection, cleanup and exploration process

- We used data from Google Trends (using CSV files) and the Yahoo Finance API (using an import of yfinance) to develop a mathematical correlation between the two.
- For each month in a 10-year period (2014 to 2023), we retrieved the average Google Trends search term popularity (on a scale of 0 to 100) and the stock price for related companies.
- We used a wide variety of search terms that customers may Google search when they are looking to buy certain products or services.
- We looked at the average Google Trends value and average stock value for each month as a whole in the 10-year period.

Project Overview

Approach taken to achieve goals

- First, we verbalized approaches and ideas
- Once we landed on an idea, we mob programmed a proof of concept
- Then with the tool that we built together, we individually researched a series of related Google search terms and related stock data
- We queried and collected a variety of google search data.
- Then we spent time testing the data against relative stock price history in various compilations to find optimal correlation.

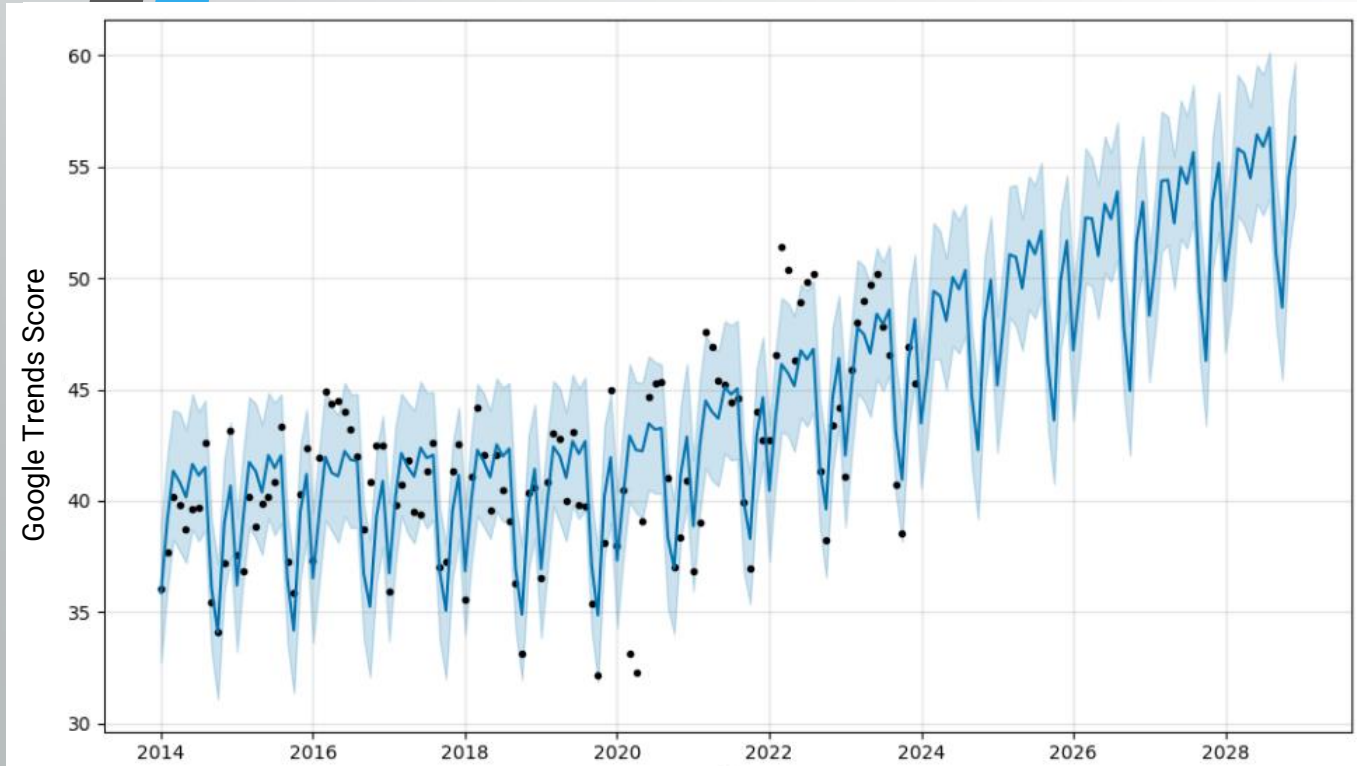


Vineet's Conclusion

Company: Acushnet Holdings, Stock Ticker: GOLF

- Seasonal Trends
- Product-Specific Strategy
- Utilize Data Tools
- Smart Product Choice
- Top-Search Product Picks
- Strategic Advertising Period

Last 10 Years & Next 5 Years Projection Trend



GOLF Stock Open, Close, & Google Trends Correlation

	Month	Close	Open	Average of Search Terms	Month2
44	2020-07	36.084938	33.164004	50.124647	7
45	2020-08	33.467480	36.274612	50.372364	8
53	2021-04	40.620045	39.736790	51.493945	4
54	2021-05	51.075073	40.850457	53.266843	5
55	2021-06	47.426861	51.305492	56.827451	6
56	2021-07	49.334312	47.793519	55.209277	7
57	2021-08	48.111305	49.729140	54.071815	8
67	2022-06	40.563835	39.756060	54.731632	6
68	2022-07	47.634010	40.664371	57.141127	7
69	2022-08	46.578304	47.243011	58.232105	8
77	2023-04	49.574585	50.385499	57.653361	4
78	2023-05	44.264076	49.614136	55.709404	5
79	2023-06	54.074173	44.620092	62.898088	6
80	2023-07	59.227356	54.360441	66.362599	7
81	2023-08	58.154648	58.830057	65.786568	8

Vineet's Conclusion

- High correlation discovery
 - Noted a strong correlation between stock and Google Trends data during code execution.
- Strategic trade research
 - Investigated trades focusing on months with elevated correlations.
 - Discovered a recurring pattern: entering trades in April and exiting in August.

GOLF Stock Share Value in USD



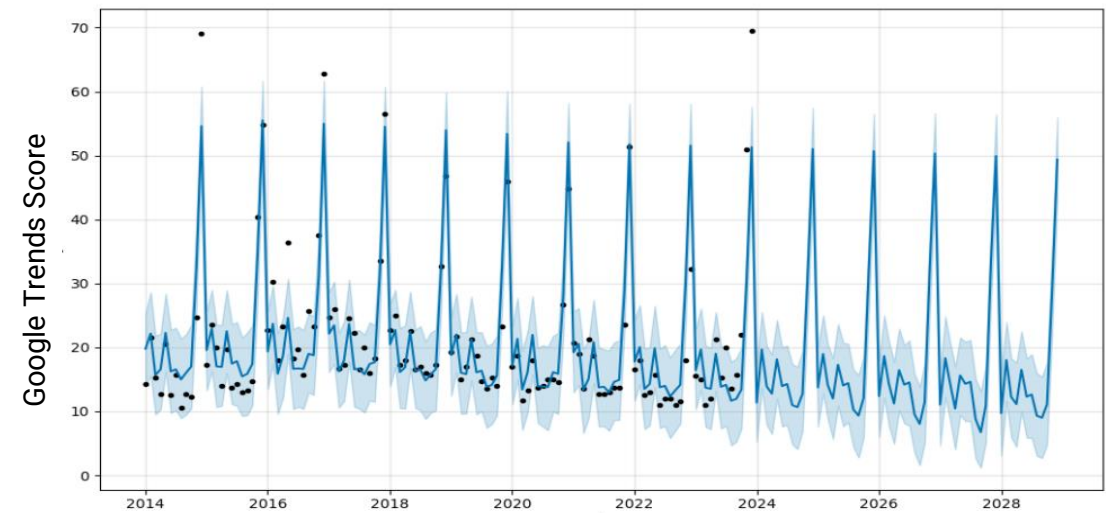
Trading Algorithm

GOLF Stock Share Value USD



Jasmine's Conclusion

Pandora



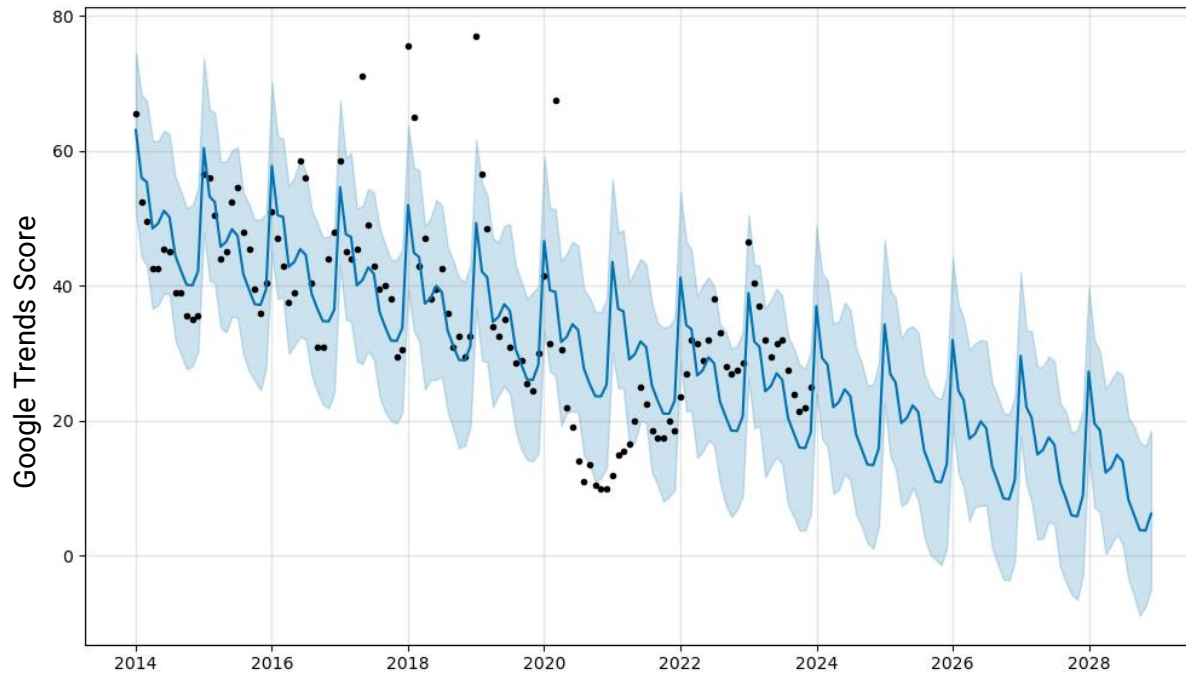
- Is there a certain time of year that is better to advertise certain products? The best time to run advertisements for Pandora products or products that are similar, are during the month before Mothers day and before Christmas. As well as around Black Friday.

ds	trend	yhat_lower	yhat_upper	trend_lower	trend_upper	additive_terms	additive_terms_lower	additive_terms_upper	yearly	yearly_lower	yearly_upper	multiplicative_terms	multiplicative_terms_lower	multiplicative_terms_upper	yhat
0	2014-01-01	21.365412	13.938814	25.441121	21.365412	-1.575981	-1.575981	-1.575981	-1.575981	-1.575981	-1.575981	0.0	0.0	0.0	19.789431
1	2014-02-01	21.426696	15.587870	28.627240	21.426696	0.746751	0.746751	0.746751	0.746751	0.746751	0.746751	0.0	0.0	0.0	22.173446
2	2014-03-01	21.482049	9.502695	21.853519	21.482049	-5.792291	-5.792291	-5.792291	-5.792291	-5.792291	-5.792291	0.0	0.0	0.0	15.689758
3	2014-04-01	21.543333	10.309994	22.116062	21.543333	-4.973699	-4.973699	-4.973699	-4.973699	-4.973699	-4.973699	0.0	0.0	0.0	16.569634
4	2014-05-01	21.602640	16.203123	28.402132	21.602640	0.669820	0.669820	0.669820	0.669820	0.669820	0.669820	0.0	0.0	0.0	22.272461
...
175	2028-07-31	16.643086	3.018185	15.940308	15.576385	-7.308823	-7.308823	-7.308823	-7.308823	-7.308823	-7.308823	0.0	0.0	0.0	9.334263
176	2028-08-31	16.608146	2.695757	15.401788	15.509092	-7.602988	-7.602988	-7.602988	-7.602988	-7.602988	-7.602988	0.0	0.0	0.0	9.005159
177	2028-09-30	16.574334	4.828057	17.644004	15.450534	-5.490479	-5.490479	-5.490479	-5.490479	-5.490479	-5.490479	0.0	0.0	0.0	11.083855
178	2028-10-31	16.539394	22.942042	35.955718	15.386306	12.968305	12.968305	12.968305	12.968305	12.968305	12.968305	0.0	0.0	0.0	29.507699
179	2028-11-30	16.505582	43.039219	55.945406	15.314143	32.866686	32.866686	32.866686	32.866686	32.866686	32.866686	0.0	0.0	0.0	49.372268

Sean's Conclusion

Carnival Cruise Lines

Last 10 Years & Next 5 Years Projection Trend



- Booking a cruise is a lot more popular during the first 3 months of the year
- Running ads for Carnival during this time would be most effective
- The least popular time to book is in the fall

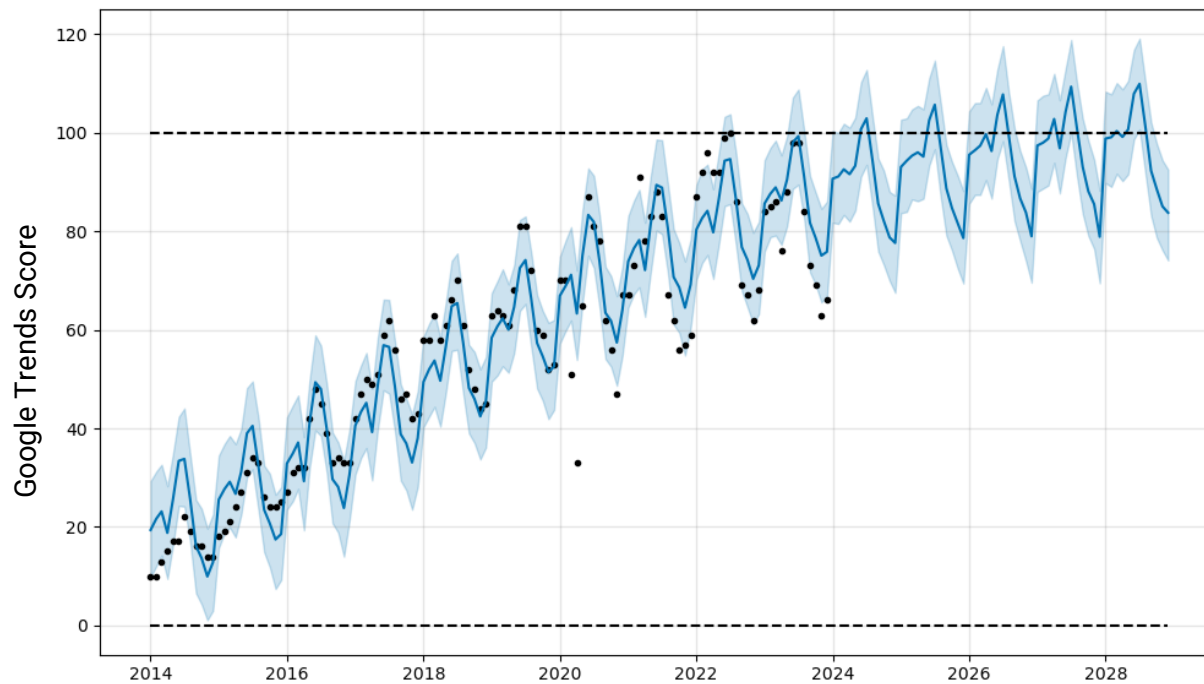
Google Trends Score Average By Month

51	49	45	36	36	37	37	35	32	29	31	36
January	February	March	April	May	June	July	August	September	October	November	December

Sean's Conclusion

Airbnb

Last 10 Years & Next 5 Years Projection Trend



- Results show that searches for Airbnb are most common in May through August, with a heightened focus on June and July
- Running ads for Airbnb are most optimal during these times
- Airbnb is searched for less frequently during the last few months of the year

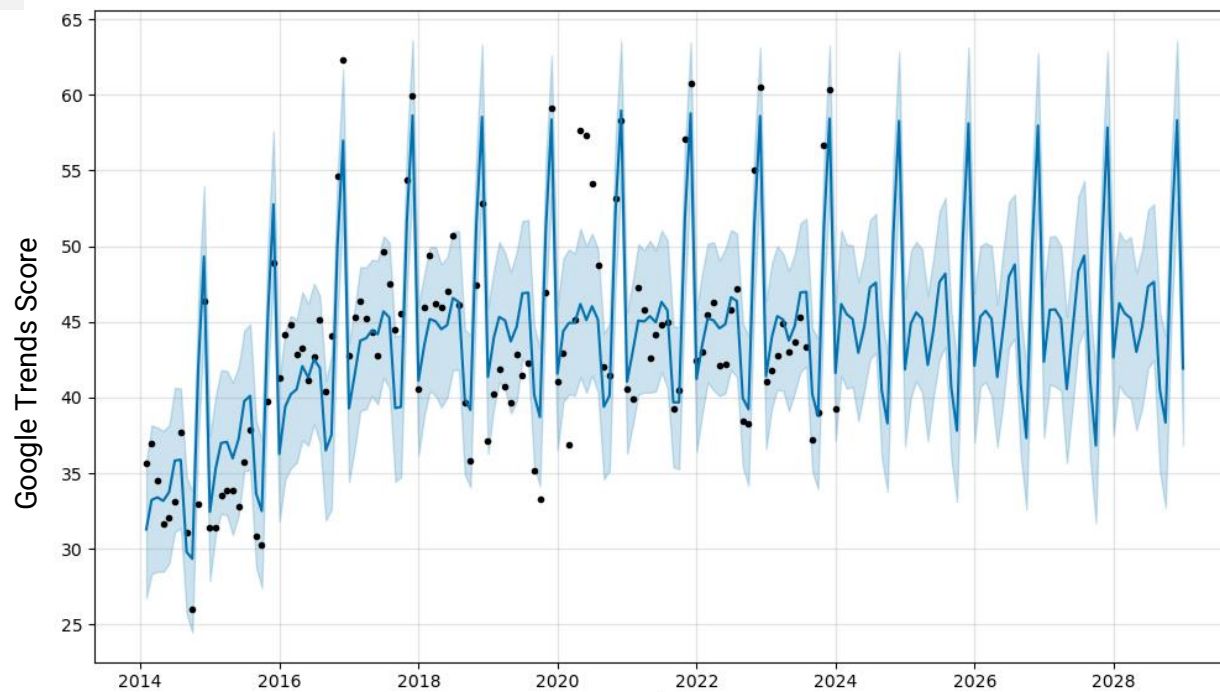
Google Trends Score Average By Month

53	55	57	52	59	67	68	60	50	48	44	47
January	February	March	April	May	June	July	August	September	October	November	December

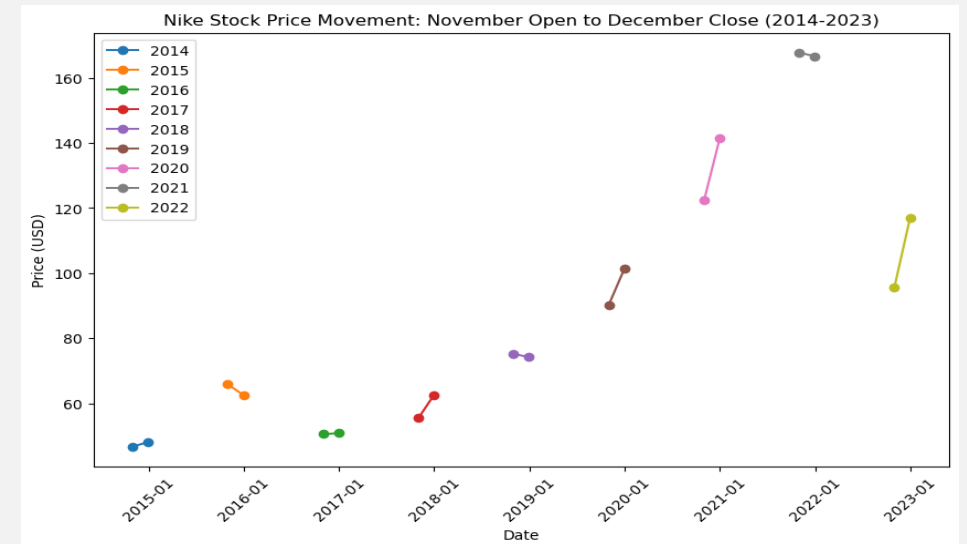
Jordan's Conclusion

- Using Google search data, we were able to locate a correlation in the trends between the compiled data and the stock price history.

Google search trends show a consistent increase in interest Nike products every November and December, forecasted to continue.



	Average Search Term % Change	Average of Stocks % chng
Average Search Term % Change	1.000000	0.652168
Average of Stocks % chng	0.652168	1.000000



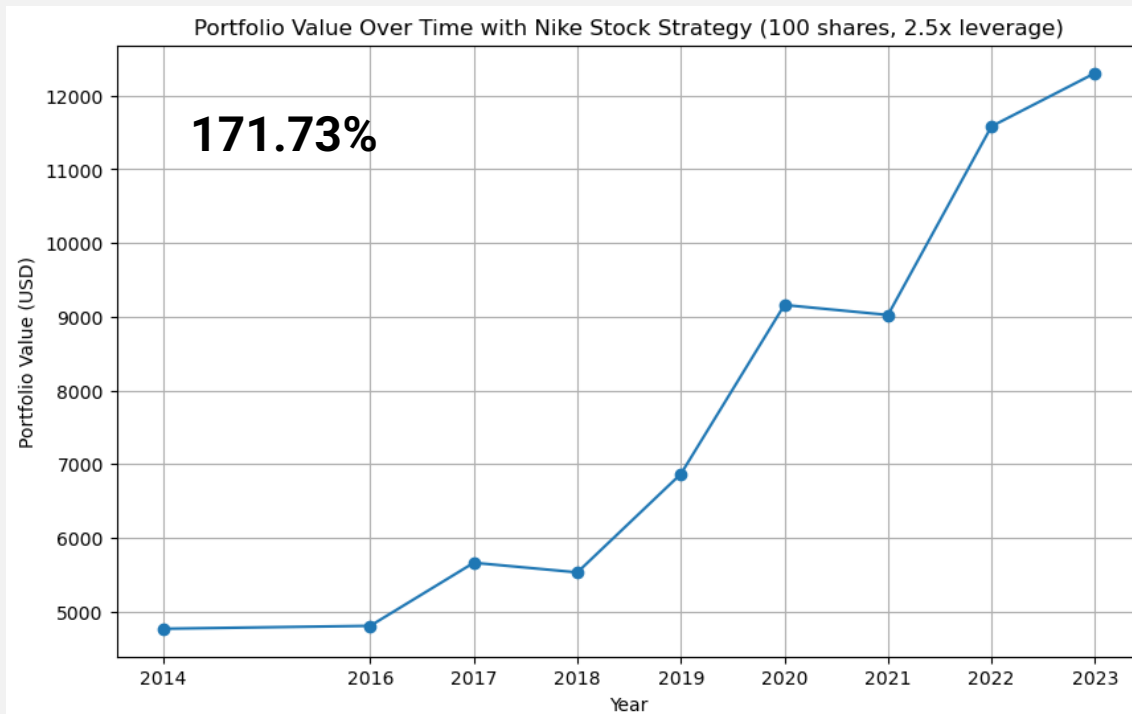
Jordan's Conclusion

- The analysis revealed that a Google Trends score of 49 serves as a benchmark for a significant correlation. To decide on trading this year, we'll employ a Time Series model to predict if November and December values are ≥ 49 .

Model Forecast:

0	2014-11-01	40.499110
1	2014-12-01	41.403100
0	2015-11-01	59.186715
1	2015-12-01	60.985306
0	2016-11-01	46.579774
1	2016-12-01	45.536434
0	2017-11-01	51.190003
1	2017-12-01	51.154060
0	2018-11-01	79.663108
1	2018-12-01	81.416071
0	2019-11-01	86.159182
1	2019-12-01	86.987922
0	2020-11-01	118.437505
1	2020-12-01	122.236260
0	2021-11-01	165.005250
1	2021-12-01	168.949990
0	2022-11-01	79.598167
1	2022-12-01	73.486255

Trading on these signals



S&P 500



This trading algorithm outperformed
the S&P 500

171.73% VS 138.95%

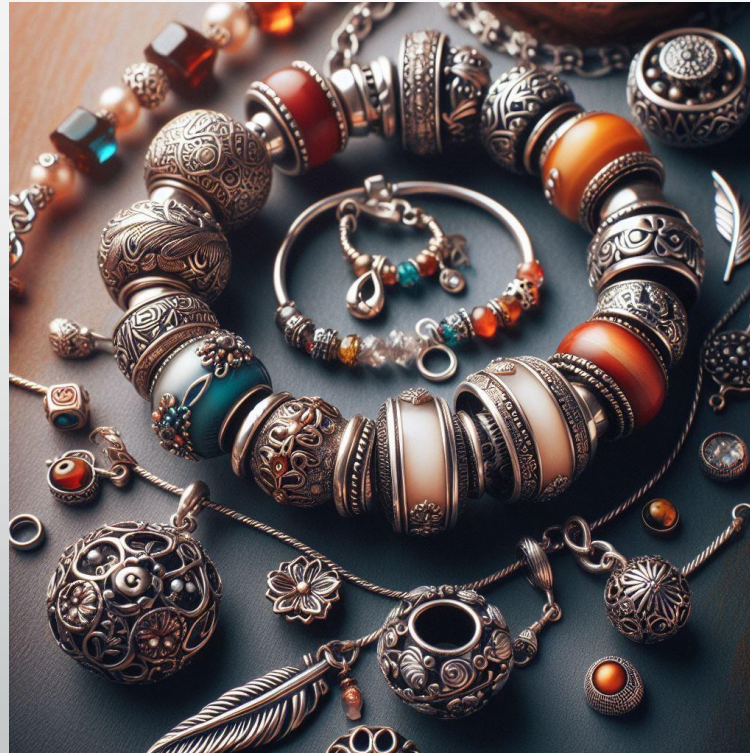
Summary



- Comprehensive analysis of Google Trends and stock data correlation
- Focus on Nike (NKE) and related consumer search terms
- Introduced a high-performing trading algorithm, outperforming the S&P 500
- Explored the application of Google Trends for Nike, Pandora, Airbnb, and Carnival Cruise Lines
- Emphasized the optimization of seasonal advertising strategies
- Insightful approach for companies to allocate marketing resources effectively
- Potential for increased sales and market presence through targeted advertising
- Overall, leveraging data-driven strategies for financial and marketing success.

Problems Encountered

- Initially we were unable to find a reliable API for Google search data, so we ended up manually searching for and downloading Google Trends data.
- We encountered debugging issues and errors in our code that took a good chunk of time.
- Not having up to date knowledge on some stocks costed us some time.



Future Considerations



- We would like to develop a solution that can be operated from either a terminal or a front-end interface.
- This solution would allow users to input a specific stock or a portfolio of stocks.
- It would leverage AI to generate and assess potentially relevant search terms, processing thousands of these terms.
- The aim is for it to deliver results pertinent to the selected stocks, including insights on trading algorithms that have outperformed the S&P 500 within the same timeframe.



Questions & Answers

