1970 General Motors Muscle Car Tribute show

MDA 720 Capstone

General Motors

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Capstone

Background

For this project I am going off the basis that I currently have a business that restores classic cars and hosts a television show that is based on what we do. Whether it is building customers cars and creating episodes off of that or just building cars for our enjoyment. For this project we are going to be working with General motors to help build a tribute car for the 55th anniversary of the golden age of muscle cars which was 1970. This car is going to be receiving a complete restoration and build but first we need to decide what car would be the best for this project. With this project being in under the eye of a large following and being shown at many shows across the country we want to make sure this is a car that people want to see and are still interested in 55 years later

Objective and Goals of this project

The main short and sweet objective of this project is to help decide which General Motors muscle car should be used for a television series to help showcase and celebrate the 55 year anniversary of their golden age of the muscle car. I first came up with this idea while watching T.V. One night with my dad, we started talking about why they chose this car for a specific series. Me and my dad, both being car junkies, kinda looked at each other puzzled as it was a car that wasn't really popular back in the day based on what my dad had explained. So this had me questioning why they would choose this car if it wasn't really a popular car that day in age. Which had led me doing some research using some methods discovered in class. And with these findings I was able to see that the car they chose has had incredible amounts of search volume in recent years.

From here I was set on recreating this for my business idea and using what we have been learning to help aid me in deciding what car would be good for us to use on the show. First was deciding what would be the deciding factors for us to choose the car and why these would be important for the show's success and engagement. As stated earlier we didn't want to choose a car that may have been popular 55 years ago but is not relevant anymore today. So from here I set out using trial and error with Google Trends to search and gather data on what the top 5 General Motors muscles would be to start the analysis. And then from here after the data had been collected I was able to run and create different models to help predict and forecast the search volumes for these cars. Although the metrics were not perfect they definitely gave insights and significance to my research

Data Time Stamp April 21 2024

Car Model	Description	Data Type
1970 Chevrolet Chevelle	Classic muscle car	int64
1970 Chevrolet Camaro	Iconic pony car	int64
1970 Chevrolet Nova	Compact powerhouse	int64
1970 Pontiac GTO	Legendary muscle car.	int64
1970 Oldsmobile Cutlass	Stylish mid-size classic	int64

Data Extraction and Collection

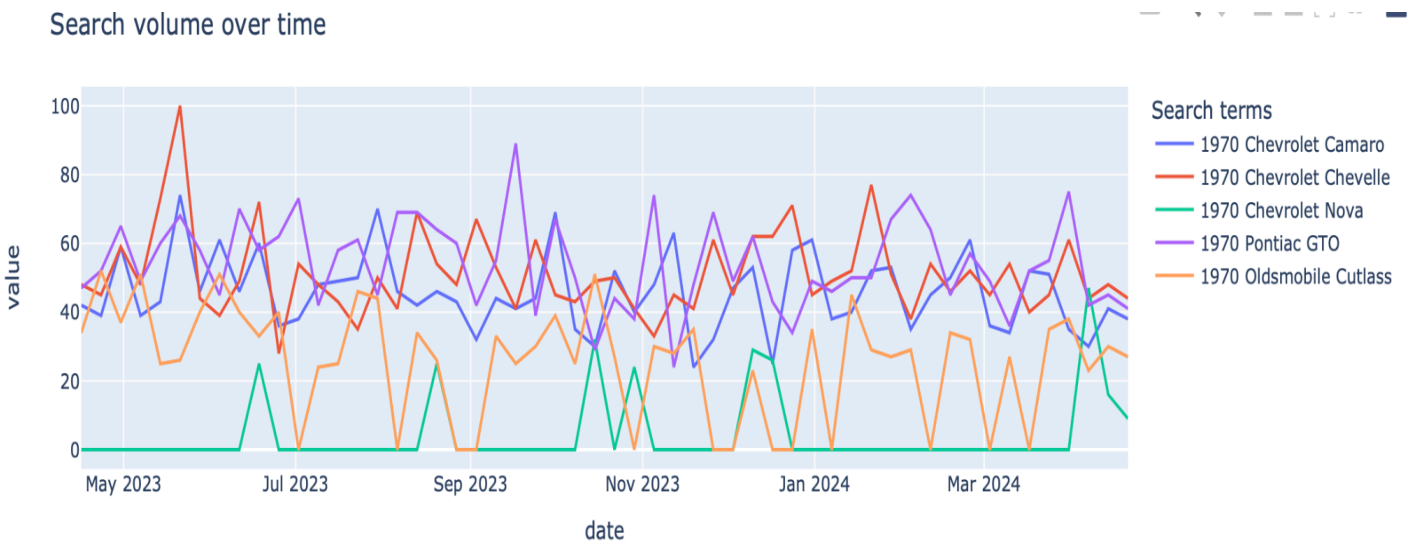
Once my business idea was concrete it was up to me to decide how my data was going to be collected, a few things had crossed my mind at first like search and gathering data from online forums, maybe old articles and a few other things. What i landed on was using Google Trends, this was for a few different reasons, firstly when looking at the popular forums what i had began to notice were heavy bias's based of what site i was on and this varied depending on the site but to me it didn't feel like the data i was going to get was going to be fair. Secondly a lot of the data was very outdated which could have been okay in some cases but for this we wanted to know what model was relevant now not 10 to 15 years ago. This is where Google trends came into play, knowing that this data was going to be as recent as it gets and not have any bias this was the clear choice for me in gathering my data. After my research on Google Trends, discovering that the data was actually sample data had me anxious at first but looking back at my goals the numbers were not what we were looking for here, so even when the numbers are scaled we can still get an understanding and grasp as to which ones are significant.

Once I had decided my method for finding my data I had to use the methods we had learned in class to make this data into clean and significant data, for this I was able to use pytrends to connect the Google Trends to python for further analysis. From here I was able to create charts and visualizations using plotly to help me look at and analyze things like search volume over time.

Through a series of different visualizations and graphs I was able to help give me a better understanding of which of these models was still being searched and at what kind of rates they were being searched at.

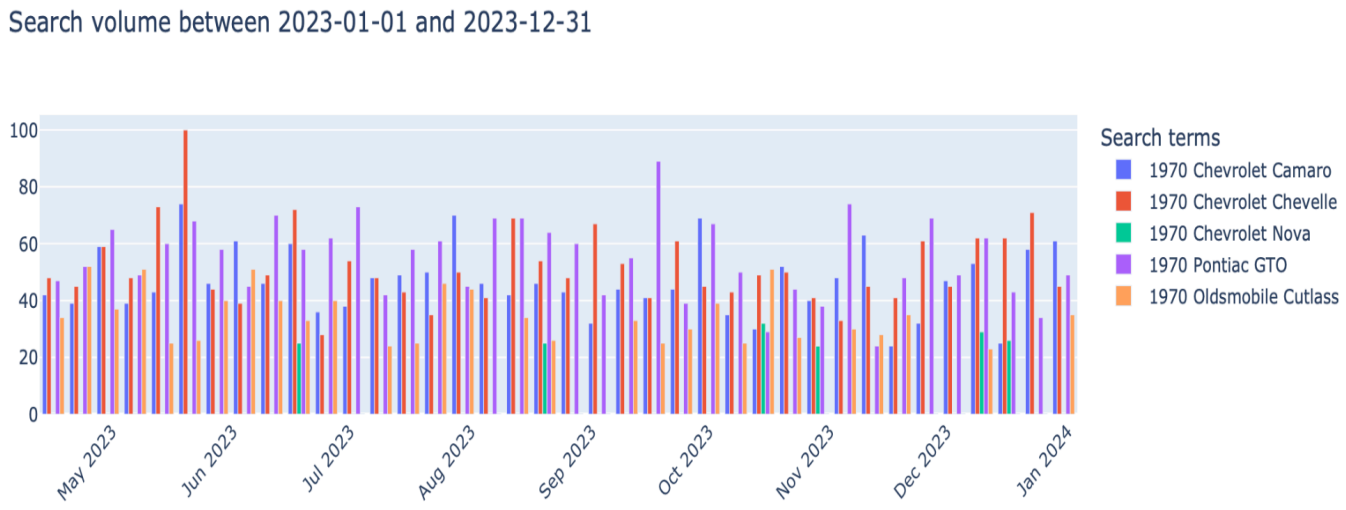
Data Visualizations using Plotly and Analysis

Search Volume over time Line Chart



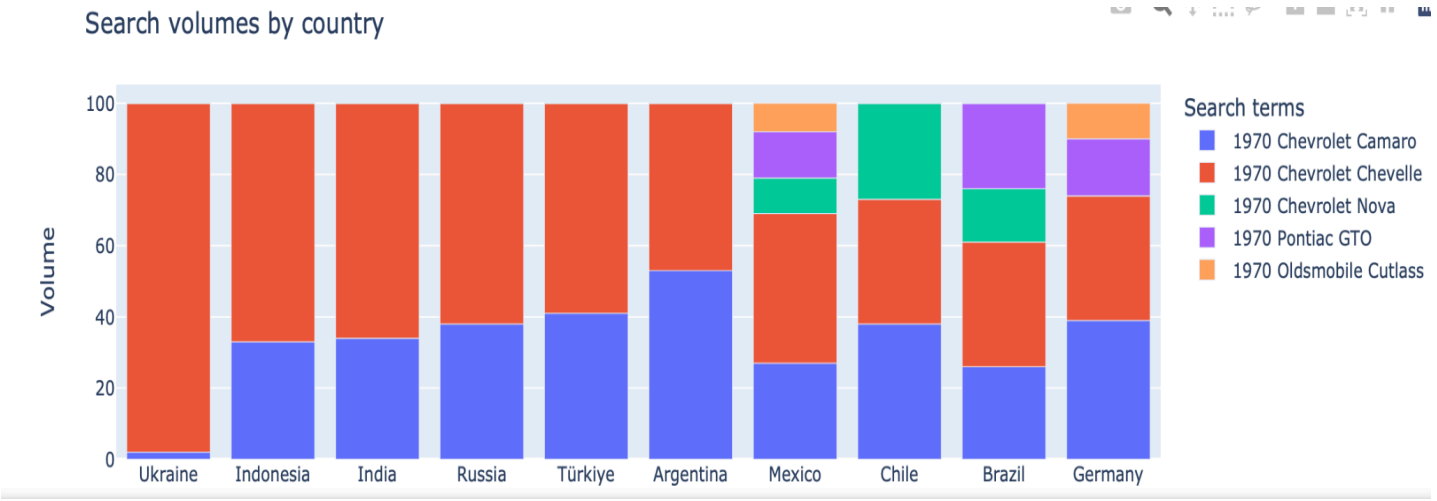
- This was the first chart that we created in hopes to give us a better understanding of the data and what we should expect, this is a simple line that graphs the volume trends for each specific model built in 1970, the range for this graph is from May 2023 to April 2024. We can see that the 1970 Chevrolet Camaro and Chevelle consistently produce the most interest, with search volumes peaking and falling in a similar pattern, perhaps indicating linked events influencing their popularity such as T.V. shows or even Car shows. While the 1970 Oldsmobile Cutlass and Pontiac GTO show moderate interest, with occasional peaks that aren't as large as the first two. And lastly we can see that the Chevrolet Nova has the least amount of search volume.

Search Volume between 2023-01-01 and 2023-12-31



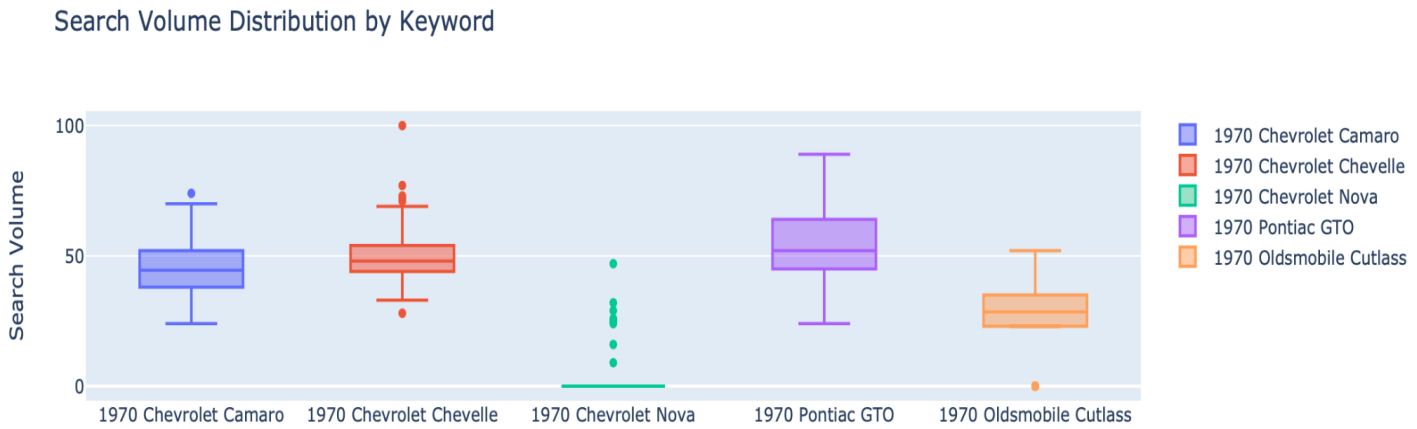
- This bar chart visualizes monthly search volume throughout 2023 for the classic cars from 1970 that we had chosen from our initial search, here it shows a similar theme as our first graph but it gives us a better look into the trends that may affect these search and help us determine whether they can be seasonal or related to outside factors such as car shows or events. This graphs clearly shows us that there is definitely a seasonal appeal when it comes to the pattern of these searches, which can be useful in helping decide what month would be best for us to launch our show.

Search Volume by Country



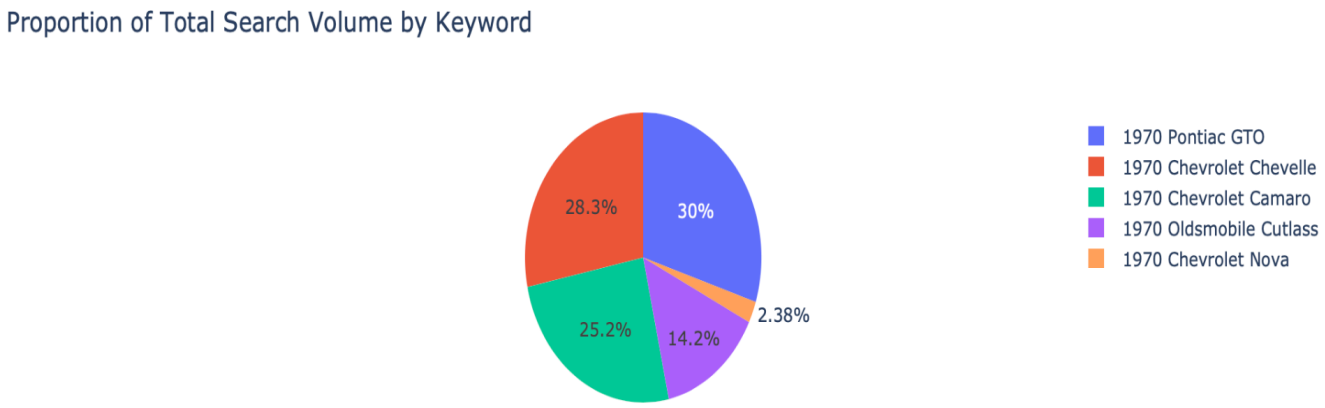
- The bar graph contrasts the volume of searches conducted worldwide for the five 1970 models we chose. The most sought-after General Motors muscle cars shown in this graph are the Chevelle and Camaro, which regularly have the highest search interest in practically all of the highlighted nations. Both the Pontiac GTO and Chevrolet Nova show moderate interest while the GTO is particularly well-liked in Mexico and Brazil. In every nation, the Oldsmobile Cutlass has the fewest searches. This shows that in comparison the Chevelle and Camaro have a wider search volume worldwide.

Search Volume Distribution by Keyword



- This box plot shows the variance in all the search volumes for each of these models, once again the Camaro and Chevelle have higher median search volumes with a wider spread, indicating fluctuating but generally strong interest compared to the other three, whereas the Nova has a wide spread of data with many low outliers, showing that there tends to be a more erratic search interest. The GTO has a more centered range of search volumes, showing more consistent interest, while the Cutlass exhibits the lowest median search volume and least variability, indicating it is consistently less searched for than the other four models.

Proportion of Total Search Volume by Keyword

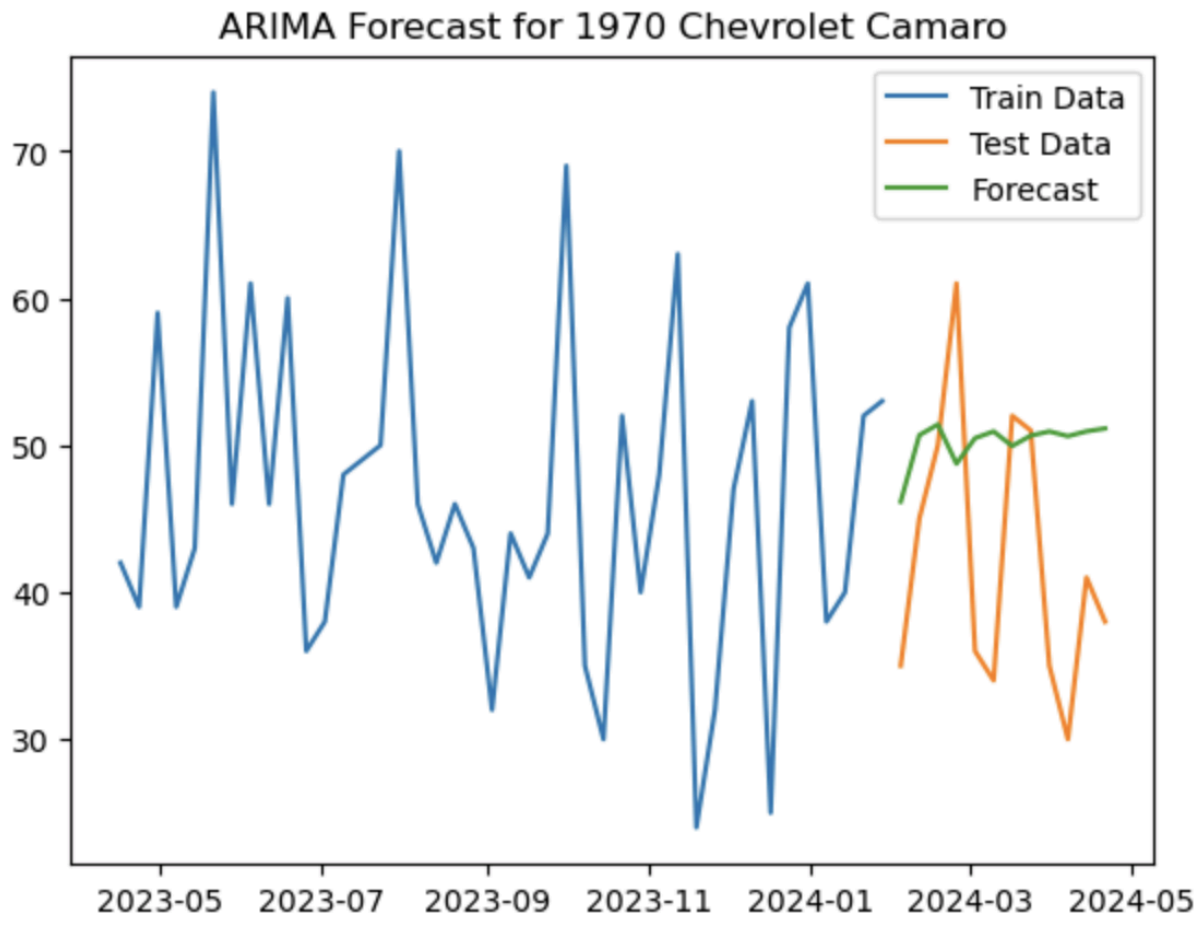


- This Pie chart gives a great overview in a simplified form that eliminates external factors such as trends, this would be a great graph if you are just looking for the bare minimum basic and see what model just have the most search volume,
    - The 1970 Pontiac GTO has the largest portion with 30% of the total search volume.
    - The 1970 Chevrolet Chevelle follows with 28.3%.
    - The 1970 Chevrolet Camaro is next with 25.2%.
    - The 1970 Oldsmobile Cutlass has 14.2%.
    - The 1970 Chevrolet Nova has the smallest share at 2.38%.

Models and Predictions

For this section we had decided it would be best for us to build models and predictions to help us determine which model is going to be the most searched in coming months as this is when the show is going to be released. So we wanted to see if maybe say the most searched model today is the Camaro but maybe in 3 months it will be the Chevelle, and yea this may be significant but is the difference between the two large enough to make it significant. So from here we decided it would be good to start with ARIMA. I decided to go with ARIMA because it is very versatile and can handle data with or without trends and seasonal patterns, but yet it is not overly complex for my data.

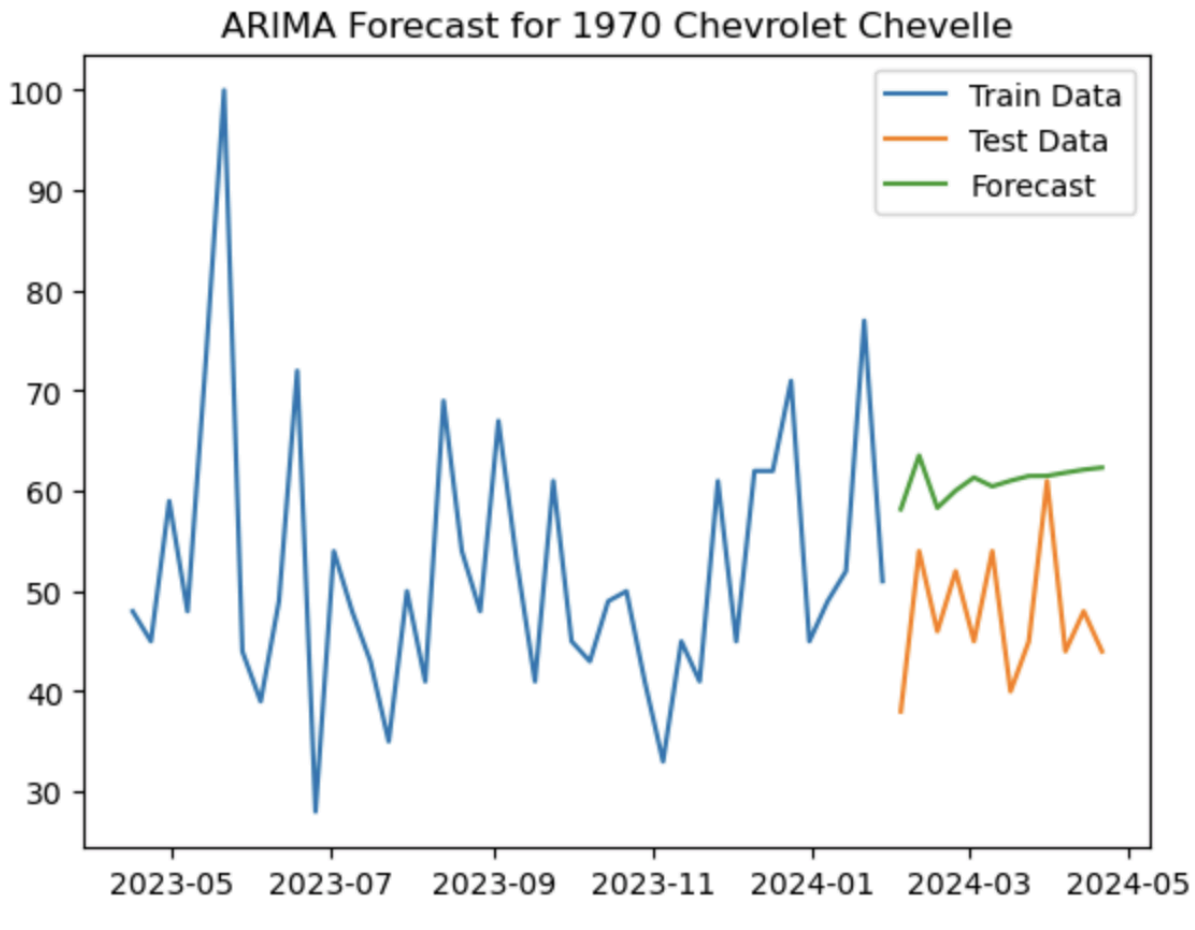
Best overall model



Metrics For ARIMA 1970 Chevrolet Camaro

```
Keyword: 1970 Chevrolet Camaro
RMSE: 12.11073410940652
MAE: 10.329085160031797
MAPE: 27.928324135595954
MSE: 146.66988066874254
```

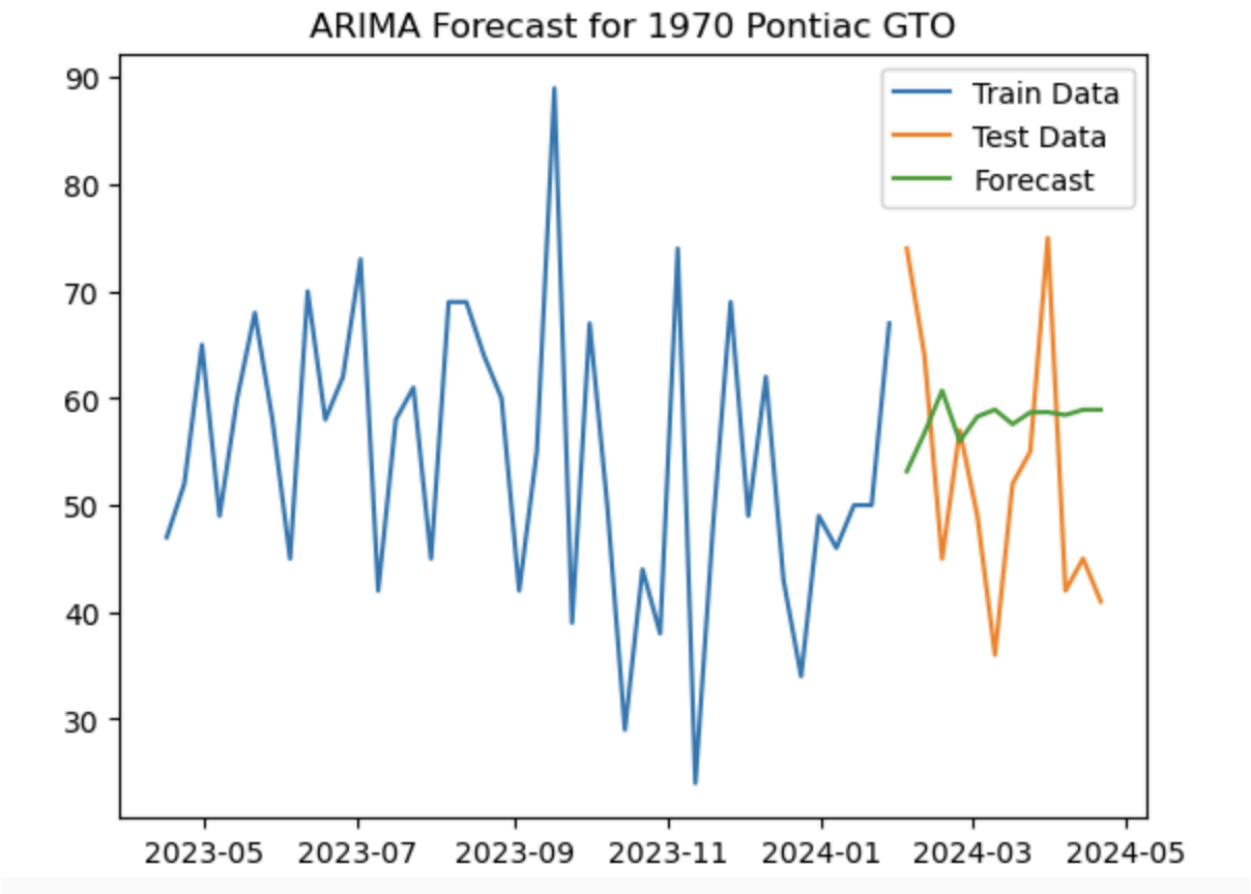
Second Best Model



Metrics for ARIMA 1970 Chevrolet Chevelle

```
Keyword: 1970 Chevrolet Chevelle
RMSE: 14.69764963818722
MAE: 13.435778236165746
MAPE: 30.252510689864604
MSE: 216.02090488690496
```

Third Best Model



Metrics for ARIMA 1970 Pontiac GTO

```
Keyword: 1970 Pontiac GTO
RMSE: 14.265563174154943
MAE: 12.571299671099254
MAPE: 25.979468804710077
MSE: 203.50629267580564
```

Conclusions and Recommendations

Overall I have come to many conclusions from my project here. First off I have realized how useful google trends and the connection to python can be in everyday scenarios. Secondly regarding the objective of my project, I have been able to really open this data up in different ways that would definitely be overlooked if the data would not have been processed and visualized in python.

Now when it comes to the outcome of my project and the decision I was able to make using my data collection and analysis of it, after diving into it I was able to uncover trends that were not noticeable when the data was first collected, this allows for a better and more accurate analysis in all aspects. When it comes to the decision making process when deciding which car would be most popular to build in series almost 55 years after they were made has left us with 3 different options that each provide significant data and all have a different approach.

1. 1st approach
    a. Highest overall search volume over the past year
        i. 1970 Pontiac GTO
2. 2nd approach
    a. Highest median search volume with largest peaks
        i. 1970 Chevrolet Chevelle
3. 3rd approach
    a. Best performing model
        i. 1970 Chevrolet Camaro

Each of these approaches has its own significance and can help in different roles and routes that the company would like to take. Based on our companies' needs we have decided that we are going to go with the second approach. We feel as if the search volumes are close enough in numbers that the median search volume and the seasonal trend that is seen with the Chevelle is going to provide the exposure that we are looking for. As we saw with both the line graph and bar chart we can see that the Chevelle had high spikes in the summer months and yet it was still consistent and comparable to the other models through the other months. Based off of the prediction models that we had made were able to get a idea of what the future trends were going to look like but the uncertainty and poor results from the metrics made it difficult for us to go with that, although it did play a role into our insights in determining if our show could have

success in the coming months based off of the model we chose and the route we went with. The main metric we looked at when determining if these models performed well was RMSE, the ‘best one’ we obtained was for the 1970 Camaro and it was just around 12.1 which means that the model is about 12.1 units off of what the actual unit is, for us this was too large as the scale of the data was only too 100. One of the last determining factors for us is the great distribution of search volume that the Chevelle had all over the world which is promising for us as the show is going to be televised worldwide.

References

Google Trends