October-December 2025 Northern Michigan Search Interest Forecast

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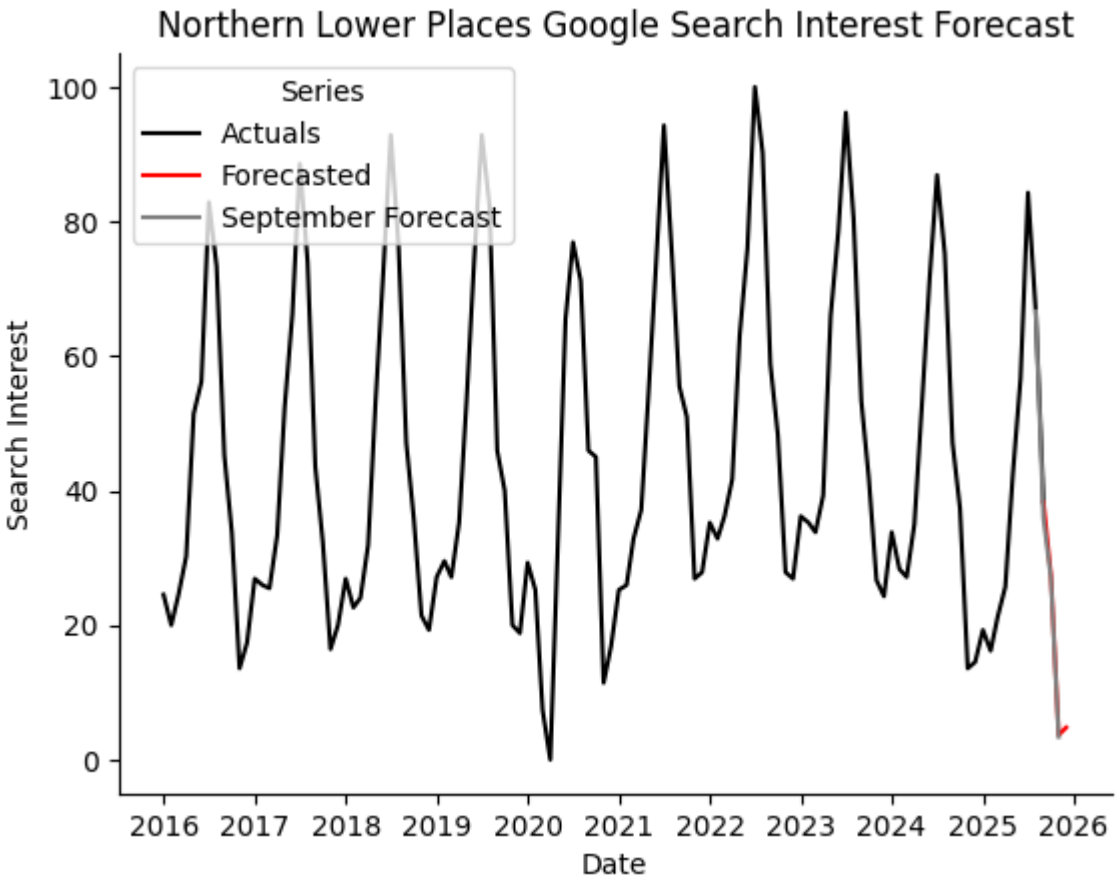
Below are my search interest forecasts for the combined Northern Lower and combined Upper Pensinsula places for October, November, and December 2025. Note that the possible range for historical search interest is normalized to a maximum of 100 and a minimum of 0, but forecasts outside this range are permissible as these values are forecasted to be outside the historical range.

For September, actuals were similar to forecasted. There was a decline in search interest from last year in both peninsulas, especially the Lower Peninsula. While the peak search interest this summer was somewhat higher than forecasted, it appears that non-peak interest is continuing it's previous trend.

The charts below provide the current forecast and last month's forecast compared to actuals. For both peninsulas, September's forecast is in grey and the current October forecast is in red. These forecasts are very similar to each other.

Also provided are barcharts comparing the average search interest for the forecast months (October, November, December) to the same months in previous years. The forecast is lower this year for both peninsulas.


Northern Lower Places Google Search Interest Forecast
Series
Actuals
Forecasted
September Forecast
Search Interest
0
20
40
60
80
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2016
2017
2018
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2025
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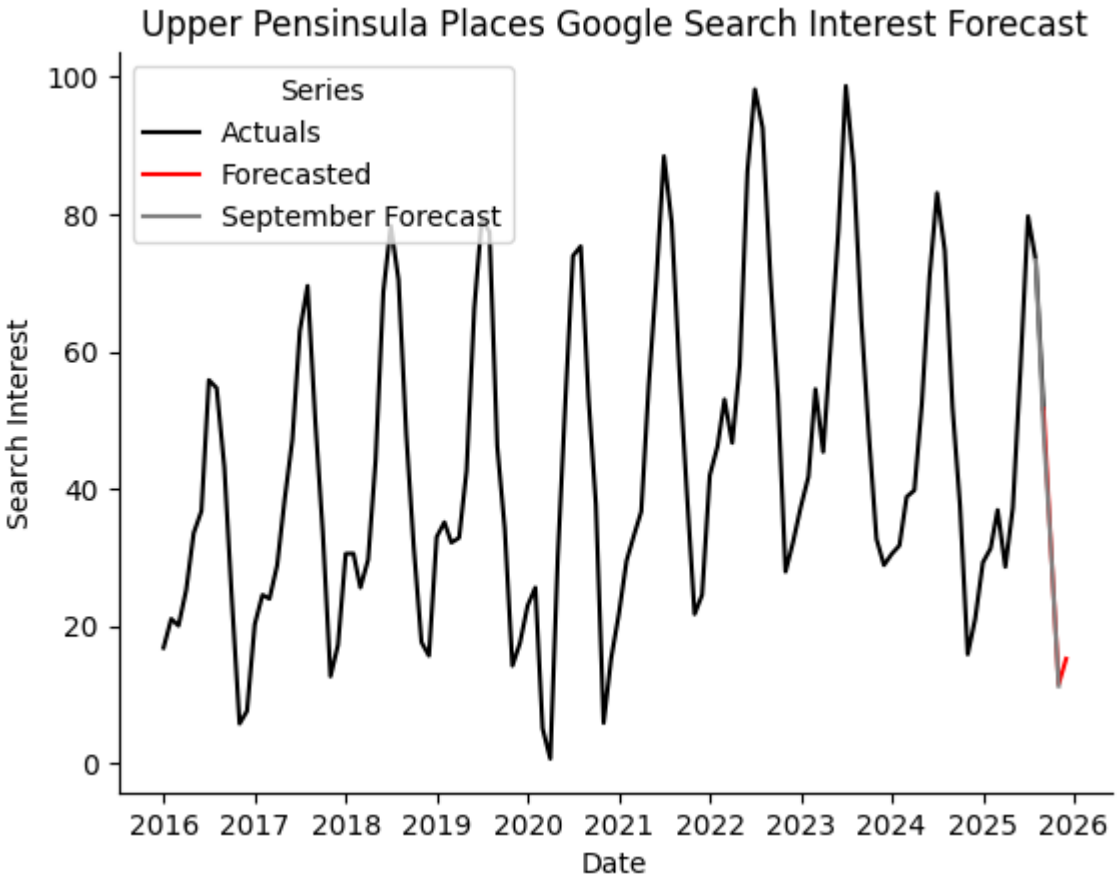
Date


Upper Pensinsula Places Google Search Interest Forecast
Series
Actuals
Forecasted
September Forecast
Search Interest
0
20
40
60
80
100
2016
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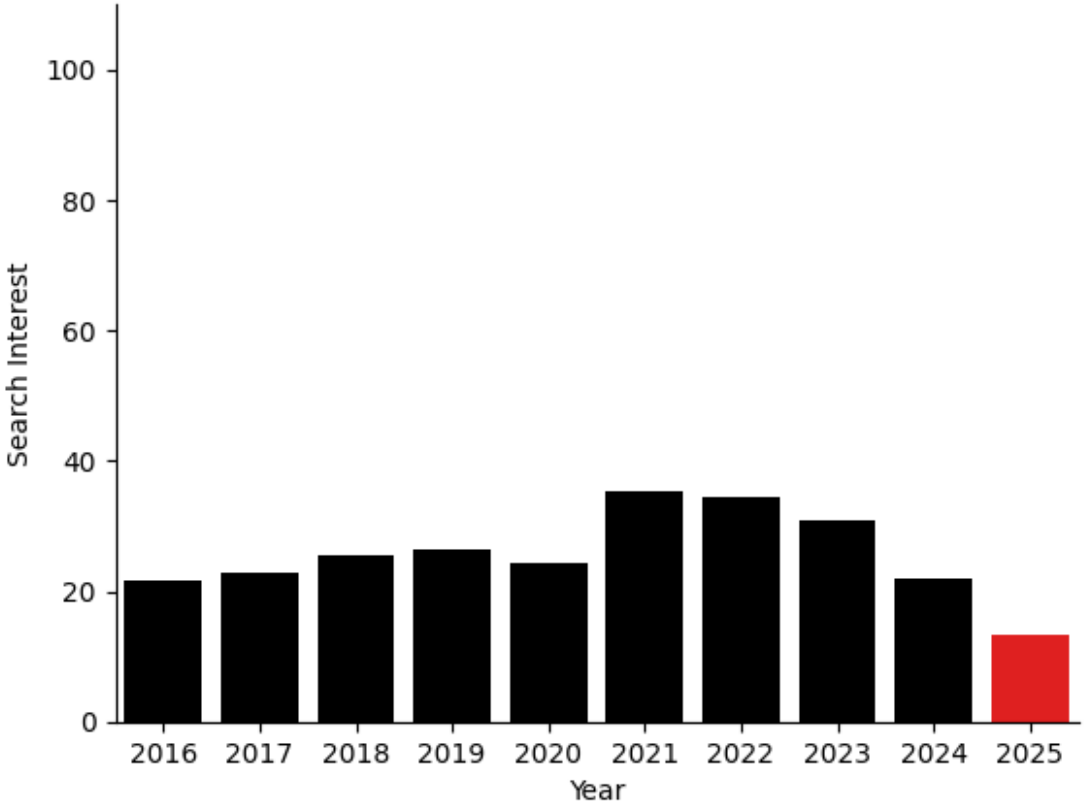
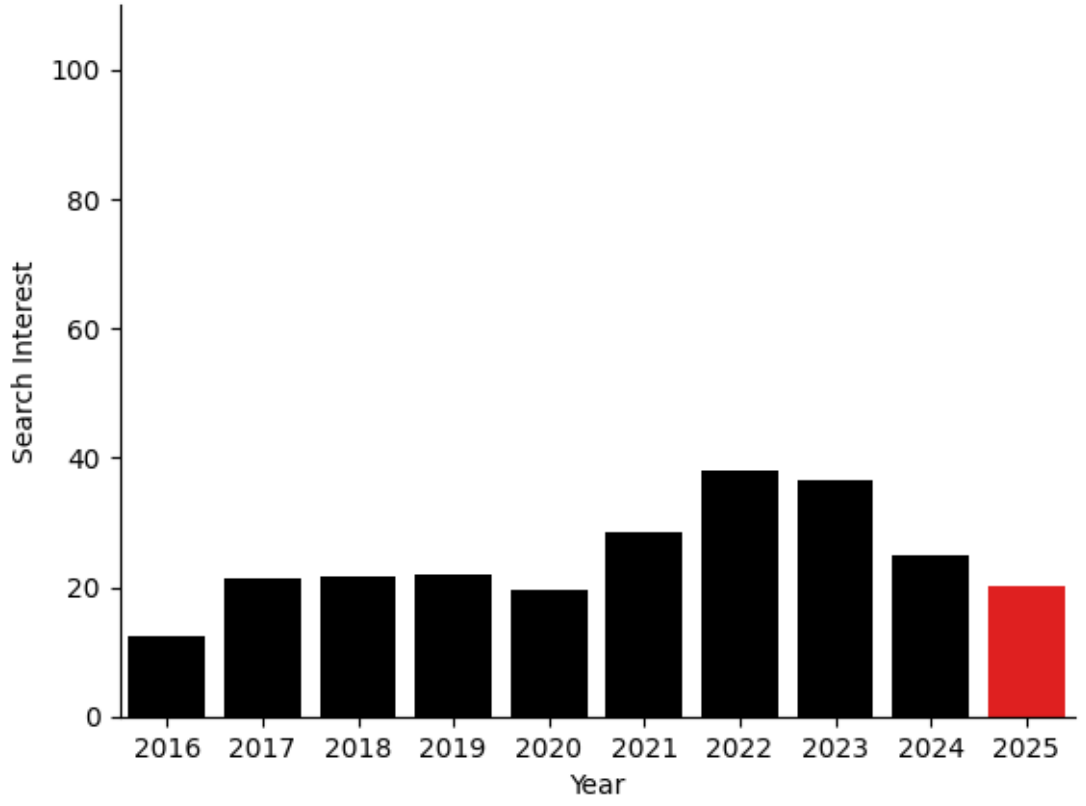
Date

Northern Lower Search Interest Averaged for October, November, and December



Upper Peninsula Search Interest Averaged for October, November, and December



The following table shows the top five places that are forecasted to have the highest search interest compared to the same time period in 2024. It's probable that searches for Greenland have been less related to the place in Michigan but rather recent popular press surrounding the territory of Greenland. Also, Free Soil likely references free soil for gardening or construction purposes. (I'm planning on removing places like Greenland, Free Soil, and Wolverine during my yearly model improvement early next year.)

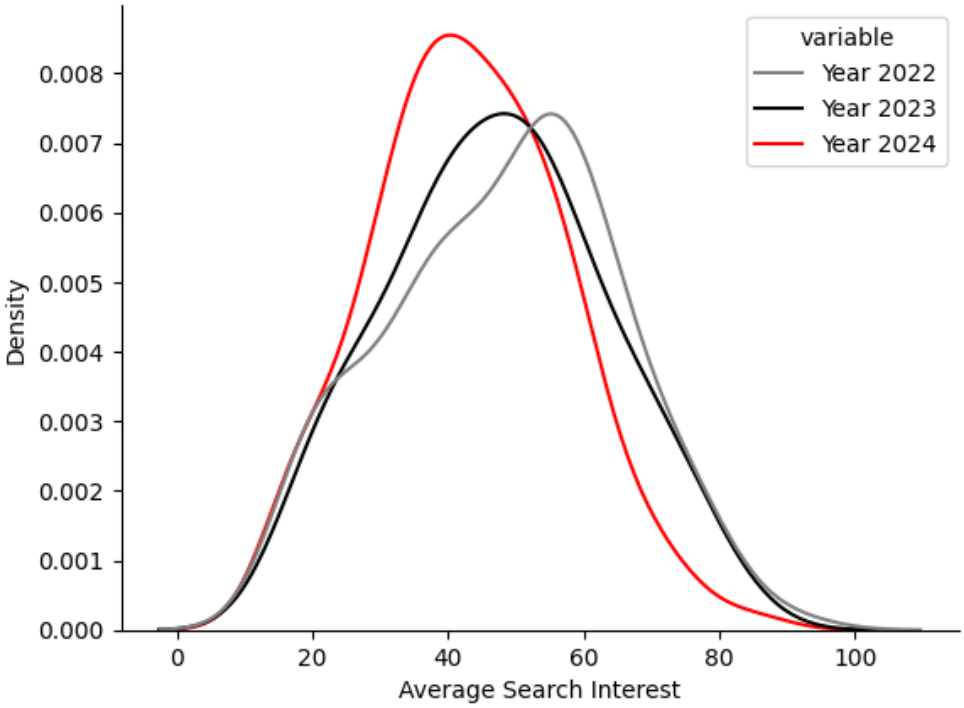
	Place	Peninsula	Difference
0	Rapid River	Upper	25.0
1	Greenland	Upper	16.0
2	Harrietta	Lower	15.5
3	Free Soil	Lower	12.5
4	Atlantic Mine	Upper	11.8

Three things impact the value of the search interest forecasts for each place.

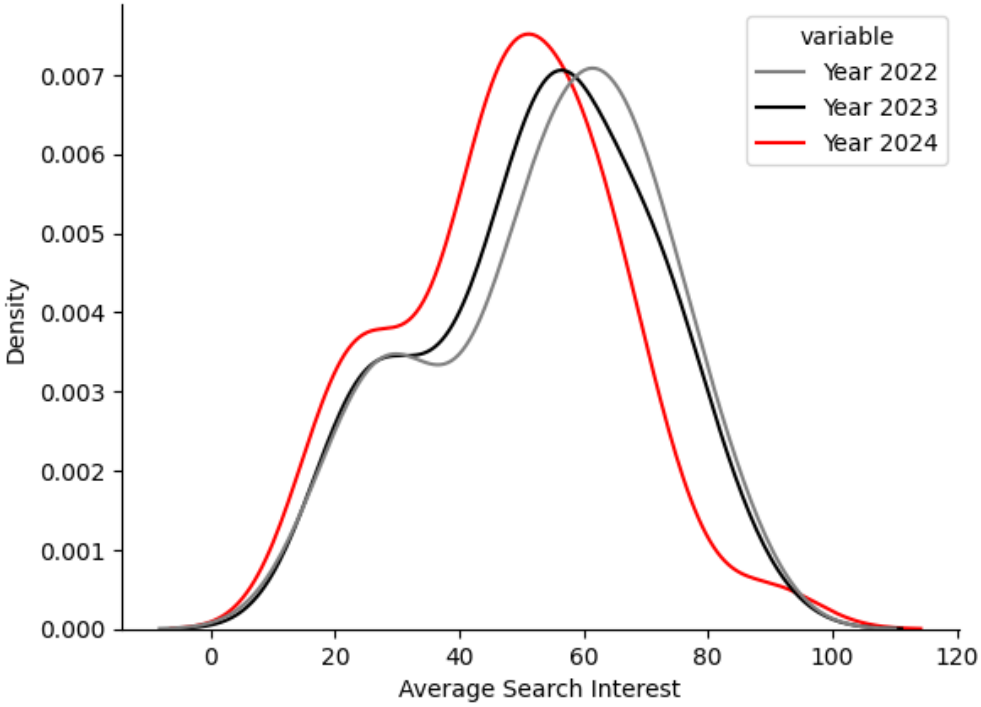
1. The previous year's monthly value for each individual place.
2. While not directly impacting the model forecast, seasonal (12 mo) differencing accounts for the fact that search interest is higher in some portions of the year than others (so previous year actual is impacted).
3. Model difference: based on forecasted weather and gas price changes, the model will predict 12 mo changes from the previous year for each individual place. These levels are adjusted for the previous 12 month trend. Then these new levels are aggregated via regression to the peninsula level series.

The two KDE plots below plot the distributions of the individual place actual values for the months of October, November, and December for the previous three years. Note that the values for 2024 serve as the last actual values for 2025. For both peninsulas, the last actuals for 2024 are lower than 2023 and 2022. I believe this shows the impact the downward trend in search interest since 2023/2024.

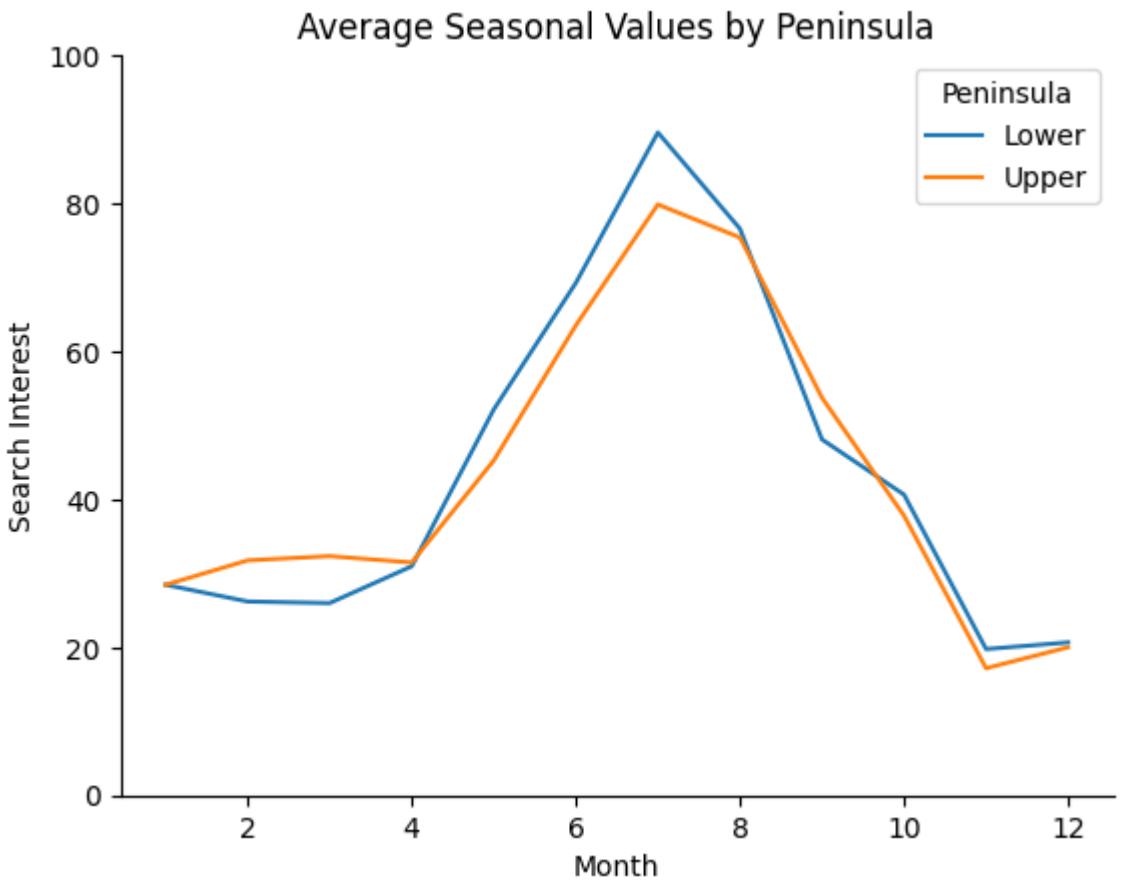
Lower Peninsula Place Level Search Interest Averaged for October, November, and December



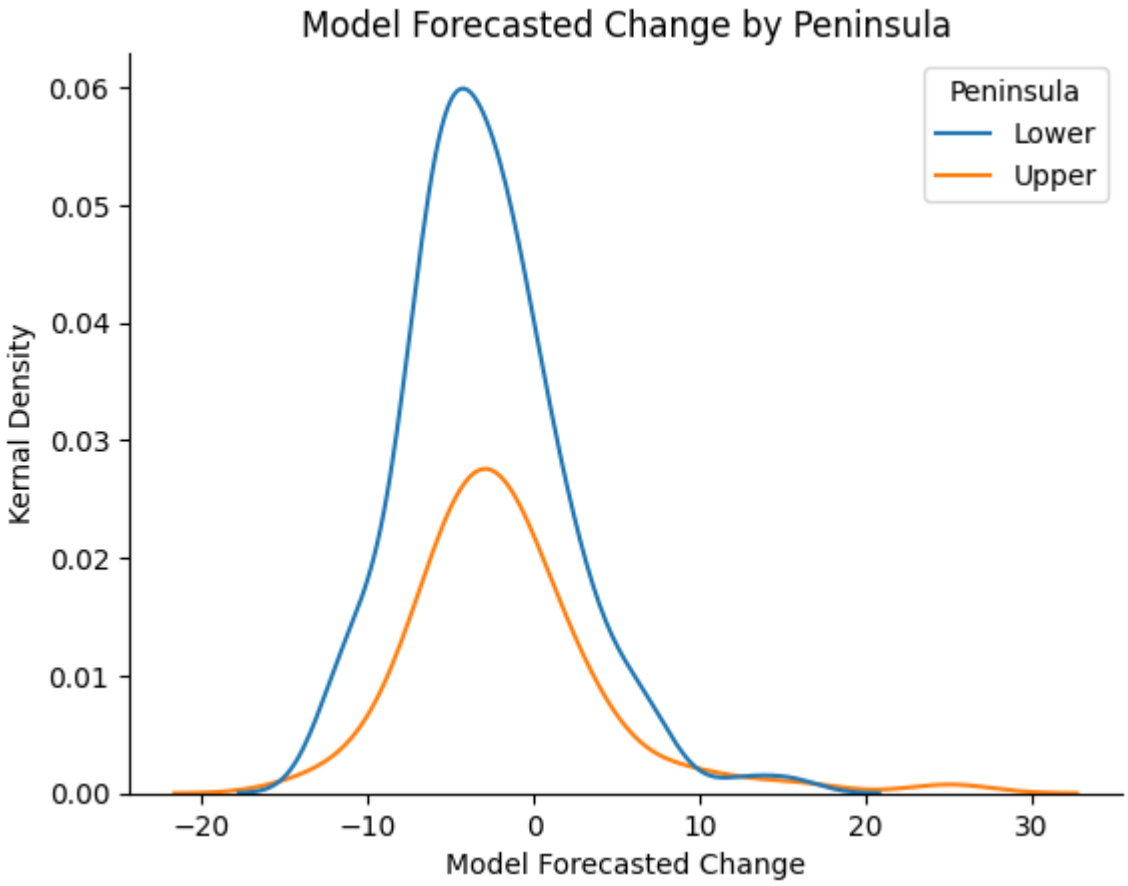
Upper Peninsula Place Level Search Interest Averaged for October, November, and December



The following figure shows the aggregate average search interest for each calendar month. Both the Upper and Lower Pensinsulas have a seasonal peak in July/August with the Lower Peninsula peak solidly in July. The Upper Peninsula has higher values for January-March likely due to winter snow sports like snowmobiling. For the October-December forecast period, we should see search interest dropping to its lowest levels.



Finally, forecasts are determined by the forecasted place level change from the previous year based on weather and gasoline prices and are adjusted based on the last 12 months of trends for each individual place. For both peninsulas, the most likely forecasted change from the previous year is now negative, because we are now adjusting for the aggregate negative trends during the last 12 months. (Note, however, that the final forecast numbers by peninsula are weighted by the size of the contribution of the place to total search interest.)



Places Impacted by Weather and Gas Prices

In addition to the above more aggregated analysis, I will now look at places that are impacted by weather and gasoline prices. (Many places are not impacted by these factors in the model and instead have an average increase or decrease year over year.) After identifying the places impacted by weather or gas prices, I then divide these places projected to have higher or lower search interest (on average) during the forecast months from the previous year. This is due to both the impact of weather and gasoline prices and the average trend year over year.

For the Northern Lower Peninsula, 56 of 142 places are impacted by weather or gasoline prices in the model. Of these, 11 are forecasted to have higher search interest during these three months than last year. The remaining are forecasted to have lower search interest than last year. These places are listed and the chart shows their yearly average search interest values for the three forecast months. Here, the verticle line signifies the start of the forecast period.

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Northern Lower Places with Weather Impact Higher Interest than Last Year
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['caberfae', 'glen arbor', 'lake leelanau', 'au sable', 'buckley', 'lakes of the nort
h', 'tustin', 'free soil', 'harrietta', 'vanderbilt', 'boon']
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_____________________________________
Northern Lower Places with Weather Impact Lower Interest than Last Year
_____________________________________
['sand lake', 'crystal mountain', 'northport', 'suttons bay', 'traverse city', 'lake
ann', 'indian river', 'manistee', 'tawas city', 'grayling', 'harrisville', 'cedar',
'benzonia', 'alden', 'mesick', 'rogers city', 'wellston', 'omer', 'west branch', 'har
rison', 'maple city', 'scottville', 'ossineke', 'alpena', 'evart', 'gladwin', 'pruden
ville', 'hillman', 'skidway lake', 'brethren', 'boyne falls', 'ellsworth', 'ironton',
'central lake', 'wedgewood', 'reed city', 'pilgrim', 'sterling', 'wolverine', 'lincol
n', 'advance', 'baldwin', 'norwood', 'twining', 'chums corner']
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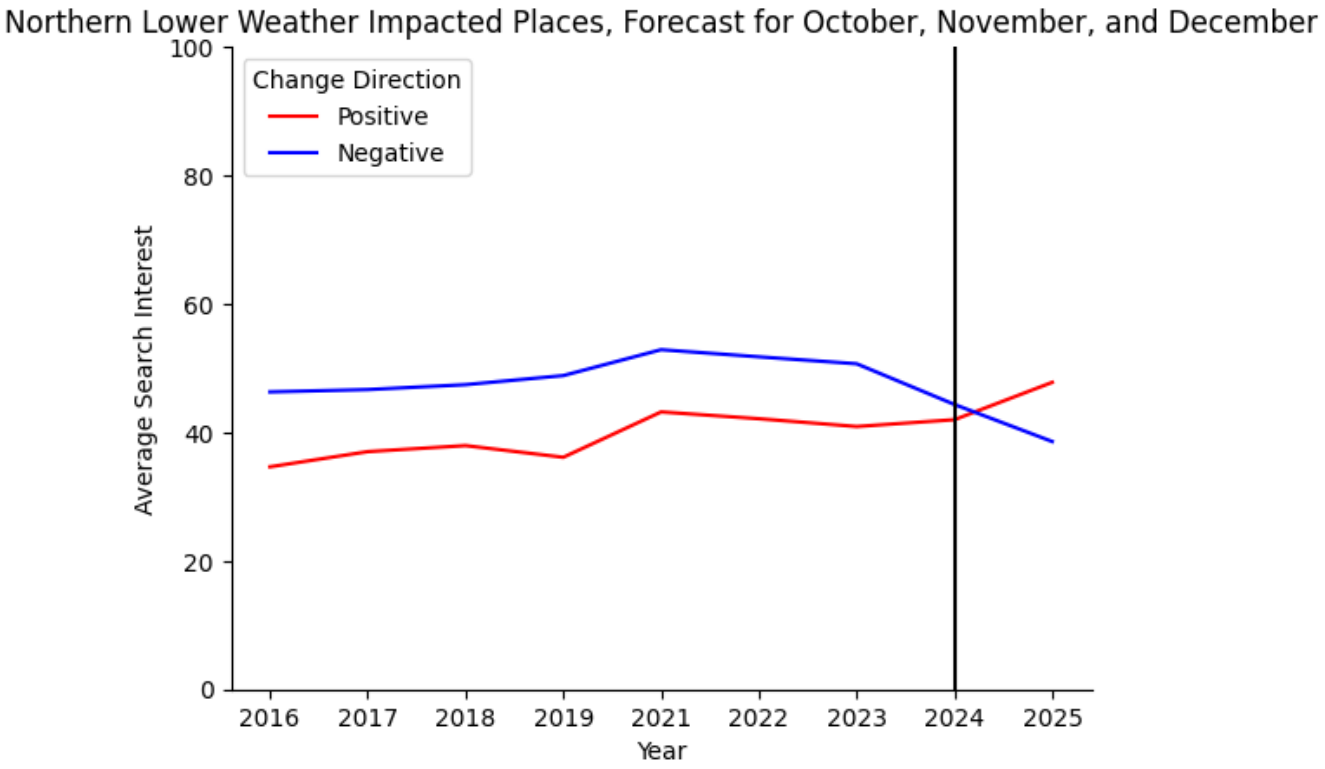

For the Upper Peninsula, 30 of 72 places are impacted by weather or gasoline prices in the model. Of these, 11 are forecasted to have higher search interest during these three months than last year. The remaining are forecasted to have lower search interest than last year. These places are listed and the chart shows their yearly average search interest values for the three forecast months. Here, the verticle line signifies the start of the forecast period.

```
Upper Peninsula Places with Weather Impact Higher Interest than Last Year
_____________________________________
['big bay', 'white pine', 'gwinn', 'rapid river', 'palmer', 'bessemer', 'dollar bay',
'atlantic mine', 'laurium', 'greenland', 'south range']

_____________________________________
Upper Peninsula Places with Weather Impact Lower Interest than Last Year
_____________________________________
['munising', 'copper harbor', 'newberry', 'sault', 'manistique', 'lake gogebic', 'gla
dstone', 'ironwood', 'mohawk', 'ishpeming', 'menominee', 'iron river', 'calumet', 'ne
gaunee', 'republic', 'three lakes', 'ewen', 'mass city', 'carney']
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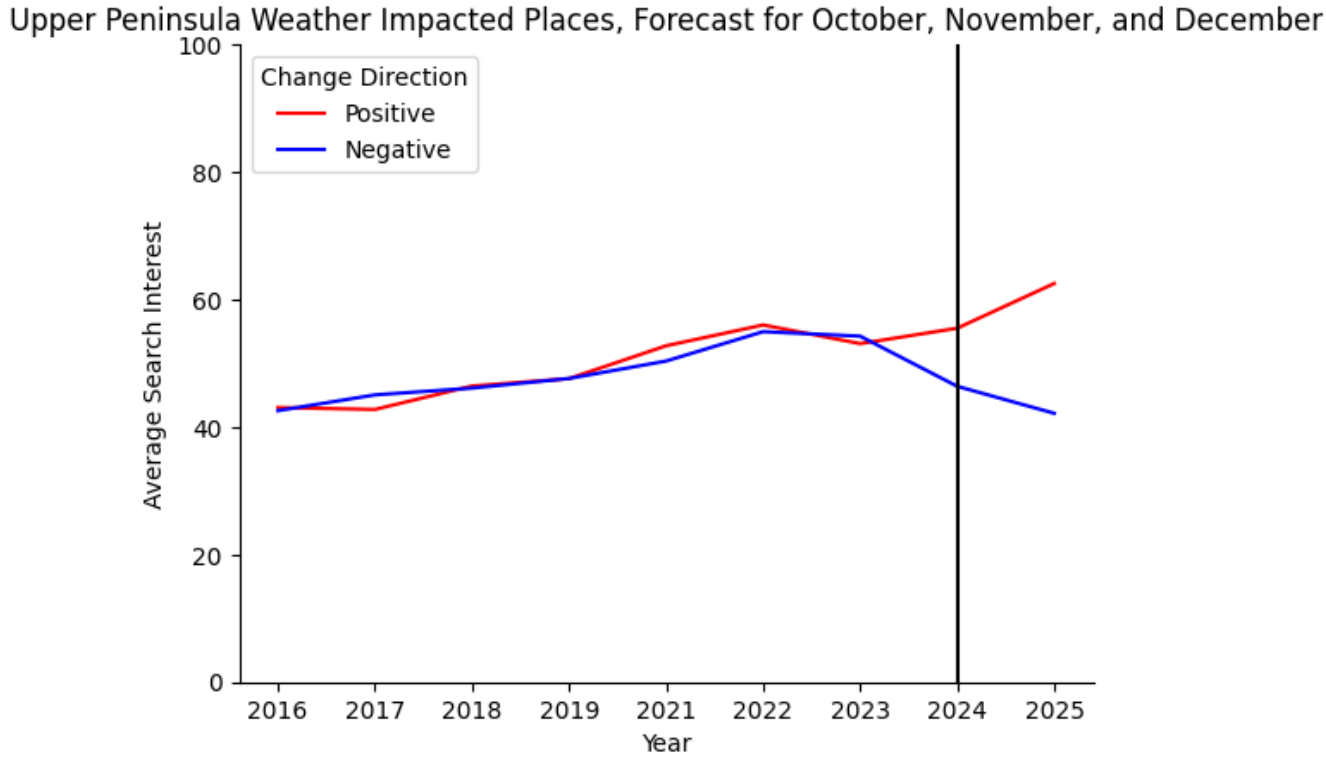
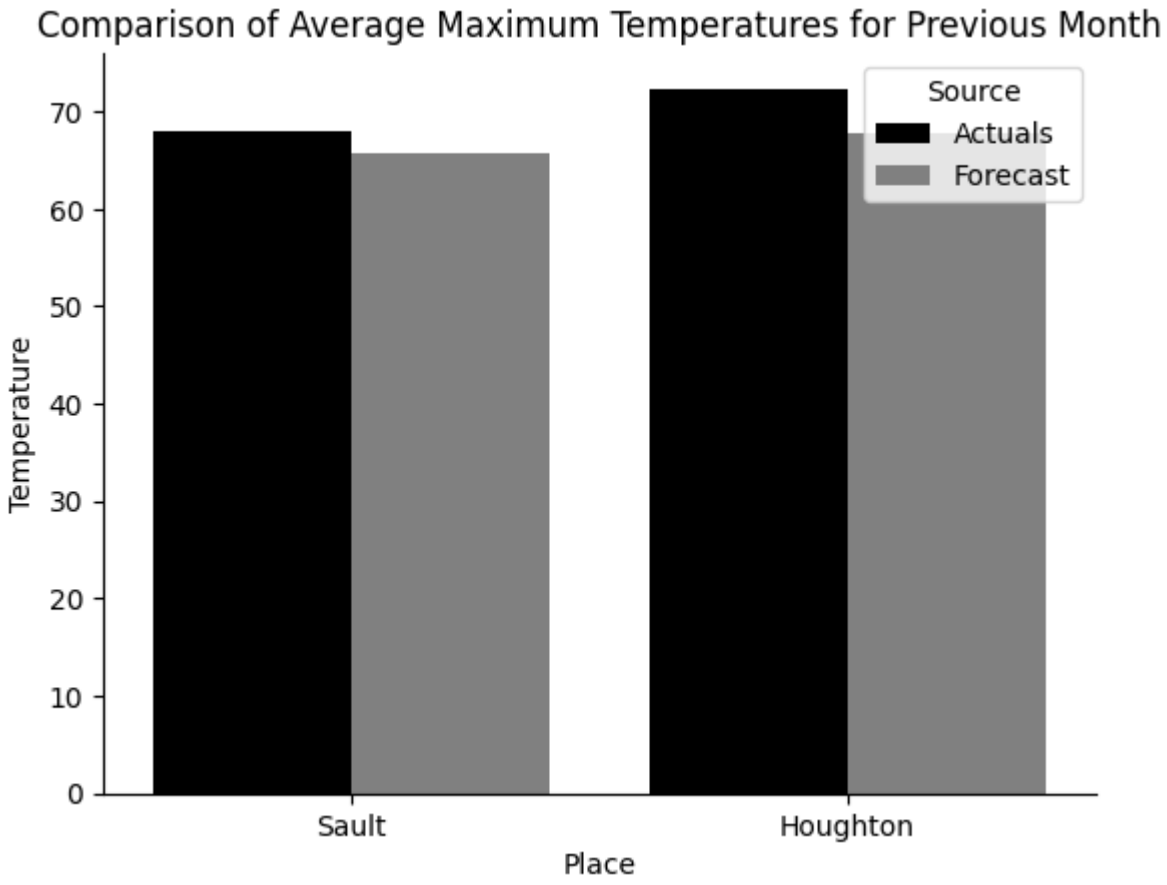


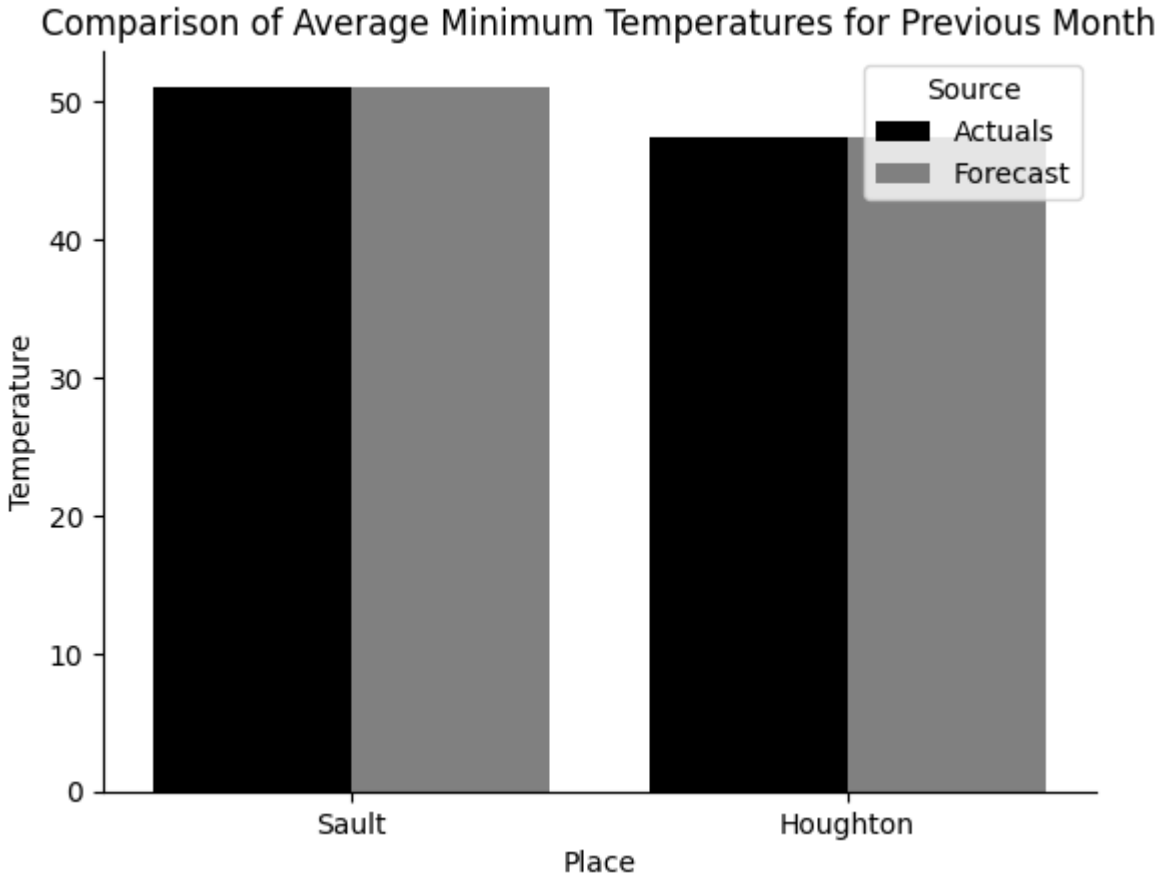
One last factor to consider is my source for weather forecasts, with a focus on temperature. All of my historical weather data used to train my models is from weather.gov. However, I source temperature forecasts from both weather.gov (average of averages) and accuweather (average maximums and average minimums). To some degree, it's difficult to compare these sources because average, maximum, and minimum temperatures are different statistics. Nonetheless, throughout this project, I've found that weather.gov usually forecasts above normal temperatures. To some extent I wonder if forecasts from a government agency are more likely to be high given politics surrounding issues like global warming.

Therefore, I will roughly track the one month forward predictive performance of the weather.gov and accuweather forecasts. First, I will look at the previous month's average temperature and determine if it actually was above historical normals. Next, I will compare the previous month's forecasted accuweather average max and min temperatures to actual values.

Starting in late August, I don't see average temperature populated in weather.gov for the Houghton Lake or Sault St Marie. Therefore, I will skip this comparison for average temperature this month. This does not have a significant impact on my current forecasts which are based on the same months last year, which have data. Hopefully, this is due to the government shutdown. However, if this problem persists I'll probably have to remove average temperature from the model.

Based on the accuweather forecasts, maximums were a little higher than forecasted last month while minimums were almost exactly the same as forecasted.




Comparison of Average Minimum Temperatures for Previous Month
Source
Actuals
Forecast
Temperature
0
10
20
30
40
50
Sault
Houghton
Place