

Michelin Star Restaurants

Group 4

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What is a Michelin Star?

Global restaurant rating system of one, two, and three stars based upon quality of cuisine and the restaurant experience.

Started as a guide for motorists and now rates over 30,000 restaurants world wide.



MICHELIN STAR

Coveted by many chefs but bestowed upon only to an excellent few.
Getting a star (or three) could change the fate of a restaurant.



High quality
cooking,
worth a stop



Excellent cooking,
worth a detour



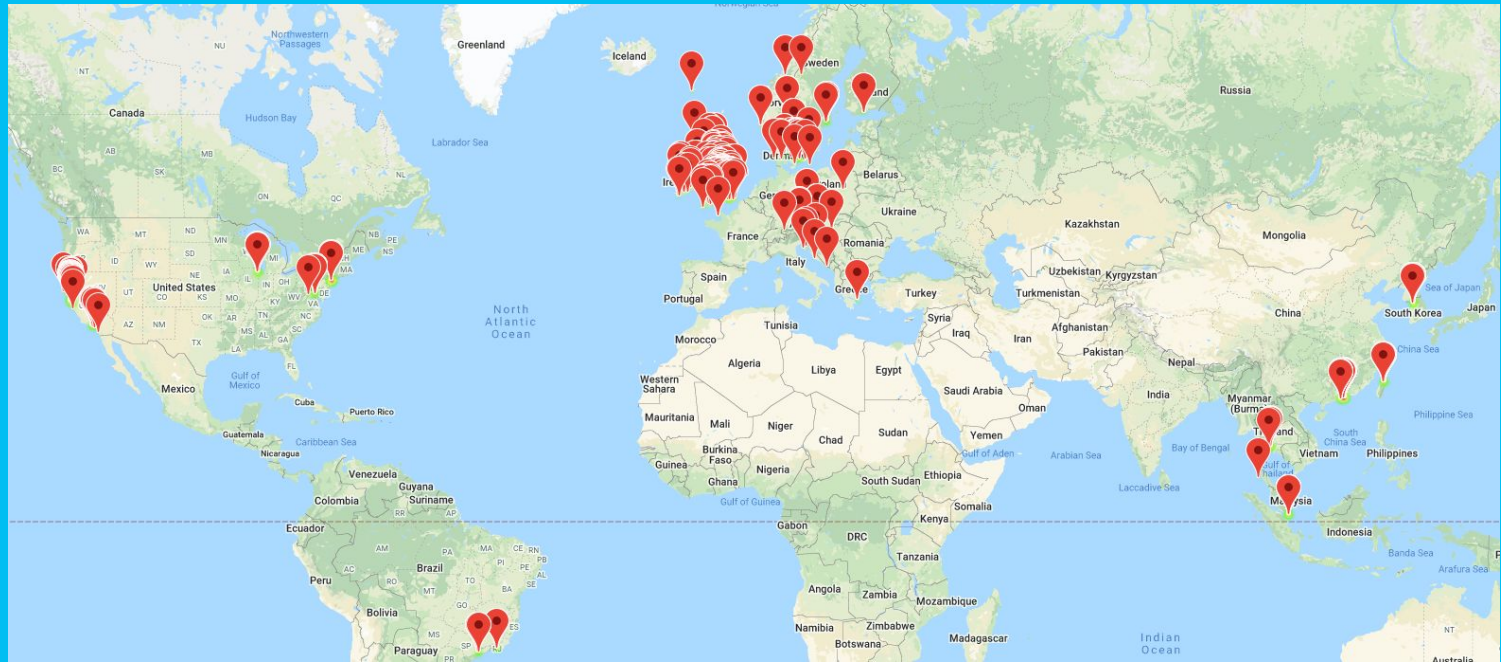
Exceptional
cuisine, worth a
special journey

- » Information obtained from Kaggle but provided by Michelin Star Guide regarding 2018-2019 star recipients.
 - » Three csv files provided for one, two, and three star
 - » 2019 US Census data
 - » Information included:
 - » Restaurant information: Name, URL, Cuisine, Price, Stars awarded
 - » Location information: Latitude, Longitude, Region, City, Zip Code
 - » Information excluded: Michelin Star Restaurant Locations in Belgium, France, Germany, Italy, Japan, Germany, Italy, Japan, Luxembourg, Netherlands, Portugal, China, Spain, and Switzerland
 - » Null data
 - » Zip Code
 - » Prices
 - » Inconsistency in region

What locations have the most Michelin Star Restaurants?

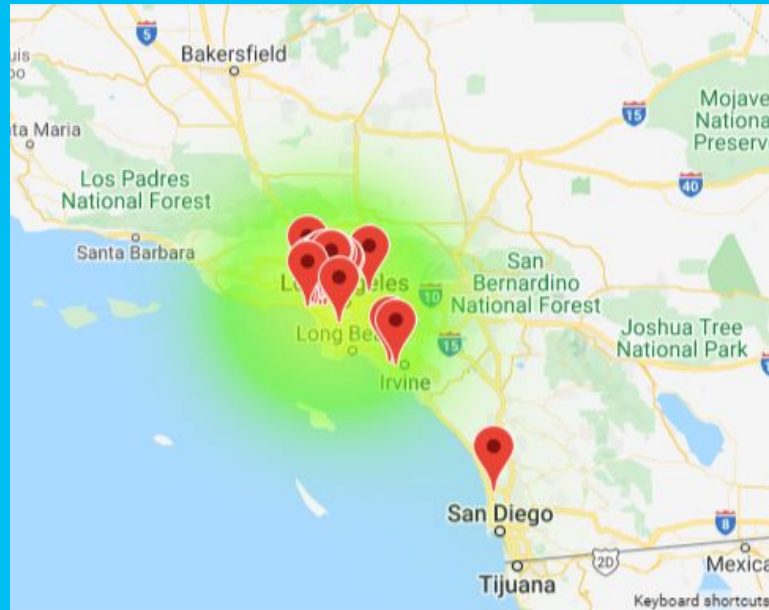
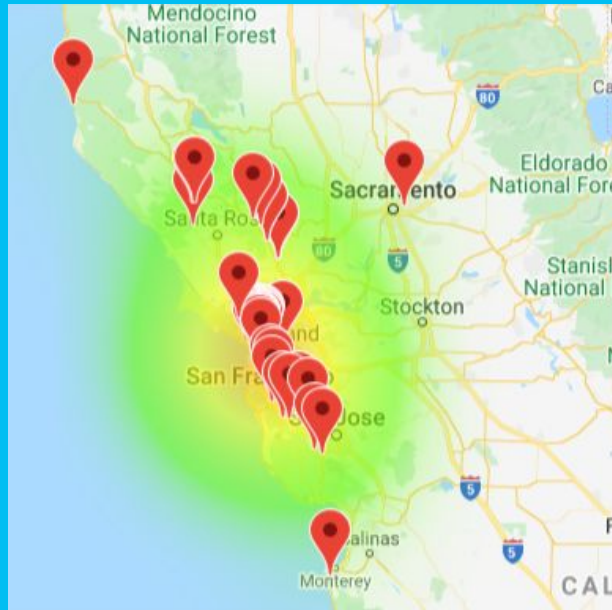
All Michelin Star Restaurants Worldwide

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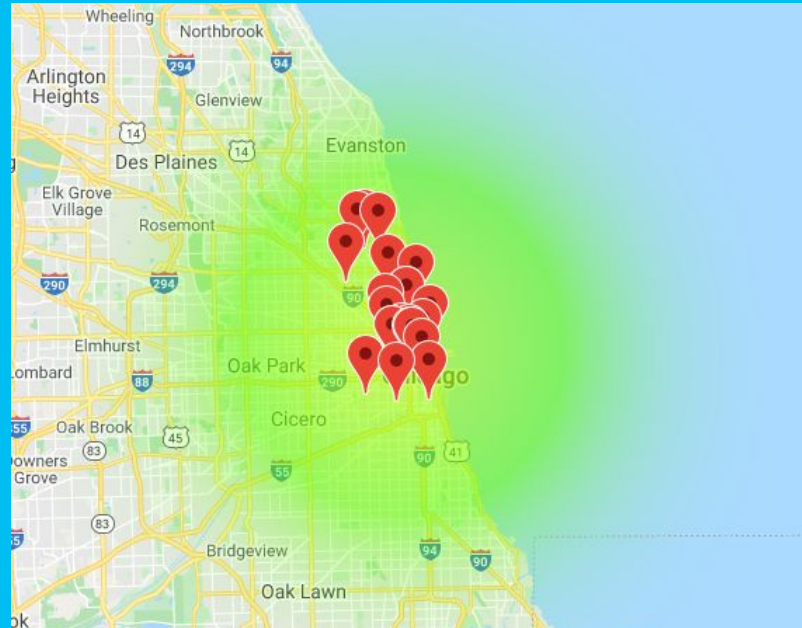
Western US regions - Concentrated in San Francisco and Los Angeles

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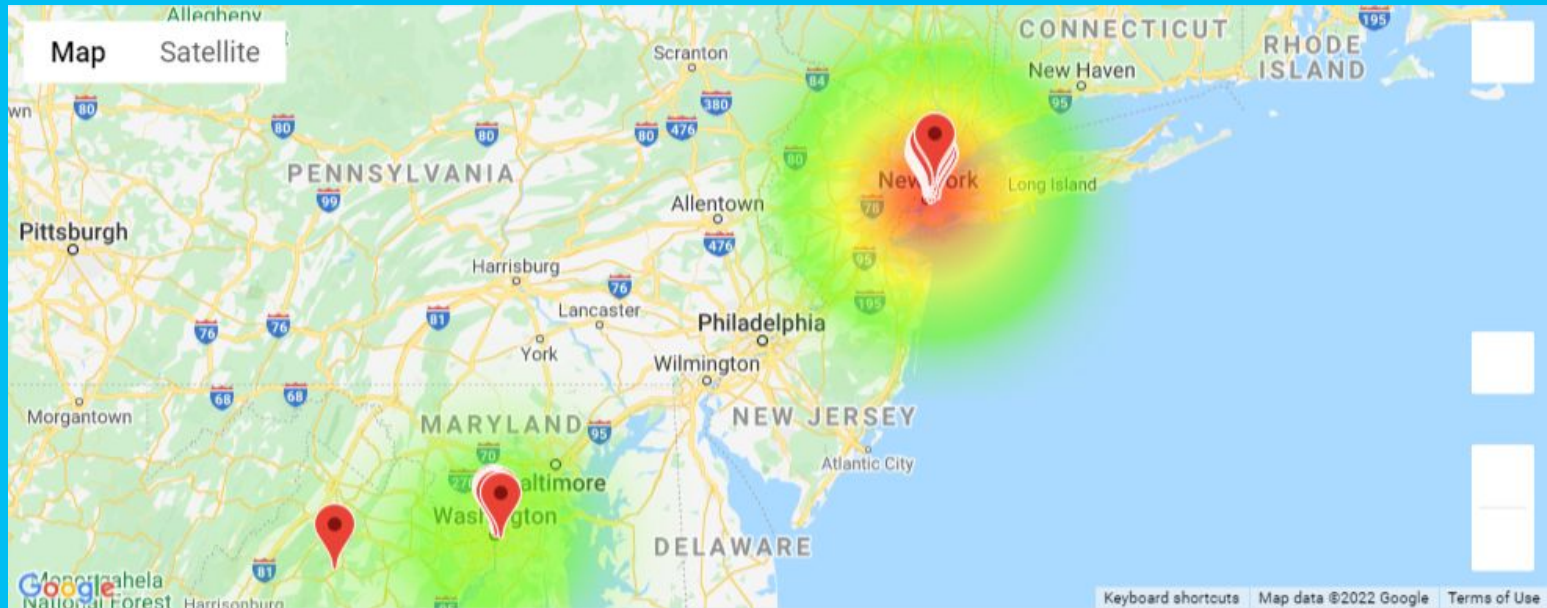
Mid-Western US regions - Chicago only

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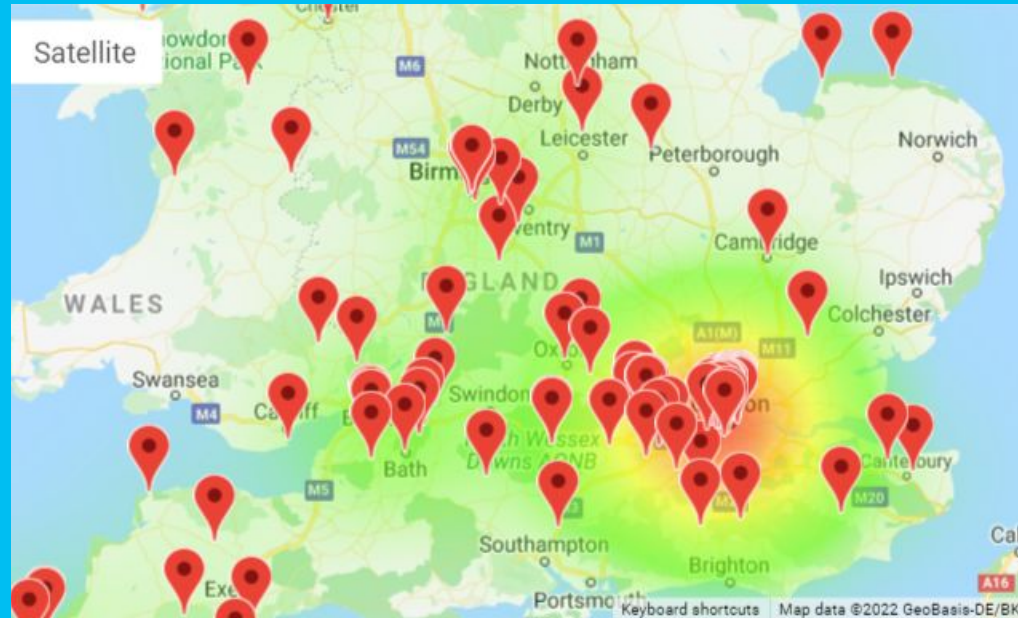
Eastern US regions - Concentrated in New York City and Washington, DC

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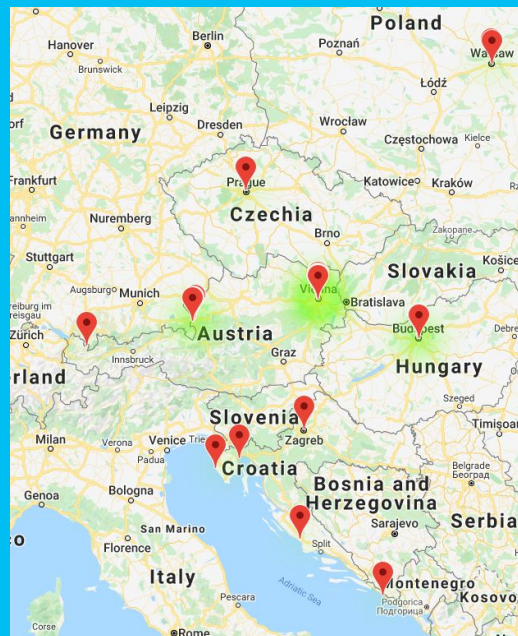
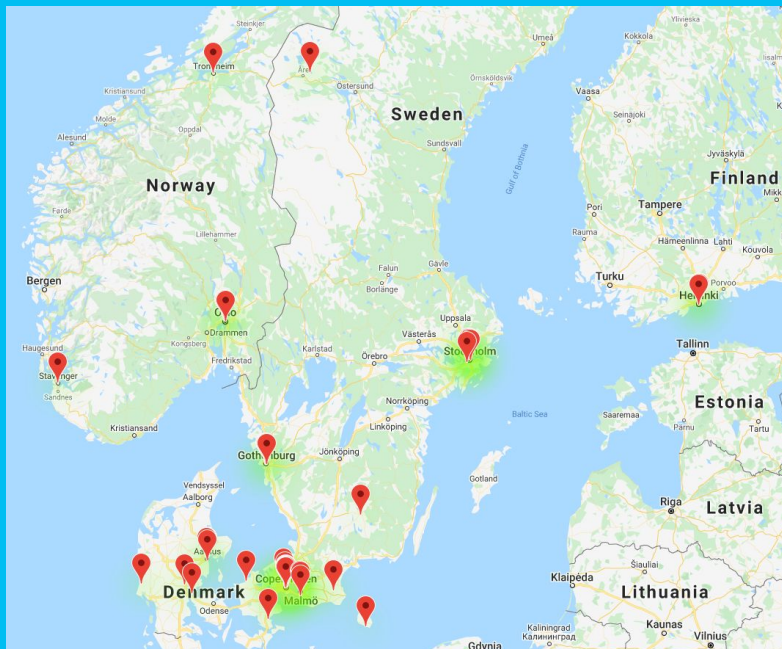
UK regions - Concentrated in London

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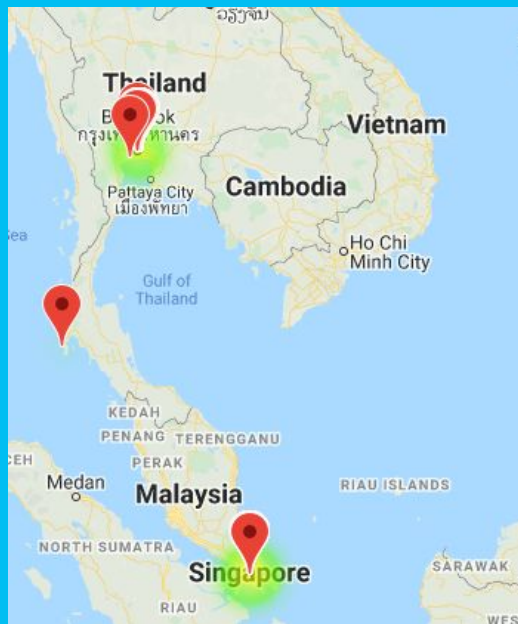
European regions - Scandinavia and Eastern Europe

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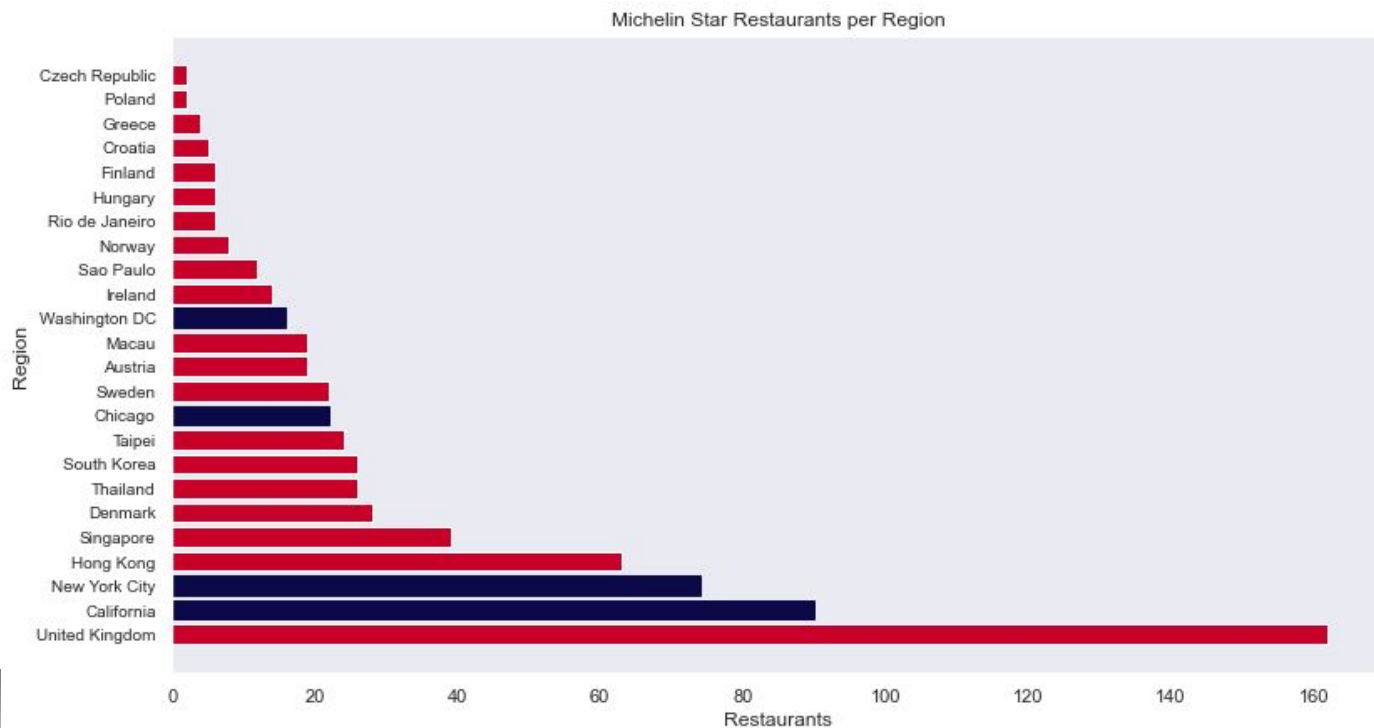
Asian regions - Scattered across the continent

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Charts related to region

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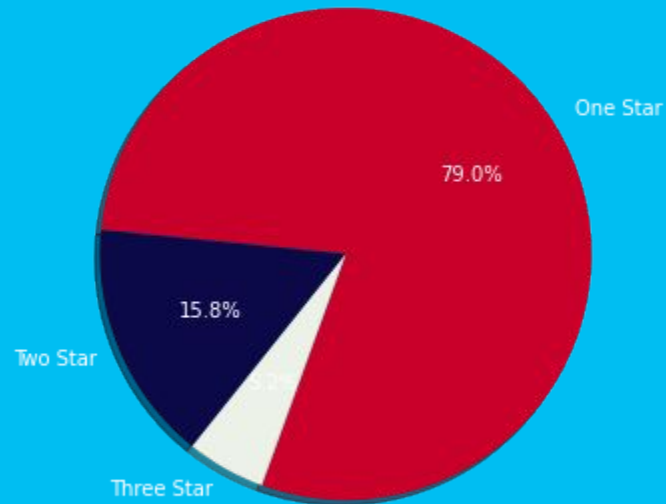


**What proportion of restaurants
are one, two or three stars?**

Breakdown of Michelin Star Restaurants (International)

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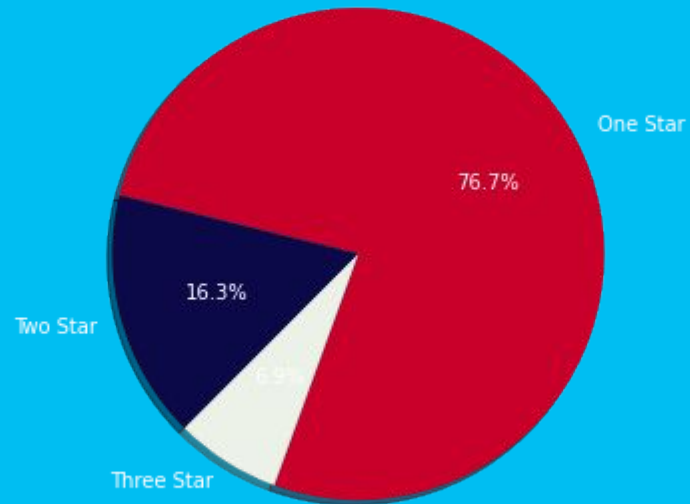
Amount of Michelin Star Restaurants



Breakdown of Michelin Star Restaurants (United States)

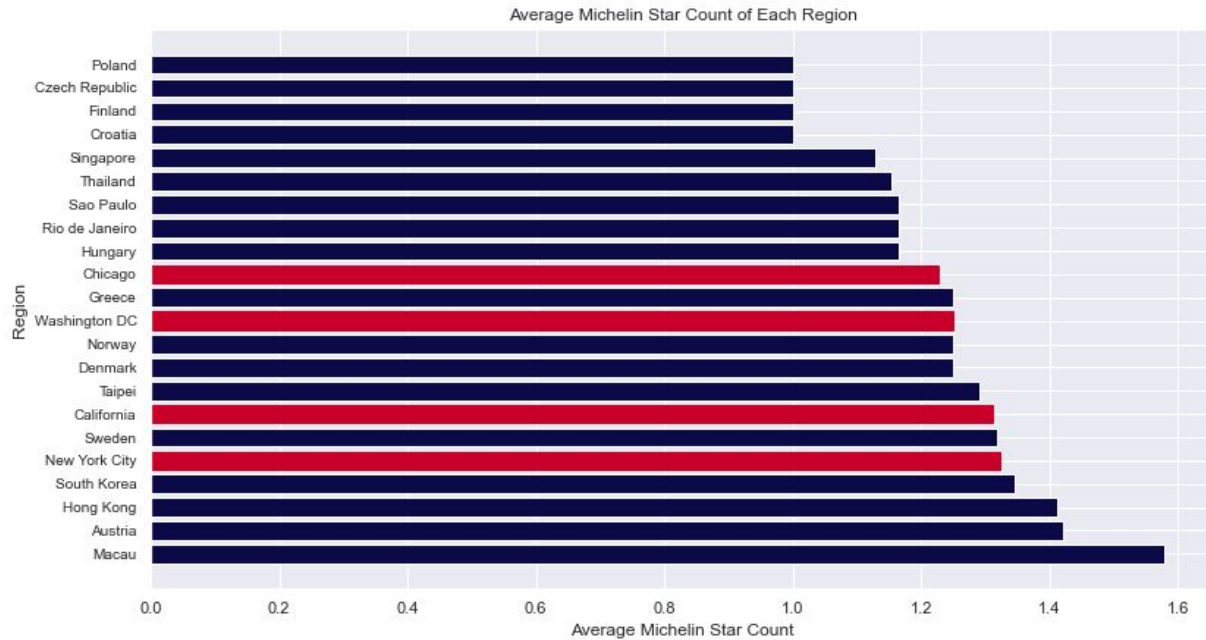
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US- Amount of Michelin Star Restaurants



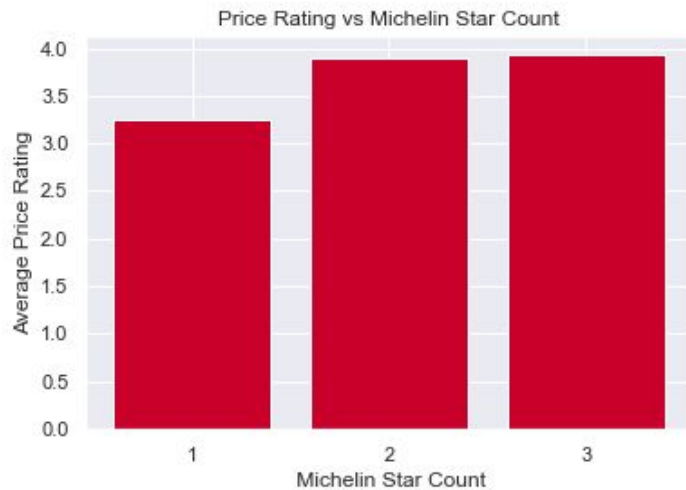
Average Michelin Star Count for Regions Worldwide

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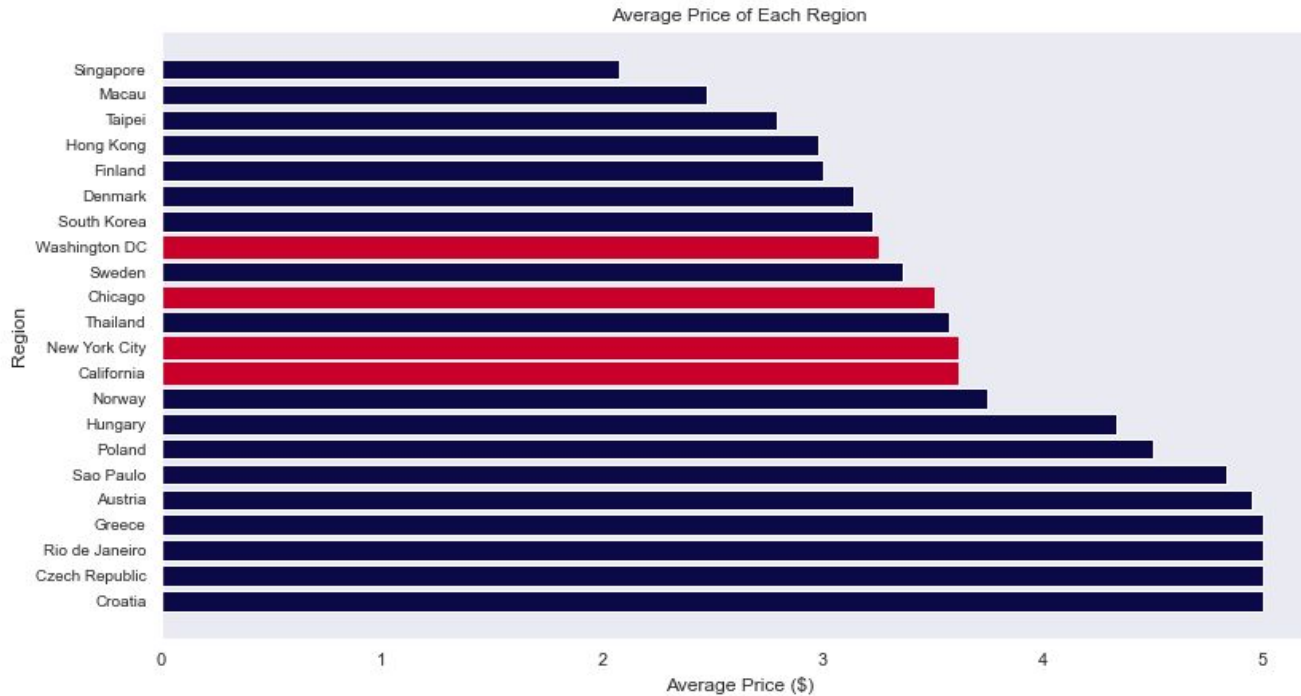
Average Price Rate versus Michelin Star Count

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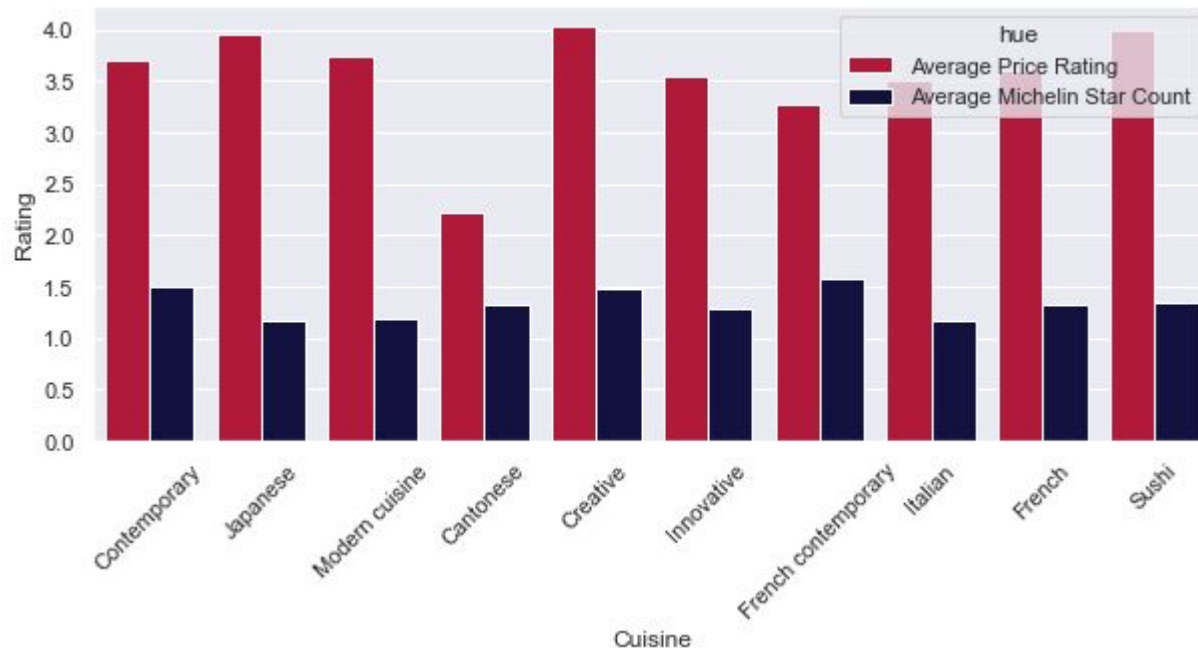
How do prices compare between location and star level?

Average Price Rating For each Region



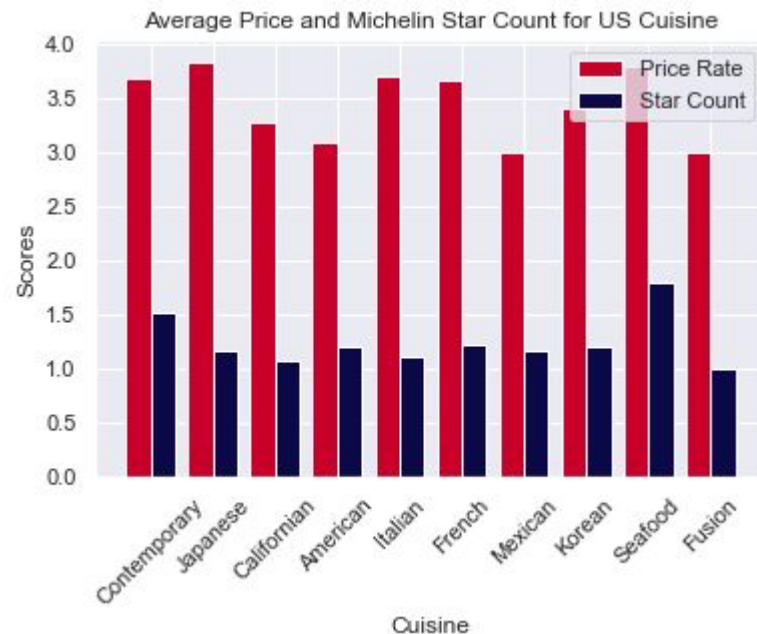
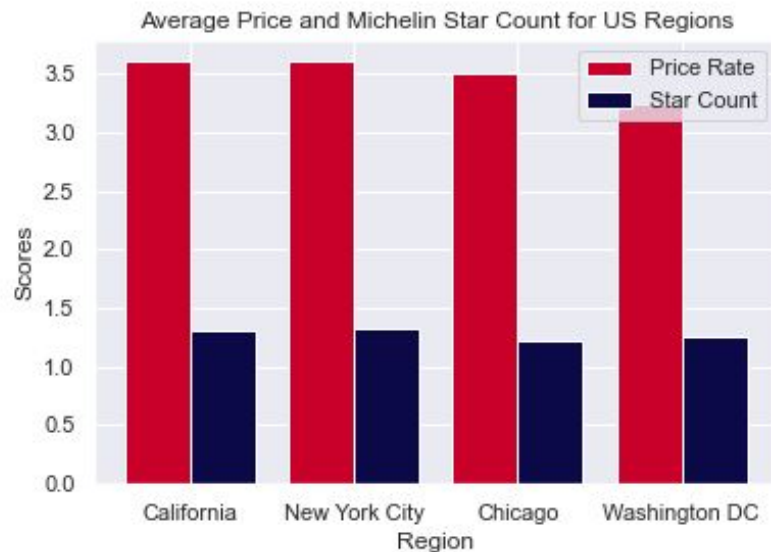
International Average Price and Michelin Star Count of 10 most popular cuisines

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US Region and Cuisine Breakdown

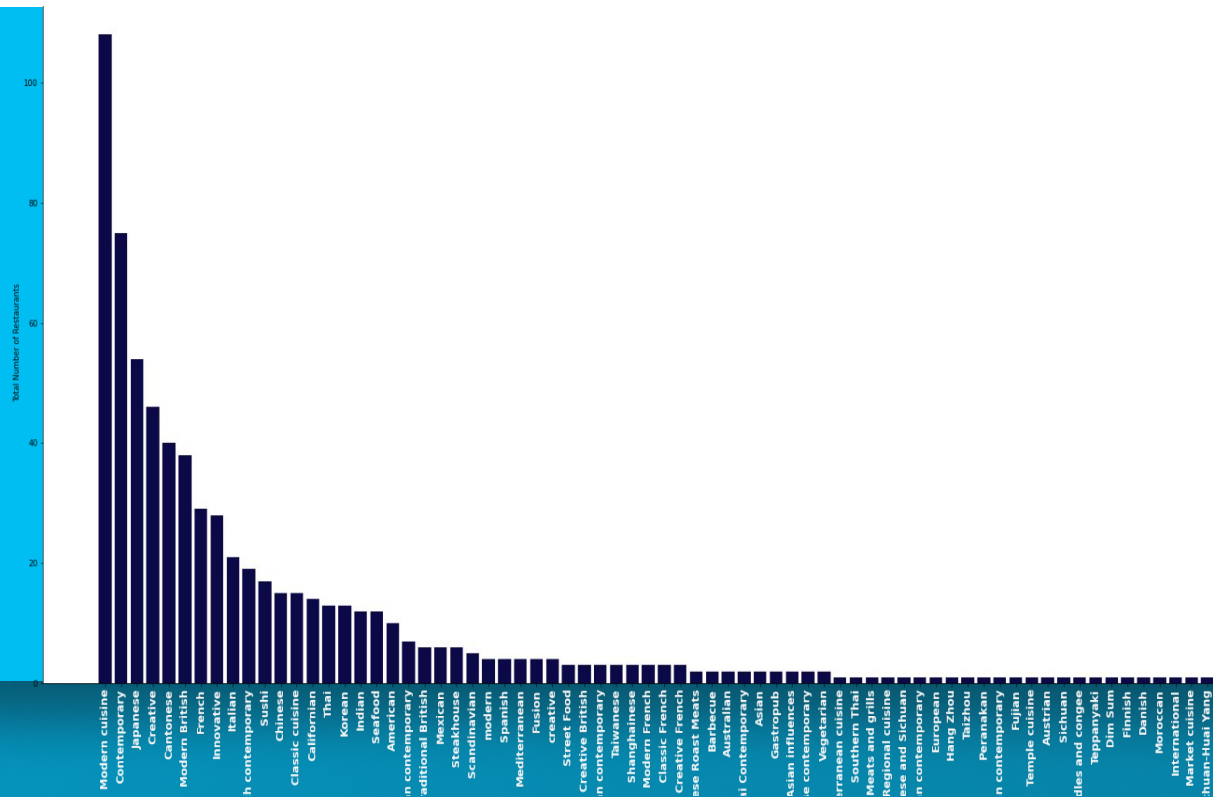
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What are the most popular cuisines worldwide?

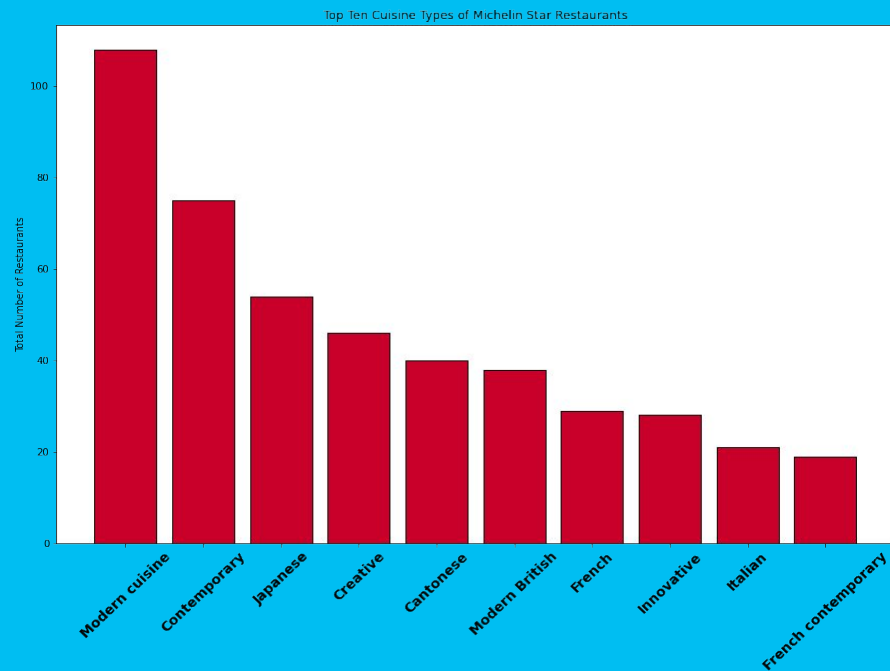
All Cuisine Internationally

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Top Ten Michelin Star Cuisines Worldwide

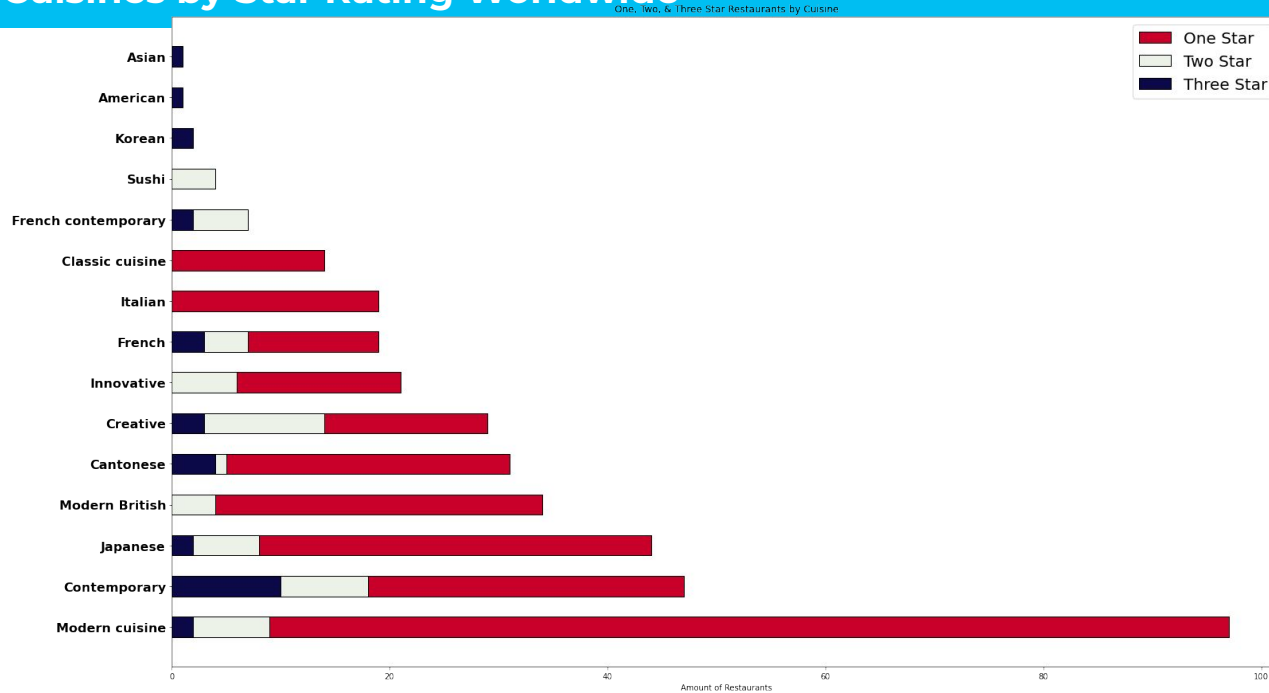
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Cuisine

Top Cuisines by Star Rating Worldwide

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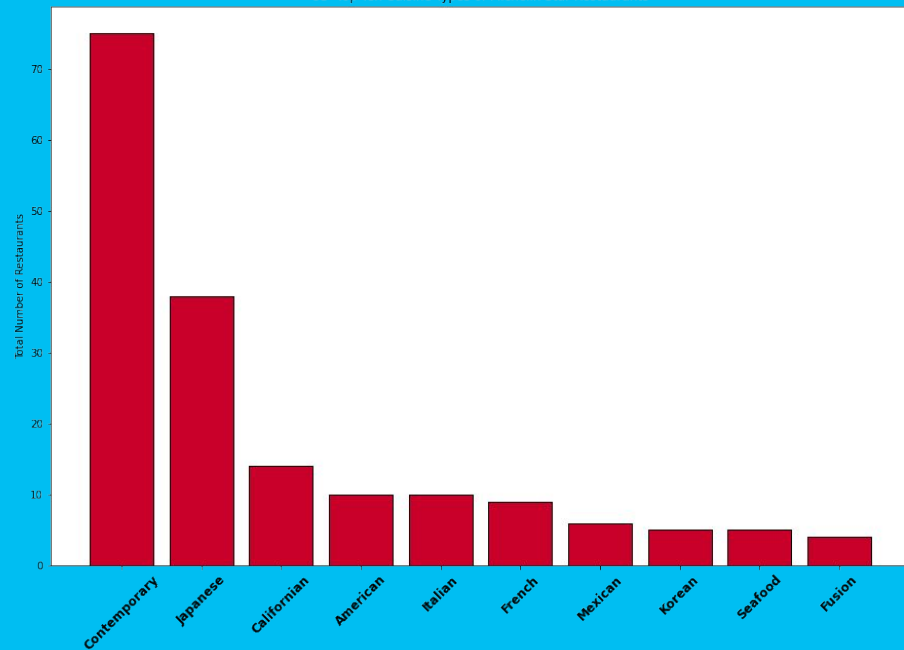


What are the most popular cuisines in the United States?

US Top Ten Cuisines

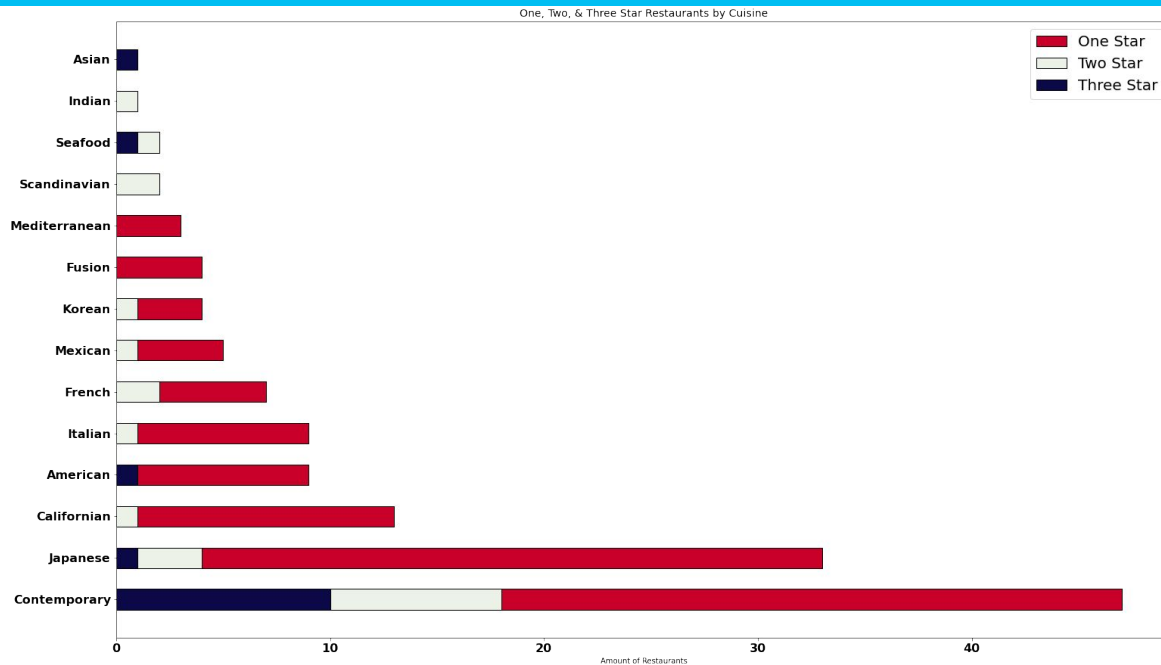
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US- Top Ten Cuisine Types of Michelin Star Restaurants



US Cuisine by Star Rating

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Logistic Regression

Predicting categories in a classification problem

What is a logistic regression?

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The Code - Includes Census Data

```
feature = mergedcensus_df[['Population', 'Median Age',  
    'Household Income', 'Per Capita Income', 'Poverty  
    Count', 'Unemployment Count', 'Unemployment Rate',  
    'michelin_star_count']]
```

```
target = mergedcensus_df["price"]
```

```
reg = LogisticRegression()
```

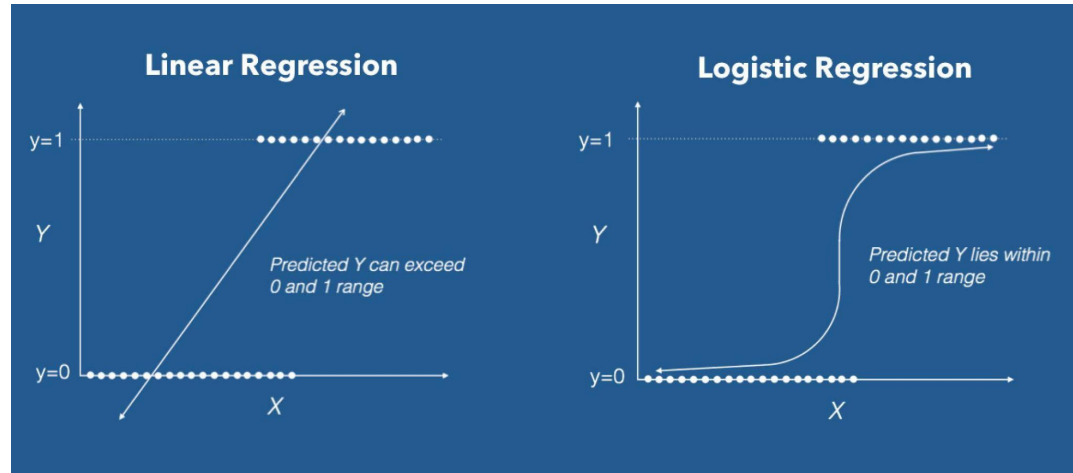
```
reg.fit(np.array(feature), np.array(target))
```

```
predicted = reg.predict(feature)
```

```
actual = target
```

```
probs = reg.predict_proba(feature)
```

It is a predictive algorithm that is based off of binary categories, rather than a slope with numerical values.



Regression Cont. - Predicted

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```
In [27]: predicted
```

[illegible]

Based on all the data brought in from the US census, the US restaurants are predicted at these price points.

It is predicting overwhelmingly 4\$ prices, which is inaccurate.

Regression Cont. - Actual

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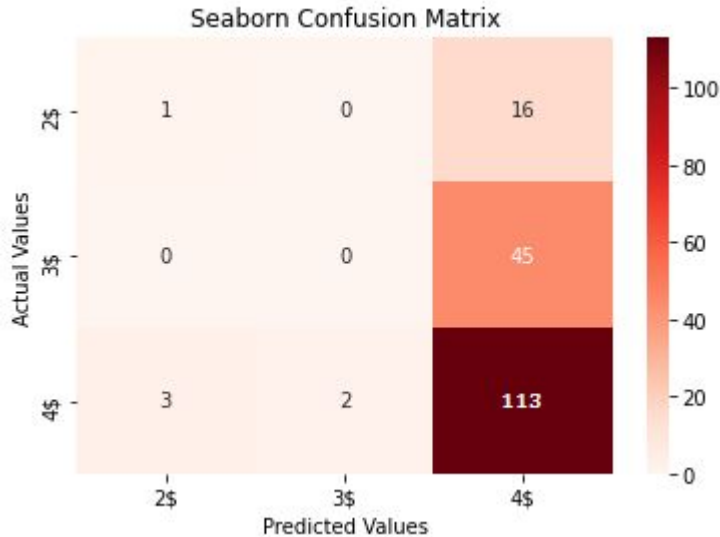
```
In [28]: actual
Out[28]: 0      $$$$
          1      $$$
          2      $$$
          3      $$$
          4      $$$$
          ...
          175    $$$$
          176    $$$$
          177    $$$$
          178    $$$$
          179    $$$$
          Name: price, Length: 180, dtype: object
```

The actual price points of these restaurants is more varied than was predicted, with several 2\$ and 3\$ restaurants.

```
In [21]: mergedcensus_df.price.value_counts()
Out[21]: $$$$      118
          $$$       45
          $$        17
          Name: price, dtype: int64
```


Regression - Confusion Matrix

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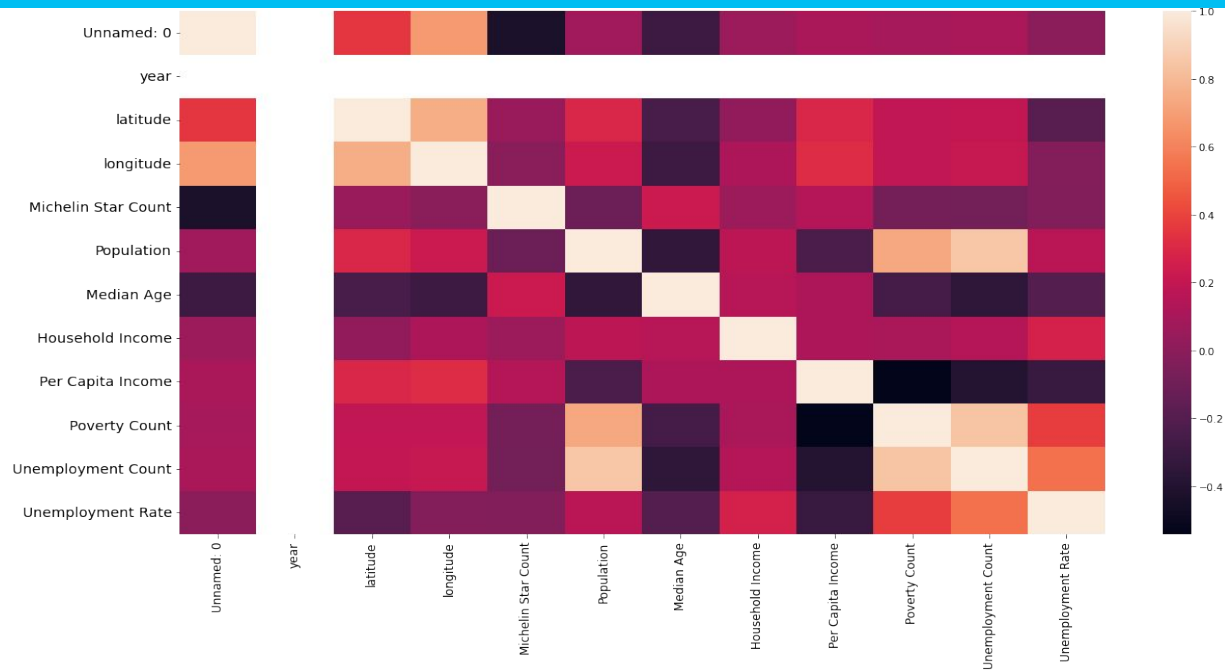
The confusion matrix shows how inaccurate the regression is.

Only one 2\$ price point was accurately predicted, and no 3\$ price points were predicted correctly.

Almost everything was predicted to be 4\$.

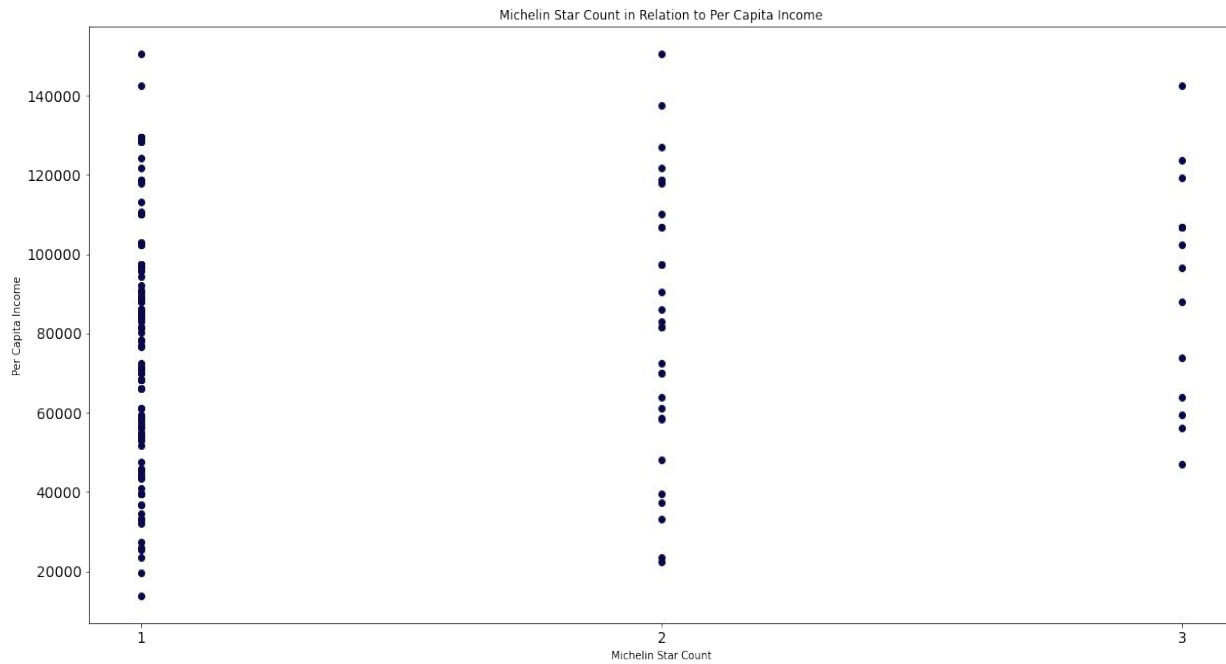
Correlation Heatmap

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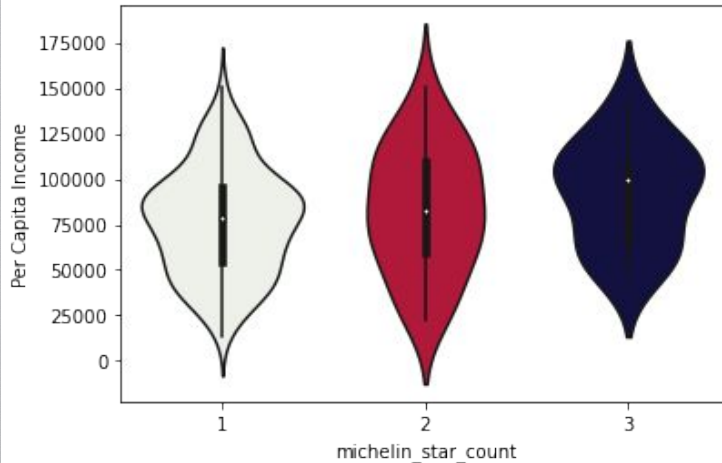
Correlation Heatmap/Pairplot

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ANOVA- Average Michelin Star by Per Capita Income - Violinplot

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ANOVA stands for Analysis Of Variance. It tests the differences between two or more means.

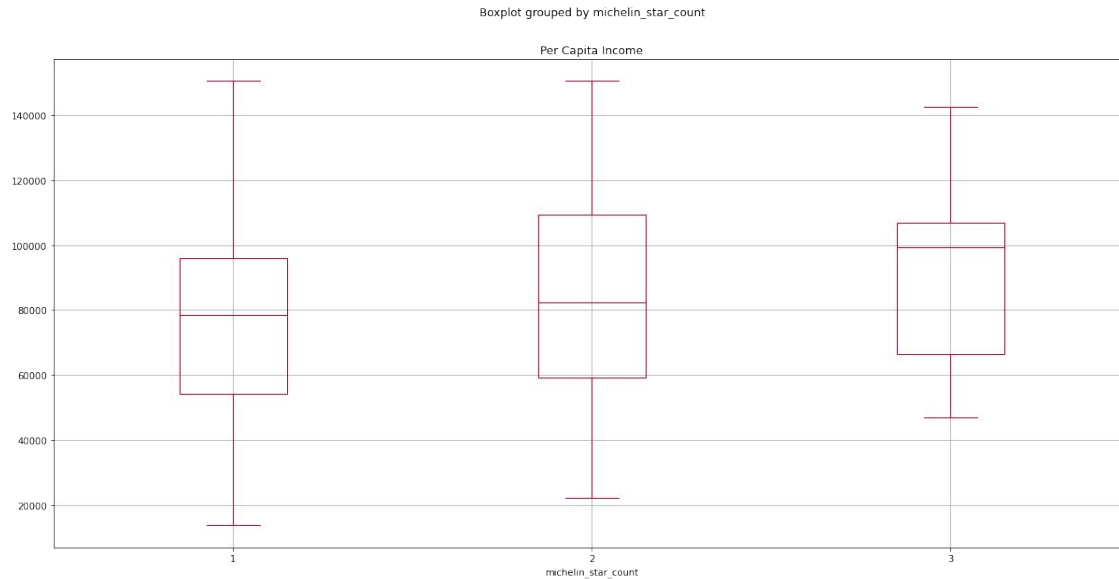
This chart compares the average regional Per Capita Income versus the Michelin Star Count.

The average PCI is higher for 3-star restaurants. The average PCI for 1-star restaurants is around \$75k, 2-star is around \$83k, and 3-star is nearly \$100k.

Average PCI increases as star count increases.

ANOVA Cont. - Boxplot

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The average PCI is much higher for 3-star restaurants than for 1- and 2-star restaurants.

There are no outliers for PCI based on Michelin star count.

Conclusions

The region with the most Michelin Star restaurants is the United Kingdom. Approximately, 79% of Michelin Star restaurants are one star. Average price increases with star count and per capita income in the United States. Higher star count also correlates to higher restaurant price worldwide.

References

<https://www.kaggle.com/jackywang529/michelin-restaurants?select=one-star-michelin-restaurants.csv>

<https://www.kaggle.com/lunamcbride24/michelin-star-exploration-classification>

<https://www.kaggle.com/thomaskonstantin/michelin-restaurants-eda-missing-price-prediction>

<https://www.census.gov/data/developers/data-sets.html>

<https://guide.michelin.com/us/en/restaurants>

Colors reference image - #C9002A, #0C0948, #EDF2E8

