CAR PRICE PREDICTION

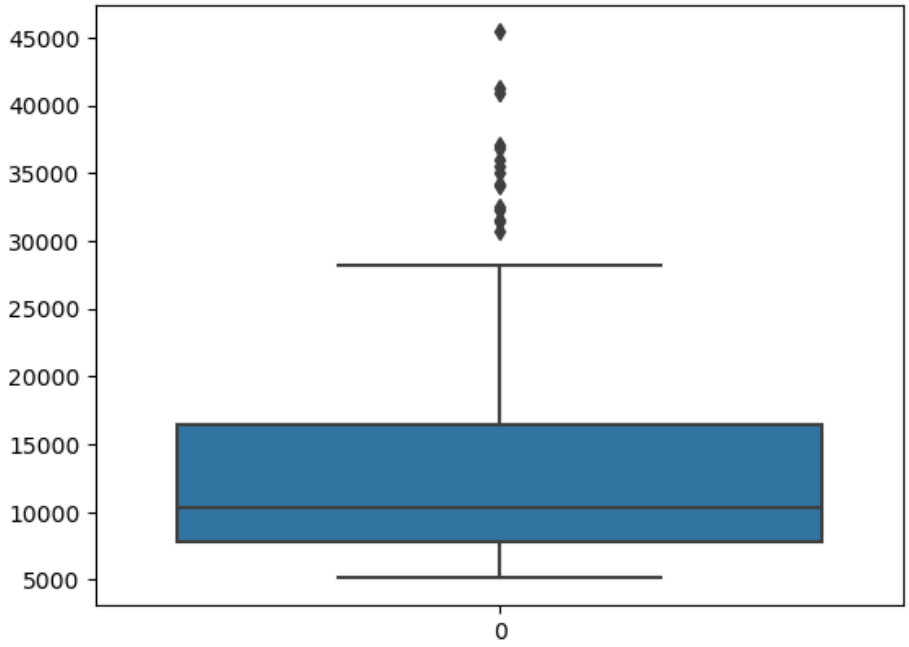
https://github.com/yasking68/Maha-ML-Project/tree/main/Project%20MAHA

We are tasked with modeling the price of cars using the available independent variables. This model will enable management to understand precisely how prices fluctuate with these variables. Consequently, they can adjust car designs, business strategies, and other factors to achieve specific pricing levels. Additionally, the model will provide valuable insights for management to comprehend the pricing dynamics in a new market.

Our Data :

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 205 entries, 0 to 204
Data columns (total 26 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   car_ID            205 non-null    int64
 1   symboling         205 non-null    int64
 2   CarName           205 non-null    object
 3   fueltype          205 non-null    object
 4   aspiration        205 non-null    object
 5   doornumber        205 non-null    int64
 6   carbody           205 non-null    object
 7   drivewheel        205 non-null    object
 8   enginelocation    205 non-null    object
 9   wheelbase         205 non-null    float64
 10  carlength         205 non-null    float64
 11  carwidth          205 non-null    float64
 12  carheight         205 non-null    float64
 13  curbweight        205 non-null    int64
 14  enginetype        205 non-null    object
 15  cylindernumber    205 non-null    int64
 16  enginesize        205 non-null    int64
 17  fuelsystem        205 non-null    object
 18  boreratio         205 non-null    float64
 19  stroke            205 non-null    float64
 20  compressionratio  205 non-null    float64
 21  horsepower        205 non-null    int64
 22  peakrpm           205 non-null    int64
 23  citympg           205 non-null    int64
 24  highwaympg        205 non-null    int64
 25  price             205 non-null    float64
dtypes: float64(8), int64(10), object(8)
memory usage: 41.8+ KB
```

Check of Outlier:



To gain a better understanding of the car price distribution in our dataset, we use a box plot. The box plot provides a visual summary of the minimum, first quartile (Q1), median, third quartile (Q3), and maximum values, as well as any potential outliers.

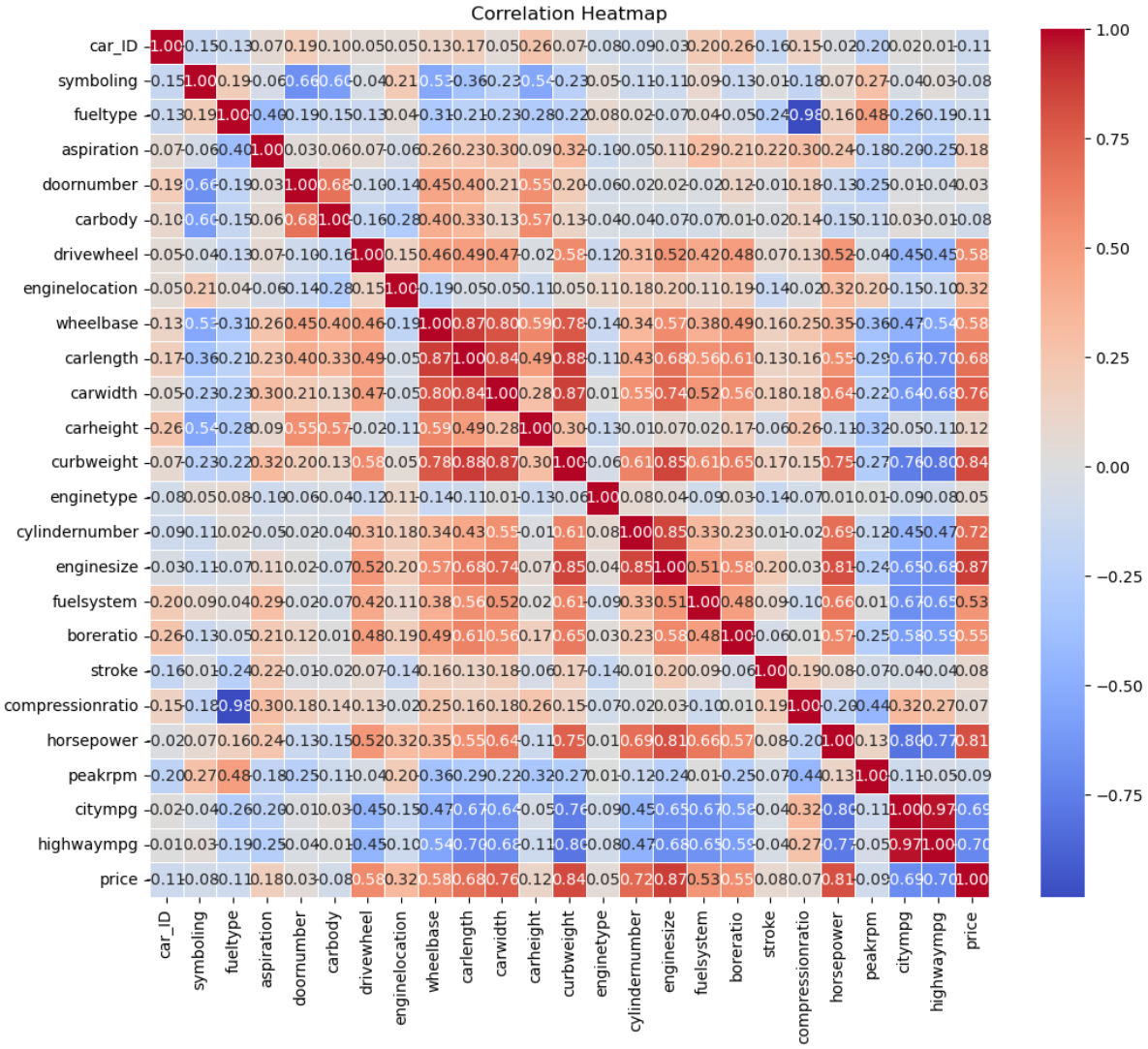
From the box plot, we observe that the majority of car prices range from approximately 5,000 to 25,000, with a median price around 10,000. There are several outliers with prices above 30,000, indicating some cars are significantly more expensive than the rest.

This exploratory analysis helps in understanding the overall distribution and spread of car prices, which is essential for building an accurate prediction model.

To prepare the dataset for generating the machine learning model, I encoded the categorical variables into numerical format. This is necessary because machine learning algorithms require numerical inputs to process the data effectively.

To understand the relationship between the car prices and the independent variables, I calculated the correlation matrix. This matrix helps in identifying which variables have a significant linear relationship with the car prices.

After computing the correlation matrix, I plotted a heatmap to visualize the correlations among the numerical variables in the dataset. This visualization helps in identifying the strength and direction of relationships between different pairs of variables.



The analysis of the scatter plot and heatmap reveals that several independent variables significantly influence car prices. Variables such as drive wheel type, wheelbase, car length, car width, curb weight, cylinder number, engine size, fuel system, bore ratio, and horsepower exhibit a positive correlation with car prices, indicating that as these values increase, car prices tend to rise. Conversely, city MPG and highway MPG show a negative correlation, meaning higher fuel efficiency in city and highway driving is associated with lower car prices. These insights are essential for understanding the key factors that impact car pricing and will be crucial in developing an accurate predictive model.

I'll create a machine learning model using multiple variables for predicting car prices using Linear Regression. The independent variables influencing the car price include 'drivewheel', 'wheelbase', 'carlength', 'carwidth', 'curbweight', 'cylindernumber', 'enginesize', 'fuelsystem', 'boreratio', 'horsepower', 'citympg' (negatively correlated), and 'highwaympg' (negatively correlated). We'll employ Linear Regression for this task.

```
[109]: #check the Accuracy of created ML model
       linre.score(x,y)

[109]: 0.8304847089055049
```

In conclusion, the analysis of the results indicates that the machine learning model developed for car price prediction using multiple variables and linear regression performs admirably. With a score of 0.83, the model demonstrates a robust ability to predict car prices accurately. Moreover, the predicted values closely align with the actual values, affirming the model's efficacy. These findings suggest that the created machine learning model is not only effective but also reliable for car price prediction tasks.