



**A  
PRESENTATION  
on  
“Car Price Prediction”**



**HENRY HARVIN EDUCATION  
SECTOR-2, C-107, NOIDA, UP**

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ABHIJIT ROY

# PREDICTIVE ANALYSIS CASE STUDY

## SUBMISSION :

Linear Regression Model to Predict the price of cars and determine the factors driving car price.

## CASE STUDY OVERVIEW

# PROBLEM STATEMENT

A Japanese automobile company Torao Yamaha Auto aspires to enter the US market by setting up their manufacturing unit there and producing cars locally to give competition to their US and European counterparts.

They have contracted an automobile consulting company to understand the factors on which the pricing of cars depends. Specifically, they want to understand the factors affecting the pricing of cars in the American market, since those may be very different from the Japanese market. The company wants to know:

- Which variables are significant in predicting the price of a car
- How well those variables describe the price of a car



# BUSINESS GOAL

It is required to model the price of cars with the available independent variables. It will be used by the management to understand how exactly the prices vary with the independent variables. They can accordingly manipulate the design of the cars, the business strategy etc. to meet certain price levels.

Further, the model will be a good way for management to understand the pricing dynamics of a new market.

# Data Reading and Understanding

The data set contains 205 entries and 29 columns. The names of those columns are :

Company,  
cars range,  
Symboling,  
engine type,  
carbody,  
door number,  
engine location,  
fuel system,  
cylinder number,  
aspiration,  
drive wheel,

Car\_ID,  
car length,  
car width, fuel type,  
car height,  
car volume,  
curb weight,  
Horsepower,  
Bore Ratio,  
Compression Ratio,  
Highway miles per gallon (mpg),  
Engine Size,  
Stroke, City Miles per gallon (mpg),  
Fuel economy,  
Peak Revolutions per Minute (rpm),  
Wheel Base, Price.

Here, our **target variable** is “**PRICE**”.



## Assumptions and Data Handling

**Car Company:** We have assumed that Volkswagen, vokswagen, and vw are the same companies, and same for others.

**Data Cleaning:** We have renamed the car company names to their correct names, as per our understanding. We have converted all the data to lower case to avoid any case errors. The **deduplicated** function searched for any duplicate values in our data and found none.

There were no missing values in the data and by performing the above steps, we prepared our data for analysis.

A separate data set **corr** was created that dealt only with the correlation of our target variable, price. This was done in order to select the best response variables for our study.

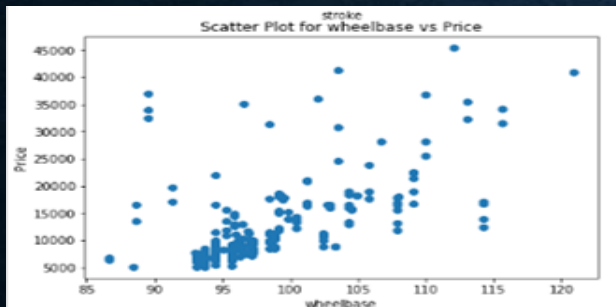
Another dataset **cars** was created that included only the columns that we selected based on our data exploration.

# Data Exploration

Based on our data exploration, we chose the best features that would help us predict the prices of the cars. These are :

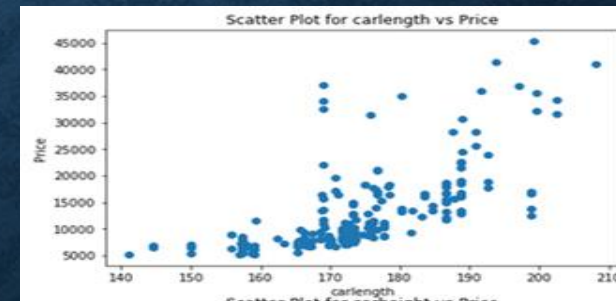
Wheel Base, Car Length, Car Width, Curb Weight, Engine Size, Bore Ratio, Horsepower, Car Volume, Fuel Economy, Cars Range, Car Body, Fuel Type, Engine Type, Aspiration, Cylinder Number, Drive wheel

## 1. Wheel Base



It seems to have a significant positive correlation with price.

## 2. Car Length



It seems to have a significant positive correlation with price.

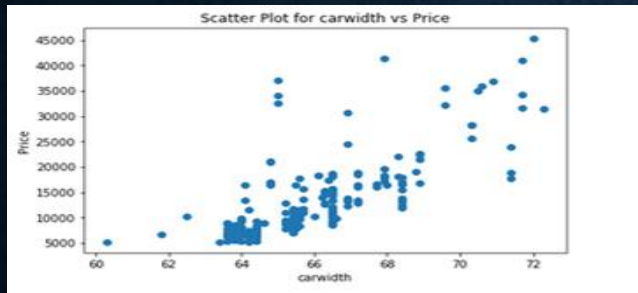


# Exploratory Data Analysis

Based on our data exploration, we chose the best features that would help us predict the prices of the cars. These are :

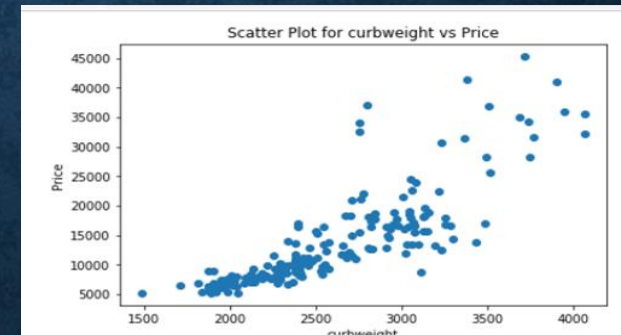
Wheel Base, Car Length, Car Width, Curb Weight, Engine Size, Bore Ratio, Horsepower, Car Volume, Fuel Economy, Cars Range, Car Body, Fuel Type, Engine Type, Aspiration, Cylinder Number, Drive wheel

## 3. Car Width



It seems to have a significant positive correlation with price.

## 4. Curb Weight



It seems to have a significant positive correlation with price.



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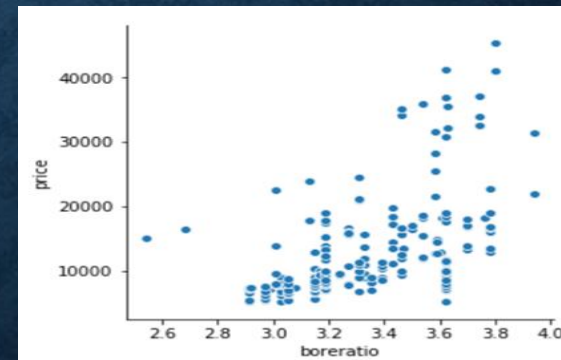
Wheel Base, Car Length, Car Width, Curb Weight, Engine Size, Bore Ratio, Horsepower, Car Volume, Fuel Economy, Cars Range, Car Body, Fuel Type, Engine Type, Aspiration, Cylinder Number, Drive wheel

## 5. Engine Size



It seems to have a significant positive correlation with price.

## 6. Bore Ratio



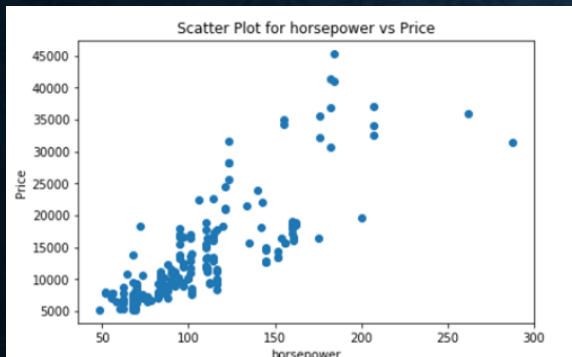
It seems to have a significant positive correlation with price.

# Exploratory Data Analysis

Based on our data exploration, we chose the best features that would help us predict the prices of the cars. These are :

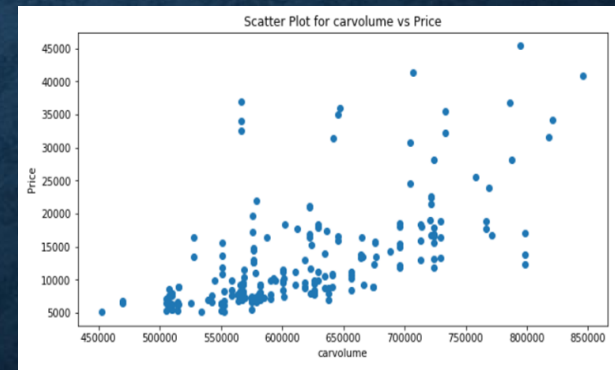
Wheel Base, Car Length, Car Width, Curb Weight, Engine Size, Bore Ratio, Horsepower, Car Volume, Fuel Economy, Cars Range, Car Body, Fuel Type, Engine Type, Aspiration, Cylinder Number, Drive wheel

## 7. Horse Power



It seems to have a significant positive correlation with price.

## 8. Car Volume



It seems to have a significant positive correlation with price.

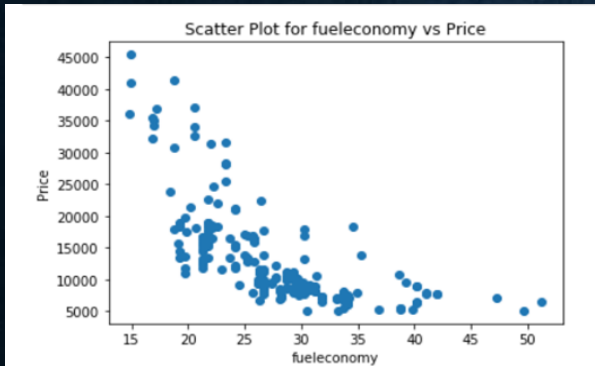


# Exploratory Data Analysis

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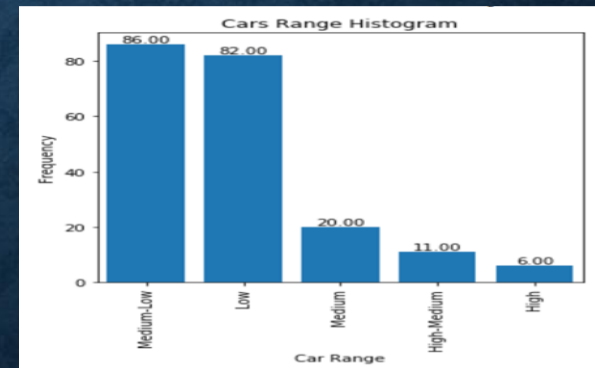
Wheel Base, Car Length, Car Width, Curb Weight, Engine Size, Bore Ratio, Horsepower, Car Volume, Fuel Economy, Cars Range, Car Body, Fuel Type, Engine Type, Aspiration, Cylinder Number, Drive wheel

## 9. Fuel Economy



It seems to have a significant negative correlation with price.

## 10. Cars Range



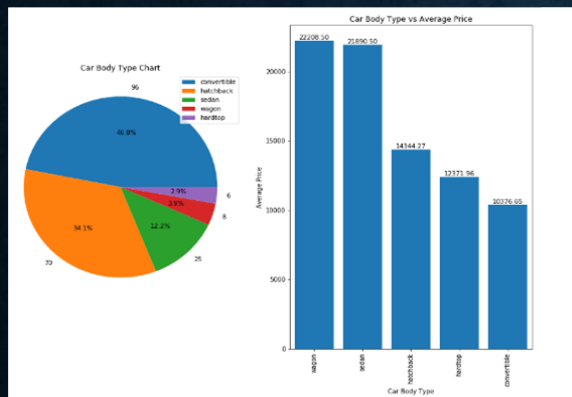
It seems that most people prefer medium-low range and low range cars.

# Exploratory Data Analysis

Based on our data exploration, we chose the best features that would help us predict the prices of the cars. These are :

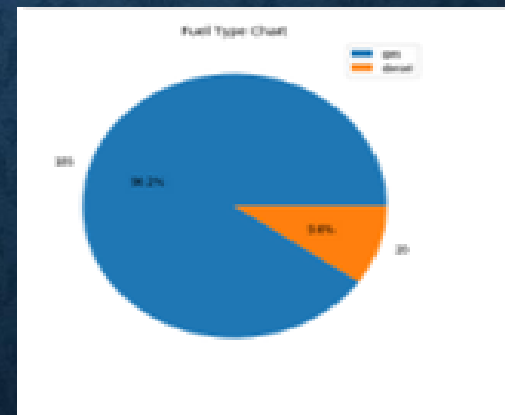
Wheel Base, Car Length, Car Width, Curb Weight, Engine Size, Bore Ratio, Horsepower, Car Volume, Fuel Economy, Cars Range, Car Body, Fuel Type, Engine Type, Aspiration, Cylinder Number, Drive wheel

## 11. Car Body



It seems that people prefer convertible due to its low price range

## 12. Fuel Type



It seems that most people prefer gas cars despite their high price range.

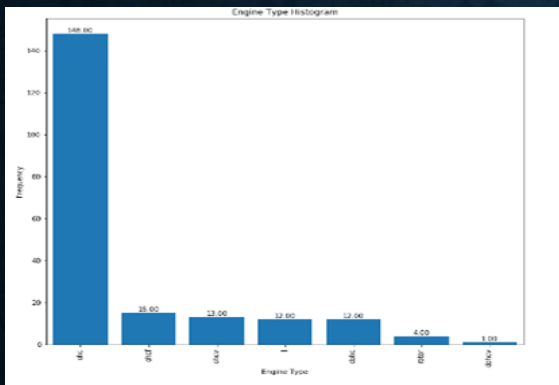


# Exploratory Data Analysis

Based on our data exploration, we chose the best features that would help us predict the prices of the cars. These are :

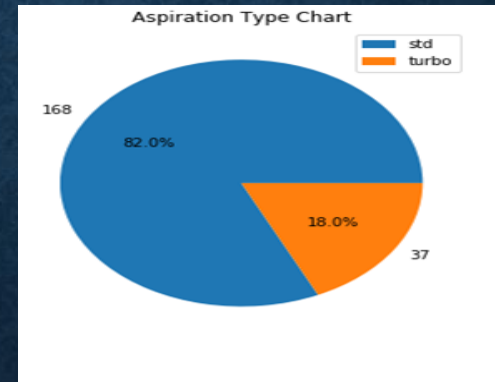
Wheel Base, Car Length, Car Width, Curb Weight, Engine Size, Bore Ratio, Horsepower, Car Volume, Fuel Economy, Cars Range, Car Body, Fuel Type, Engine Type, Aspiration, Cylinder Number, Drive wheel

## 13. Engine Type



It seems that people prefer ohc engine type for their cars.

## 14. Aspiration



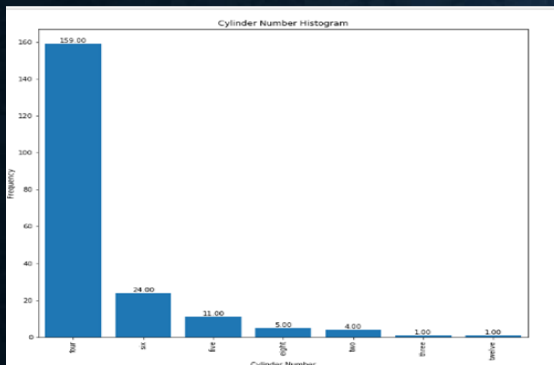
It seems that most people prefer std aspiration for their cars.

# Exploratory Data Analysis

Based on our data exploration, we chose the best features that would help us predict the prices of the cars. These are :

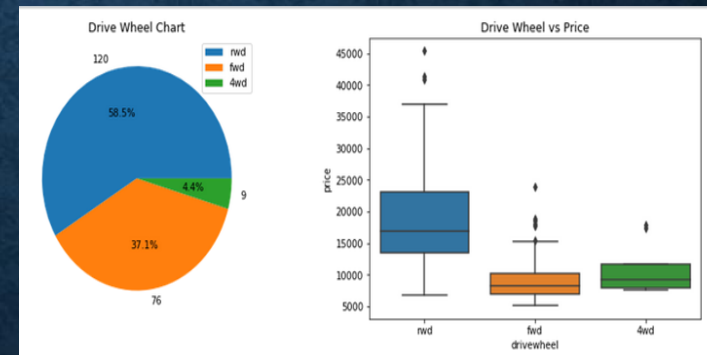
Wheel Base, Car Length, Car Width, Curb Weight, Engine Size, Bore Ratio, Horsepower, Car Volume, Fuel Economy, Cars Range, Car Body, Fuel Type, Engine Type, Aspiration, Cylinder Number, Drive wheel

## 15. Cylinder Number



It seems that people prefer four cylinders for their cars.

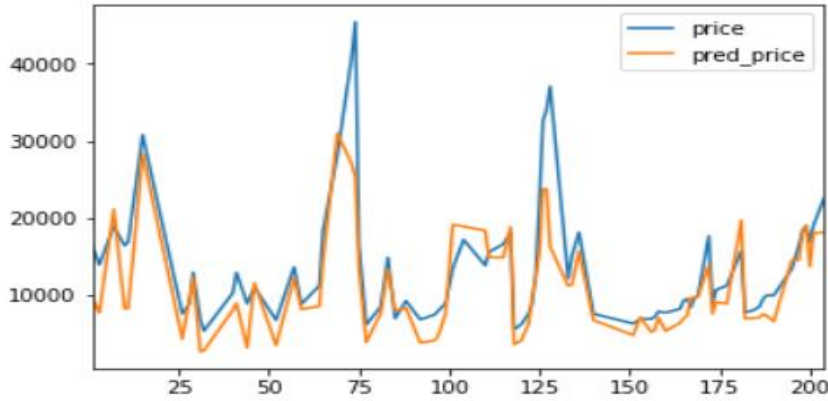
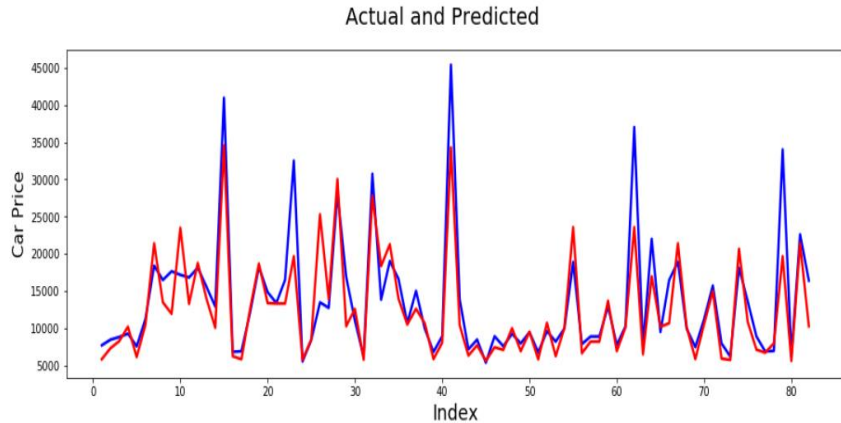
## 16. Drive wheel



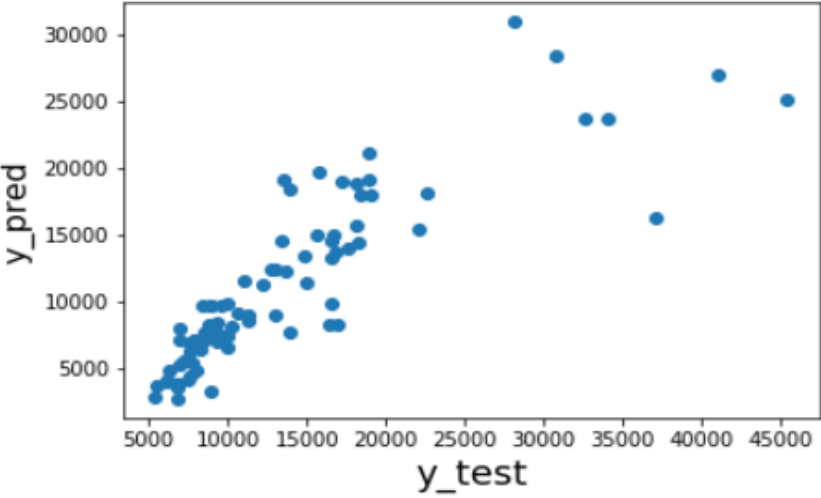
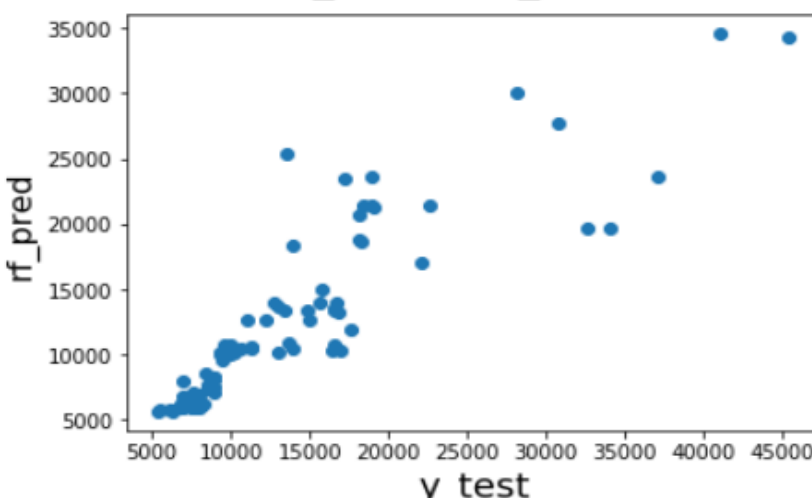
It seems that most people prefer rwd drive wheel despite of its high price range.



# Technique Comparison

Simple Linear Regression	Random Forest Regression
In simple linear regression our accuracy score was 64.377%	Using random forest our accuracy was 76.147%
When plotted a graph between actual and predicted price, we could see some significant irregularities.	When plotted a graph between actual and predicted price, we noticed negligible irregularities.
	

# Technique Comparison

Simple Linear Regression	Random Forest Regression
<p>When checked the price spread between values, we can clearly see some data points scattered too far away from the rest.</p>	<p>When checked the price spread between values, we can clearly see some data points scattering only after a little while, which is earlier than what we saw in simple linear regression.</p>
<p>y_test vs y_pred</p>  <p>This scatter plot shows the relationship between actual values (y_test) on the x-axis and predicted values (y_pred) on the y-axis for a simple linear regression model. Both axes range from 5000 to 45000. The data points are widely scattered, indicating a poor fit and high variance in the predictions.</p>	<p>y_test vs rf_pred</p>  <p>This scatter plot shows the relationship between actual values (y_test) on the x-axis and predicted values (rf_pred) on the y-axis for a random forest regression model. Both axes range from 5000 to 45000. The data points are more tightly clustered along the diagonal line compared to the simple linear regression plot, indicating a better fit and lower variance in the predictions.</p>



# Suggestions and Insights

1. Cars Range is one of the most significant variables for deciding price. Hence, the company should select their price range within 18500\$ to 30000\$ initially.
2. Fuel Economy of the car is very important for the customers these days. The company should make sure the fuel economy of cars is not less than 5 litres/100km.
3. The company should make sure to have cars with drive wheel 'rwd' because people prefer it despite its high price.
4. Most of the cars should have petrol fuel type, because people prefer petrol way more than diesel.
5. Most people prefer convertible despite its price range being medium-high. Hence, company should focus on this as well.

**NOTE:** After doing this analysis we can say that A Car is an Asset to anyone who owns it.

Hence, choose your car very carefully, whether it is for business or for personal purpose.



Thank You!

You can access the project in the following GITHUB Repository:

[https://github.com/jitroy160/Final\\_Projects/blob/master/Final\\_Projects/Final\\_Project\\_Car\\_Price\\_Prediction.ipynb](https://github.com/jitroy160/Final_Projects/blob/master/Final_Projects/Final_Project_Car_Price_Prediction.ipynb)

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THANK YOU