

TEAM X

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Dataset Introduction

Dataset :- mtcars

Source: 1974 Motor Trend US magazine

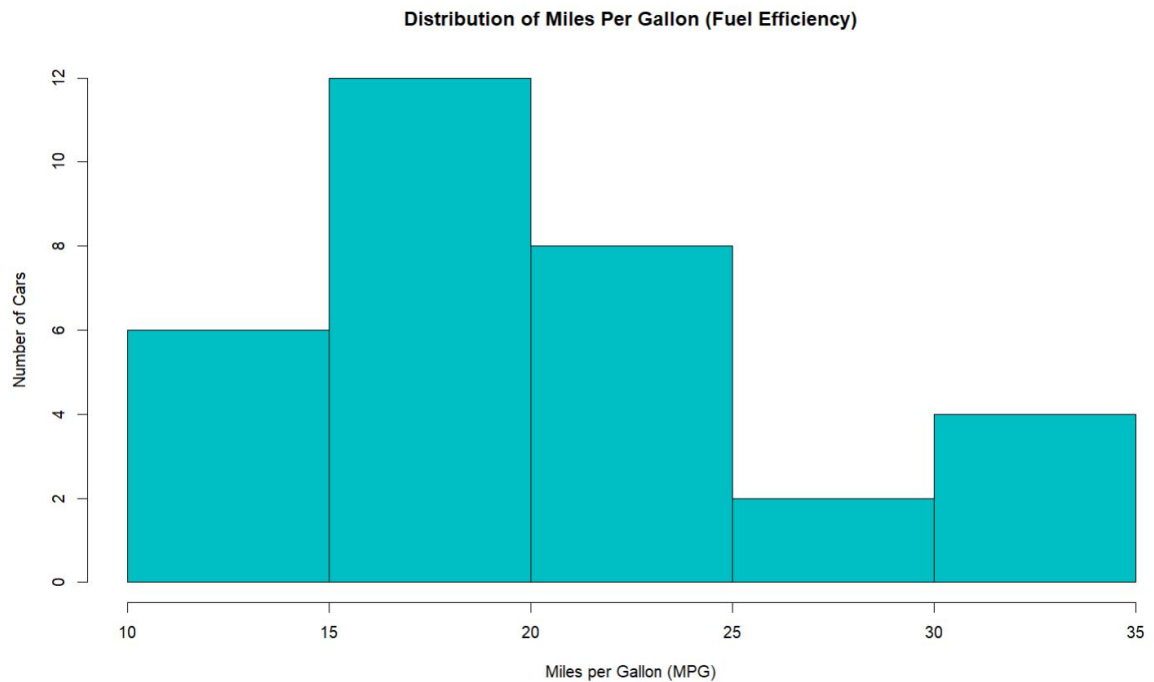
Number of Observations (Rows): 32

Number of Variables (Columns): 11

This dataset is commonly used in **statistical analysis, data visualization, and machine learning experiments** because it allows users to explore relationships between multiple quantitative variables. For example, analysts often study how a car's **weight (wt)** and **horsepower (hp)** affect its **mileage (mpg)**.

The dataset serves as an excellent resource for understanding **linear regression, correlation analysis, and exploratory data analysis (EDA)** in R. Its simplicity, numeric nature, and well-documented variables make it ideal for both **beginners and researchers** to practice data modeling techniques.

1) Histogram of MPG (Fuel Efficiency)



Explanation :-

The above histogram represents the **distribution of Miles Per Gallon (MPG)** for the cars in the *mtcars* dataset.

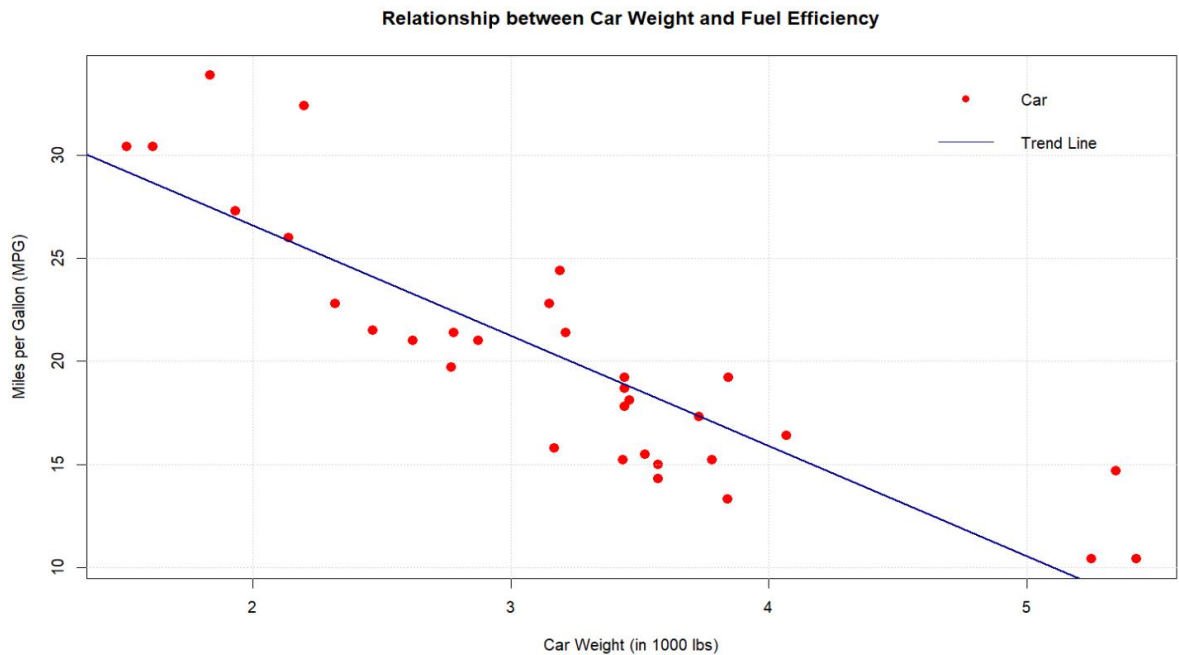
The **x-axis** shows the range of MPG values, while the **y-axis** indicates the **number of cars (frequency)** in each range.

From the graph, it can be observed that most cars have **MPG between 15 and 20**, which indicates **average fuel efficiency**.

A few cars have **below 15 MPG**, representing **low fuel efficiency**, and only a small number of cars achieve **above 30 MPG**, showing **high fuel efficiency**.

Overall, the histogram is **slightly right-skewed**, suggesting that most cars consume more fuel, while only a few models are highly fuel-efficient.

2) Scatter Plot: Weight vs MPG



Explanation :-

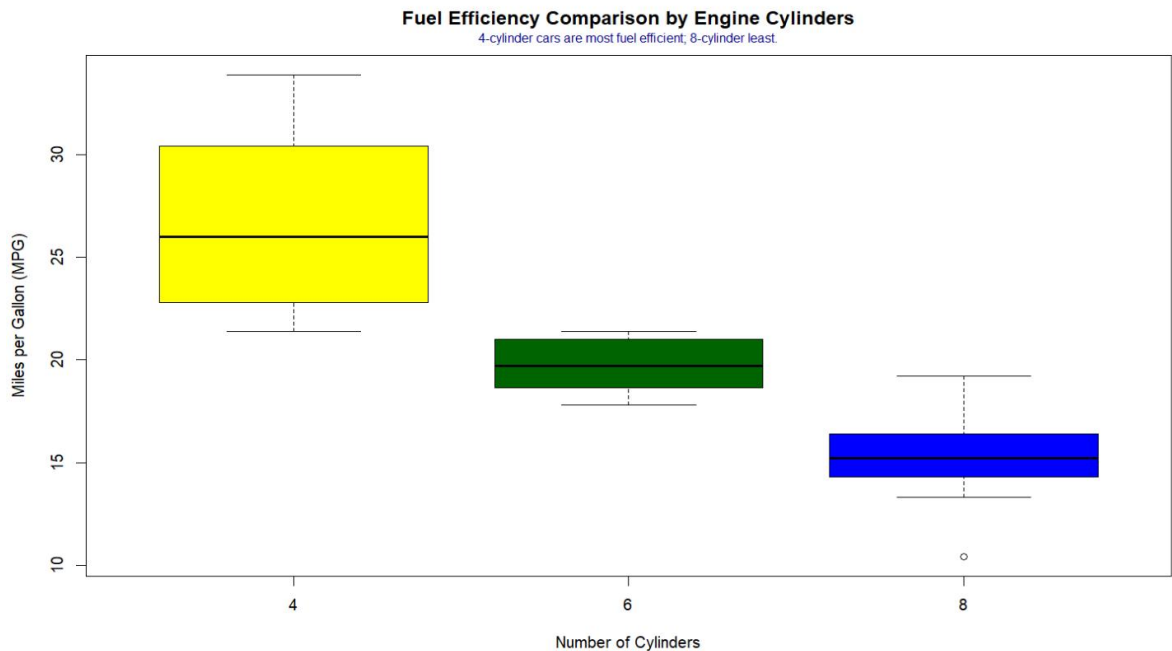
The scatter plot represents the relationship between car weight and miles per gallon (MPG) in the mtcars dataset.

The x-axis shows car weight (in 1000 lbs), while the y-axis indicates fuel efficiency (MPG).

From the plot, it is clear that as the car weight increases, the MPG decreases, showing a negative correlation.

Lighter cars tend to have higher fuel efficiency, whereas heavier cars consume more fuel. Overall, the scatter plot highlights that car weight has a strong inverse effect on fuel economy.

3) Box Plot: MPG by Number of Cylinders



Explanation:-

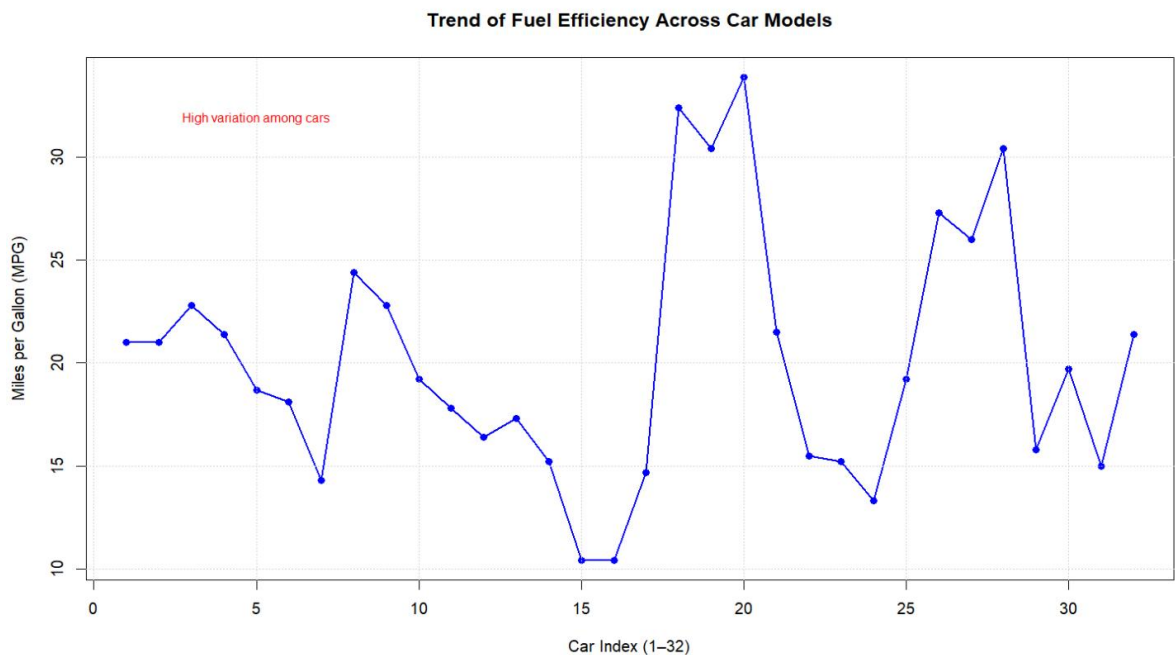
The boxplot shows the distribution of **Miles per Gallon (MPG)** for cars grouped by the **number of cylinders** in the *mtcars* dataset.

The x-axis represents the number of cylinders (4, 6, and 8), while the y-axis shows the MPG values.

From the plot, cars with **4 cylinders** have the **highest MPG**, indicating better fuel efficiency, while those with **8 cylinders** have the **lowest MPG**, showing higher fuel consumption. Cars with **6 cylinders** fall in between.

Overall, the boxplot clearly illustrates that **cars with fewer cylinders are more fuel-efficient, while cars with more cylinders consume more fuel.**

4) Line Plot: MPG Across Cars



Explanation:-

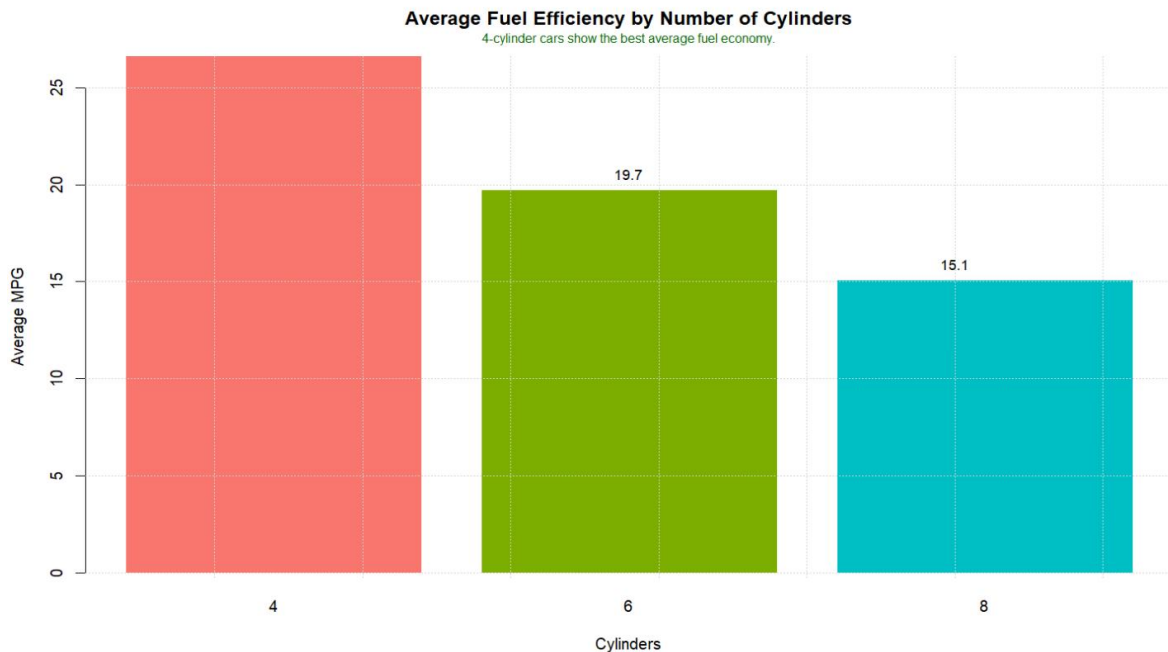
The line plot represents the variation in Miles per Gallon (MPG) for different cars in the *mtcars* dataset.

The x-axis shows the car index (each car), while the y-axis indicates the MPG values.

From the plot, it is evident that MPG values fluctuate significantly across cars, with some achieving high fuel efficiency (above 30 MPG) and others showing much lower values (around 10–15 MPG).

Overall, the line plot highlights the diversity in fuel performance within the dataset, showing that not all cars deliver the same level of mileage.

5) Bar Plot: Average MPG by Cylinder



Explanation :-

The bar chart illustrates the **average fuel efficiency (MPG)** of cars based on the **number of cylinders** in the *mtcars* dataset.

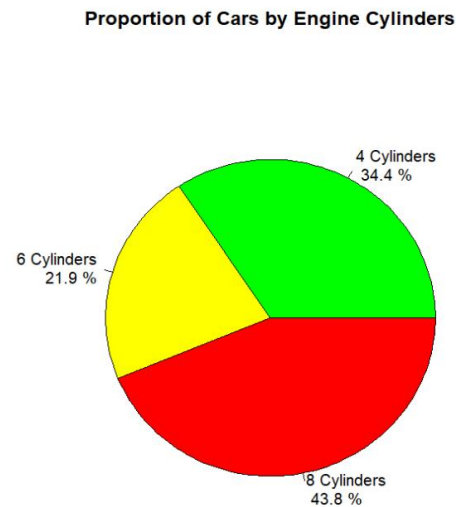
The x-axis represents the number of cylinders (4, 6, and 8), while the y-axis shows the corresponding average MPG.

From the chart, **4-cylinder cars** have the highest average MPG (around 26), indicating the best fuel efficiency.

6-cylinder cars have a moderate average MPG of about 19.7, and **8-cylinder cars** show the lowest average MPG (15.1), meaning they consume more fuel.

Overall, the bar chart clearly demonstrates that **fuel efficiency decreases as the number of cylinders increases**, with 4-cylinder cars being the most economical and 8-cylinder cars the least efficient.

6) Pie Chart of Car Cylinders



Explanation :-

The pie chart represents the **proportion of cars by engine cylinders** in the *mtcars* dataset.

Each segment shows the percentage of cars with 4, 6, and 8 cylinders.

From the chart, cars with **8 cylinders** make up the largest share at **43.8%**, followed by **4-cylinder cars** at **34.4%**, and **6-cylinder cars** at **21.9%**.

Overall, the pie chart indicates that **most cars in the dataset have 8-cylinder engines**, while **4-cylinder cars** form a smaller but significant portion, and **6-cylinder cars** are the least common.

