**Analyzing the Influence of Vehicle Attributes on Fuel Consumption and Emissions: A Linear Regression Approach**

**Introduction**:

As we become more worried about the environment and as car technology gets better, it's really important to know how different features of a car can affect how much fuel it uses and how much pollution it makes In this project my plan is to use linear regression to look into how things like the size of the car's engine, the number of cylinders, what type of car it is, the kind of transmission it has, and what kind of fuel it uses can change how much fuel a car uses and how much CO2 it puts out. By doing this, we can learn a lot that can help car makers build cars that use less fuel and are better for the environment.

**Objectives:**

* Examine the impact of engine size on fuel consumption.
* Assess the relationship between the number of cylinders and CO2 emissions.
* Evaluate the influence of vehicle class on fuel consumption rates.
* Develop a predictive model for CO2 emissions based on multiple vehicle attributes.
* Investigate the combined impact of transmission type and fuel type on fuel efficiency.

**Methodology:**

**Data Preprocessing:**

Clean the dataset to ensure accuracy and handle any missing or anomalous values. Convert categorical variables into numerical values using encoding techniques.

**Simple Linear Regression Analysis:**

Conduct SLR to explore relationships between two variables (e.g., engine size and fuel consumption).

**Multiple Linear Regression Analysis**:

Perform MLR to study the combined effects of multiple factors on fuel consumption and emissions.

**Statistical Validation**:

Check for linearity, homoscedasticity, independence, and normal distribution of residuals to validate regression assumptions.

**Model Evaluation:**

Use R-squared, Adjusted R-squared, MSE, or RMSE to assess the performance of the regression models.

**Expected Outcomes:**

Identification of key vehicle attributes that significantly influence fuel efficiency and emissions.

Insights into how modifications (like cylinders) in vehicle design can lead to more environmentally friendly models.

A predictive model for estimating CO2 emissions based on vehicle specifications.