ST 320: Lab Assignment 3. February 10/2006

Dr. Bensmail

Ever since the Corporate Average Fuel Economy (CAFE) law was passed in 1975, the size and weight of American cars has been dropping. Passed in the wake of the Mid-East oil embargo as a means of forcing the auto industry to increase auto fuel efficiency, the CAFE law mandates that automakers produce cars achieving an average of at least 27.5 miles per gallon (mpg) and produce light trucks achieving an average of 20.7 mpg.

But according a new paper released by The National Center for Public Policy Research, "Raising Sports Utility Vehicle Fuel Efficiency Standards Would Kill," greater fuel economy has come at a high price – human lives. The paper notes that for every 100 pounds cut from the average car weight, 302 additional people die in automobile accidents. Between 1975 and 1983 alone, the average car weight dropped by more than 1,000 pounds. A recent analysis of government data indicates that 46,000 Americans have died in car accidents since 1975 that they would have survived if only they had been in larger cars.

This data frame contains data on 4 variables (columns) for 60 cars (rows). The variables are: Mileage (mileage in miles/gallon mpg), Displacements (giving the engine displacement in liters), the Weight (giving the relative weights of the cars), and Fuel (consummation per mileage) . In what is coming, we are interested in predicting the Fuel consummation using the weight of the cars.

1. Construct a scatterplot for all variables.
2. Calculate the coefficient of correlation for different pairs of variables. Interpret your findings.
3. What happens to the consummation of the Fuel when the car weight get larger?
4. What happens to the mileage when the weight get larger?

$\bar{x}$;

6. **Provide a residual analysis for this model?**
7. Calculate the coefficient of Determination? is it small or large?
8. Is this regression model adequate? explain? Is the weight important to predict the Fuel?
9. Provide the Anova table.
10. Calculate the standard deviation of the regression model?
11. Provide the plot of the distribution of the residual $\hat{e} = y - \hat{y}$. Does the distribution look like a normal distribution? What is the mean of $\hat{e}$ and the standart error of $\hat{e}$?
12. What do we expect the increase of Fuel to become when we increase the weight by 100 pounds.
13. A Honda Civic 4 owner decided to go skiing with his family. He added a carry on lagguge over his car in order to be able to bring the ski materials. If the weight of the carry on luggage is 440 pounds, what we predicted amount of Fuel.