Project 1 - Group 2

Multivariate Statistical Methods for Engineering and Management

(MEMEG, 1st Semester, 2021/2022)

Handed out on 10 of November, 2021.

To be handed back on 4 of December, 2021.

Group 2:

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Consider the **Auto** data set, available in **library(ISLR)** and select the subset from **ontiac ventura sj** until **chevy s-10**.

1. Make a exploratory analysis, using plots and summary statistics (e. g. mean, covariance, generalized/total variance and Mahalanobis distances, to describe the data).

2. One researcher has rudimentary knowledge about multiple linear regression analysis and wants your help to find a way to explain the variable **mpg** with some predictors variables.

   (a) Make a preliminary analysis of the data and discuss what you have learned from this analysis.

   (b) Fit a regression model to the dataset.

   (c) Test for significance of the regression. Discuss the results in terms of the p-value. Compare the test results with the coefficient of multiple determination. Is there any evidence that a subset of the original variables should be excluded from the model? Proceed in order to find the best subset of regressors.

   (d) Check model adequacy, investigate possible influential/leverage observations and outliers.

   (e) Calculate 92% confidence interval (CI) on the mean responses for cars **datsun 210** and **mercedes-benz 240d**. For the same values of the regressors, and the same confidence level, calculate the prediction interval (PI). Compare and discuss the obtained results.

About the report:

- The report should not exceed 20 pages (including Annexes).

- Do not forget to include: introduction, the dataset in study, objectives of the study, methodology used, decisions, conclusions and references.

- The R code and the report must be send to me: `irodrig@math.tecnico.ulisboa.pt` and also a print copy.