Transmission and fuel consumption analysis

Americo

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Executive summary

The main goal of this analysis is using the `mtcars` dataset to answer two questions:

- is an automatic or manual transmission better for `mpg`?
- quantify the `mpg` difference between automatic and manual transmissions;

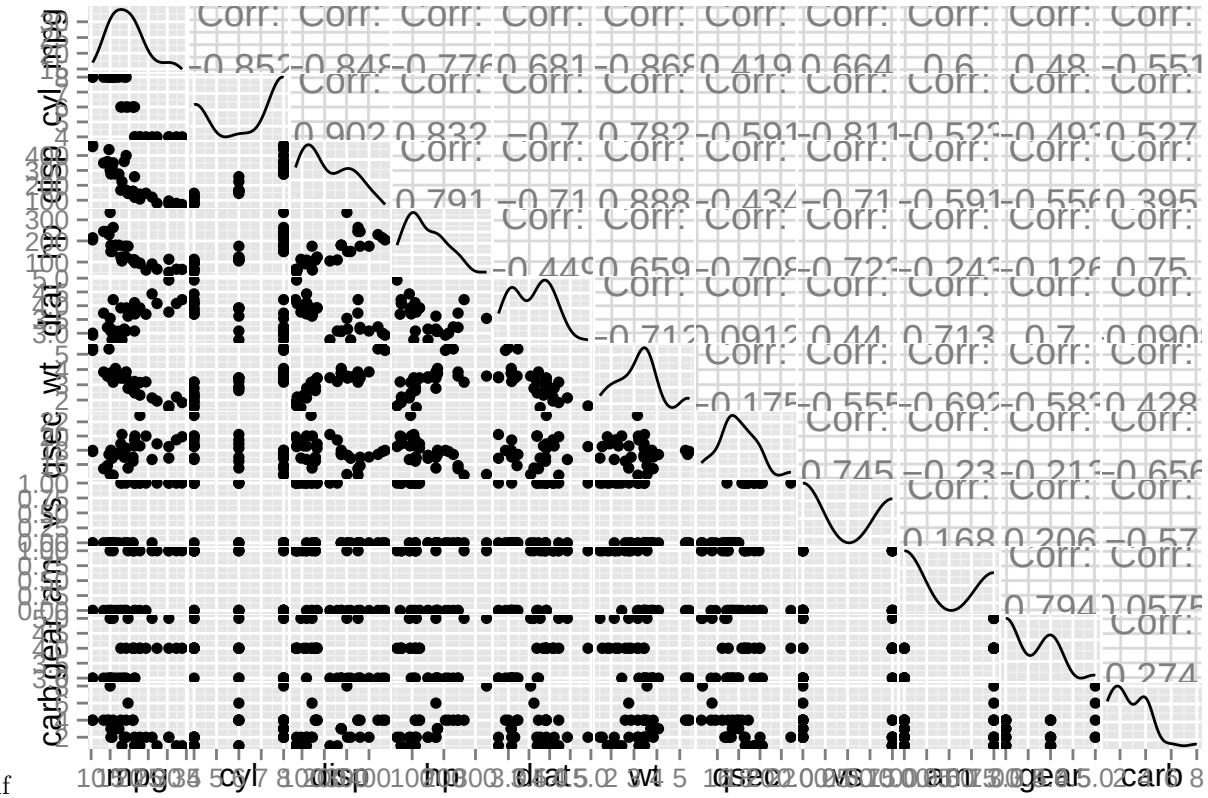
`mpg` being *miles per gallon*, an indicator of fule consumption.

The results are as follows: the main effect of transmission, `am`, on consumption, is significant:

```
## Source: local data frame [2 x 3]
##
##   am mean_mpg  n
## 1  0 17.14737 19
## 2  1 24.39231 13
```

0 being automatic transmission, and *1* the manual one. It seems that cars with manual transmission has less fuel consumption on average, but analyzing data and hearing the domain experts opinion, I have detected a possible confounding variable, weight - `wt`. As you wll see in the rest of the analysis, automatica tranmission cars tend to weigh more, and weight is able to explain all the relationship between `mpg` and `am`. At the end of the analysis I'll try to idenfity a parsimonious model to predict `mpg`.

Exploratory data analysis



scatterplot-1.pdf

The `mtcars`dataset is composed by 32 observations and 11 variables, some interpretable as factors; for details please look at `?mtcars` on the R console. There are no missing values. At the appendix you find the plot *Scatterplot matrix* which represents the relationship between all pairs of variable, and it is extremely useful to orient the modeling. Infact you can see that the graph representin `wt` and `am` shows how the two groups are almost not overlapped. This, in addition to domain experts opinions, prompted me to adjust the relationship between `mpg` and `am` for `wt`at first.