

# Regression Models

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## Introduction

The report presents an analysis in the relationship automobile transmission and miles per gallon (MPG) as output. The dataset(mtcars) used in the study was extracted from the 1974 Motor Trend US magazine. This report also quantifies the MPG difference between automatic and manual transmission.

## Analysis

### *Exploratory Analysis*

The dataset mtcars is loaded for current analysis.

```
##           mpg cyl disp  hp drat   wt  qsec vs am gear carb
## Mazda RX4      21.0   6  160 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag  21.0   6  160 110 3.90 2.875 17.02  0  1    4    4
## Datsun 710      22.8   4  108  93 3.85 2.320 18.61  1  1    4    1
## Hornet 4 Drive  21.4   6  258 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2
## Valiant         18.1   6  225 105 2.76 3.460 20.22  1  0    3    1
```

```
##           Estimate Std. Error   t value    Pr(>|t|)
## (Intercept) 17.147368   1.124603 15.247492 1.133983e-15
## factor(am)1  7.244939   1.764422  4.106127 2.850207e-04
```

Table above shows an intercept estimate 17.12 interpreted as mean MPG for manual transmission and slope of 7.24 interpreted as difference between the means of manual and automatic transmission with a *p-value* of 2.85e-04 which is significant. Hence, we can reject the **null hypothesis** and further investigate the effect of other variables. Figure 1 shows a graphical depiction of above analysis.

Further, pair analysis of Figure 2 shows the correlation of variables other than am may have effect on MPG.

### *Model Selection*

Referring to Figure 2, the variables having higher correlation with MPG are cyl, disp, hp and wt. From the same correlation data, it can also be noticed that cyl has very high correlation with disp – signifying a redundancy in variables. Based on the argument presented, further analysis will be done using cyl, hp, wt and am variables.

# Appendix

## Exploratory Analysis

Figure 1

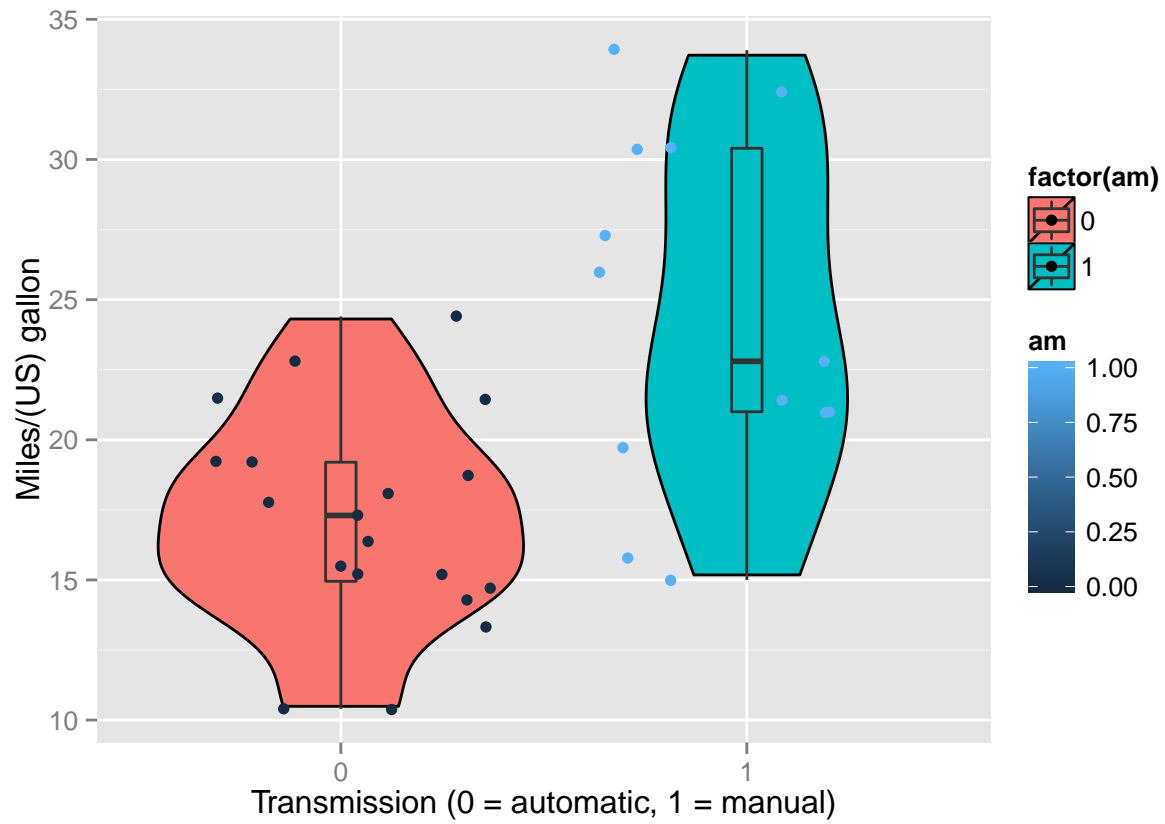


Figure 2

