Motor Trend Assignment

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Assignment

You work for Motor Trend, a magazine about the automobile industry. Looking at a data set of a collection of cars, they are interested in exploring the relationship between a set of variables and miles per gallon (MPG) (outcome). They are particularly interested in the following two questions:

- "Is an automatic or manual transmission better for MPG"
- "Quantify the MPG difference between automatic and manual transmissions"

Data

The data source for this assignment comes from the **mtcars** dataset which is bundled with R.

The dataset can be loaded into R by typing `{r data(mtcars)}`. The effect of this command is to load into the environment **mtcars**.

The resulting dataset consists of **`{r nrow(mtcar)}`** rows, each row made up of **`{r ncol(mtcar)}`** colunms.

The columns making up this dataset are:

1 mpg Miles/(US) gallon
2 cyl Number of cylinders
3 disp Displacement (cu.in.)
4 hp Gross horsepower
5 drat Rear axle ratio
6 wt Weight (lb/1000)
7 qsec 1/4 mile time
8 vs V/S
9 am Transmission (0 = automatic, 1 = manual)
10 gear Number of forward gears
11 carb Number of carburetors

The information provided here was sourced from the R documentation page. This, together with addition information can be called up by typing *?mtcars* at the R prompt. A link to the online version of the page is available at (https://stat.ethz.ch/R-manual/R-devel/library/datasets/html/mtcars.html).

Below is a sample of data:

```
tail(mtcars)
```

```
##                mpg cyl  disp  hp drat    wt qsec vs am gear carb
## Porsche 914-2  26.0   4 120.3  91 4.43 2.140 16.7  0  1    5    2
## Lotus Europa   30.4   4  95.1 113 3.77 1.513 16.9  1  1    5    2
## Ford Pantera L 15.8   8 351.0 264 4.22 3.170 14.5  0  1    5    4
## Ferrari Dino   19.7   6 145.0 175 3.62 2.770 15.5  0  1    5    6
## Maserati Bora  15.0   8 301.0 335 3.54 3.570 14.6  0  1    5    8
## Volvo 142E     21.4   4 121.0 109 4.11 2.780 18.6  1  1    4    2
```

Project Requirement: Is an automatic or manual transmission better for MPG

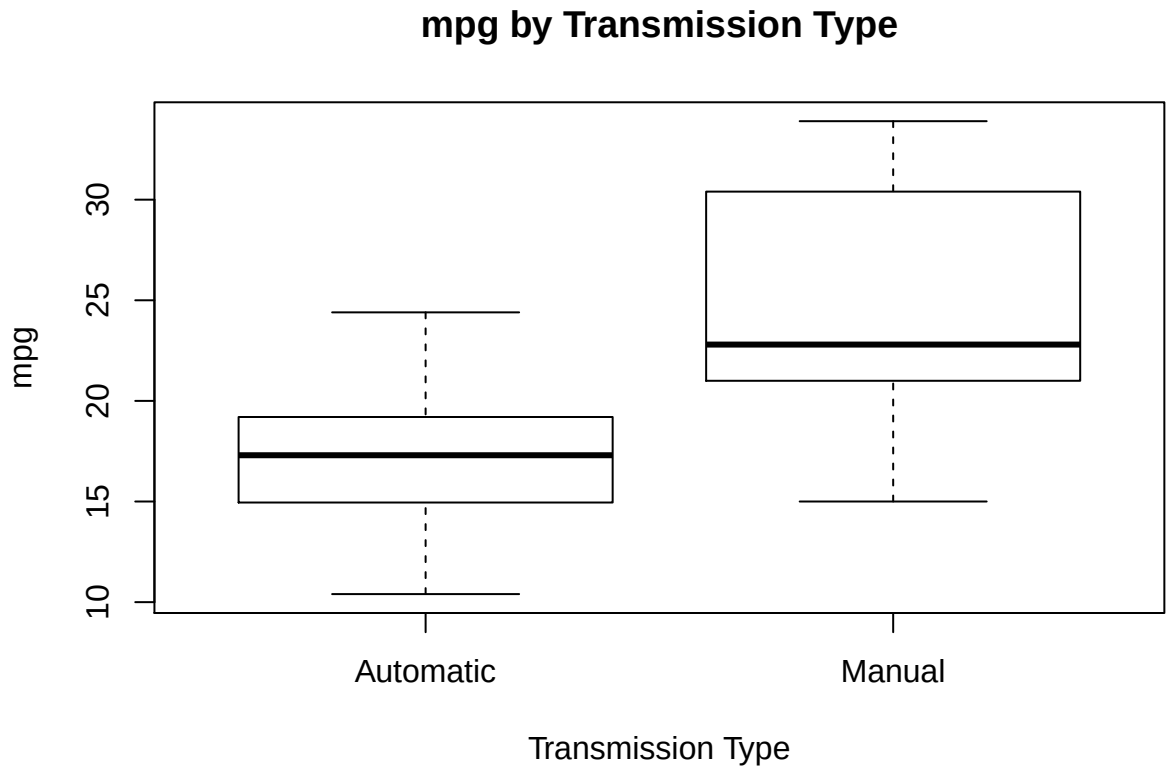
The two columns we will be dealing with are *mpg* and *am*. The data type of these two properties are:

- mpg '{r class(mtcars$mpg)}'
- am '{r class(mtcars$am)}'

am will be converted into a factor variable.

```
mtcars$am <- as.factor(mtcars$am)
levels(mtcars$am) <-c("Automatic", "Manual")
```

```
boxplot(mpg~am, data = mtcars,
        xlab = "Transmission Type",
        ylab = "mpg",
        main = "mpg by Transmission Type")
```



The boxplot above examples the different transmission types with respect to the mpg. From this chart, it seems that manual transmission have a higher mpg than automatic transmissions. One could also not that neither have any outliers and the wiskers of the box plot are balanced.

```r
par(mfrow=c(2,1))
hist(mtcars$mpg[mtcars$am=="Automatic"], breaks=12, main="mpg for automatic vehicles", xlab="mpg", xlim=
hist(mtcars$mpg[mtcars$am=="Manual"], breaks=12, main="mpg for manual vehicles", xlab="mpg", xlim=c(10,3
```

```r
par(mfrow=c(1,1))
```