Regression Models - Course Project

Necati Demir

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Prepare Data

```
library(datasets)
library(ggplot2)
data(mtcars)

mtcars$am <- factor(mtcars$am, labels=c("Automatic", "Manual"))
```

Is an automatic or manual transmission better for MPG?

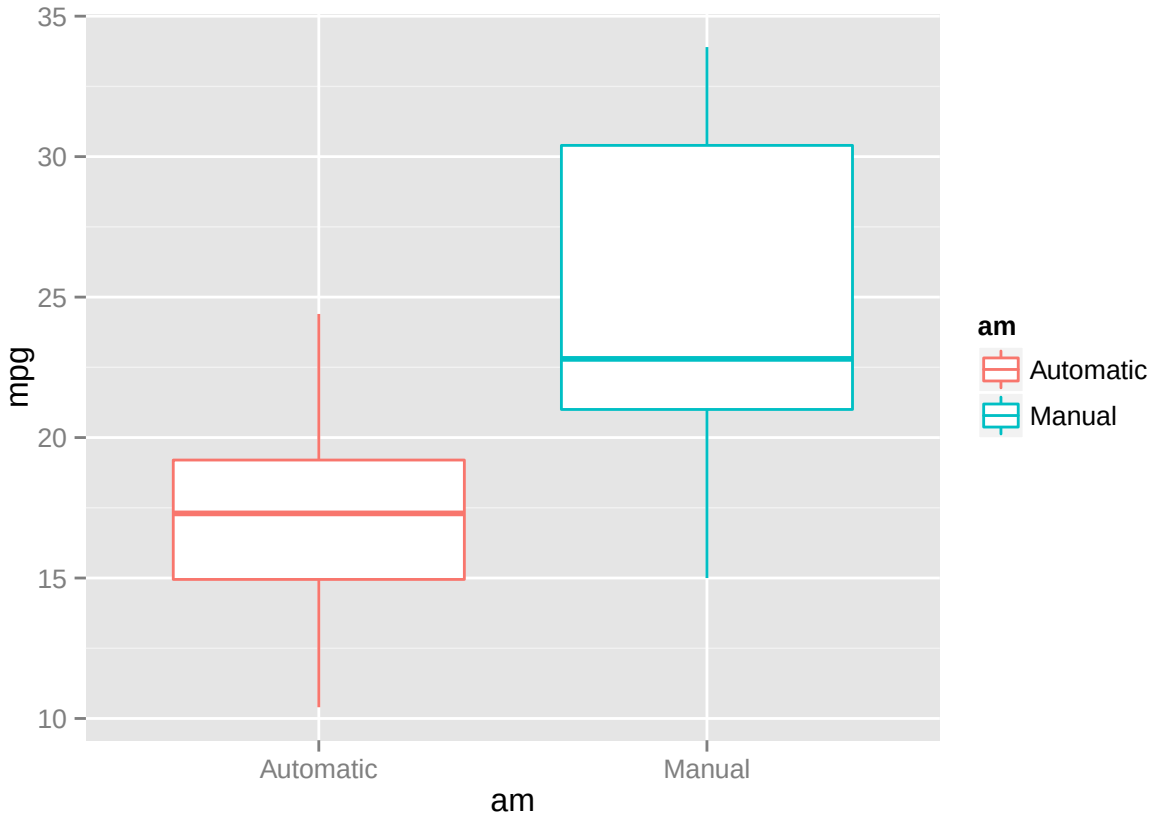
Let's make a t test to understand if means of mpg variables for each transmission type are significantly different.

```
ttest<-t.test(mpg~am, data=mtcars)
print(ttest)
```

```
##
##  Welch Two Sample t-test
##
## data:  mpg by am
## t = -3.7671, df = 18.332, p-value = 0.001374
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -11.280194  -3.209684
## sample estimates:
## mean in group Automatic    mean in group Manual
##                17.14737                24.39231
```

According to t test, there is a significance difference of means of mpg variables for each tranmission type. Let's validate by plotting.

```
plt<-ggplot(mtcars, aes(am, mpg, group=am,color=am)) + geom_boxplot()
print(plt)
```



Quantify the MPG difference between automatic and manual transmissions

To understand which variables most effect the lm, we will use step function.

```
stepmodel<-step(lm(mpg~., data=mtcars), trace=0)
print(stepmodel)
```

```
##
## Call:
## lm(formula = mpg ~ wt + qsec + am, data = mtcars)
##
## Coefficients:
## (Intercept)           wt         qsec     amManual
##       9.618       -3.917        1.226        2.936
```

It seems that wt, qsec and am variables are the variables that effect the lm. We will train run lm again by using variables wt and qsec, controled by am.

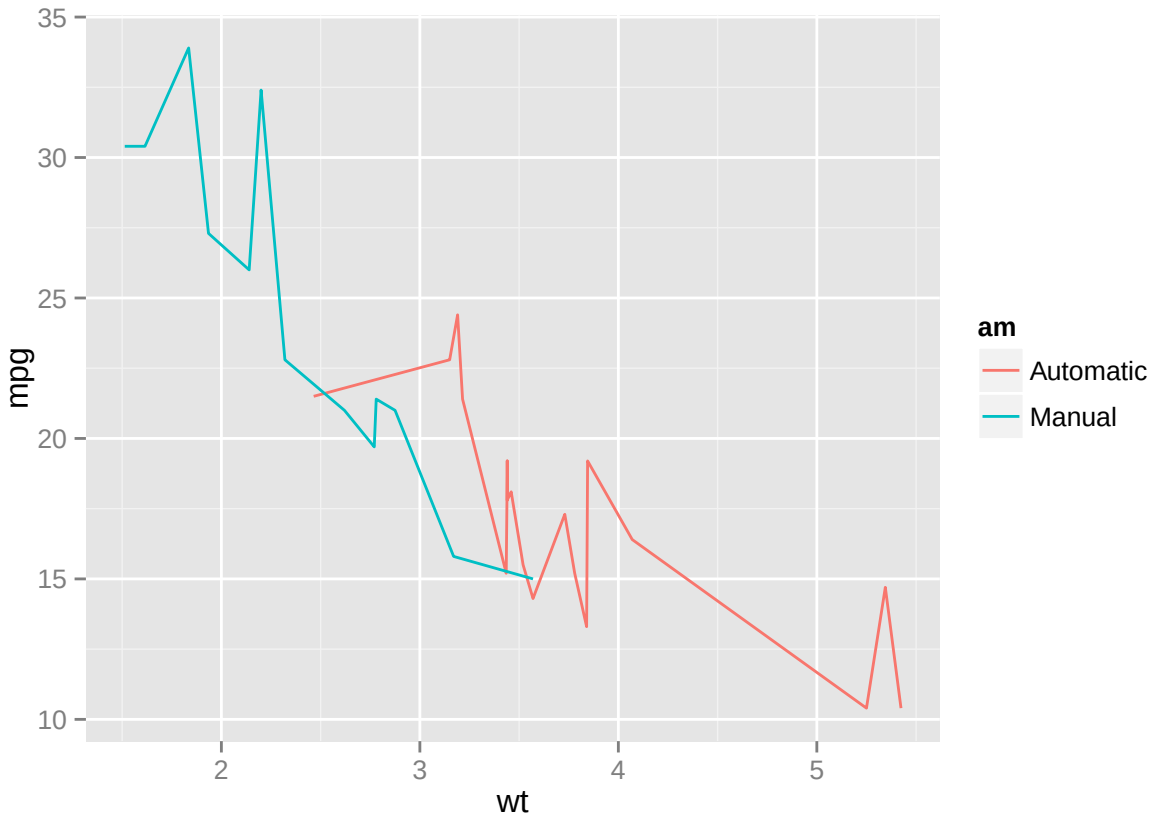
```
model<-lm(mpg~ am:(wt+qsec),data=mtcars)
print(model)
```

```
##
## Call:
## lm(formula = mpg ~ am:(wt + qsec), data = mtcars)
##
```

```
## Coefficients:
##      (Intercept)    amAutomatic:wt       amManual:wt  amAutomatic:qsec
##          13.9692           -3.1759           -6.0992            0.8338
##    amManual:qsec
##           1.4464
```

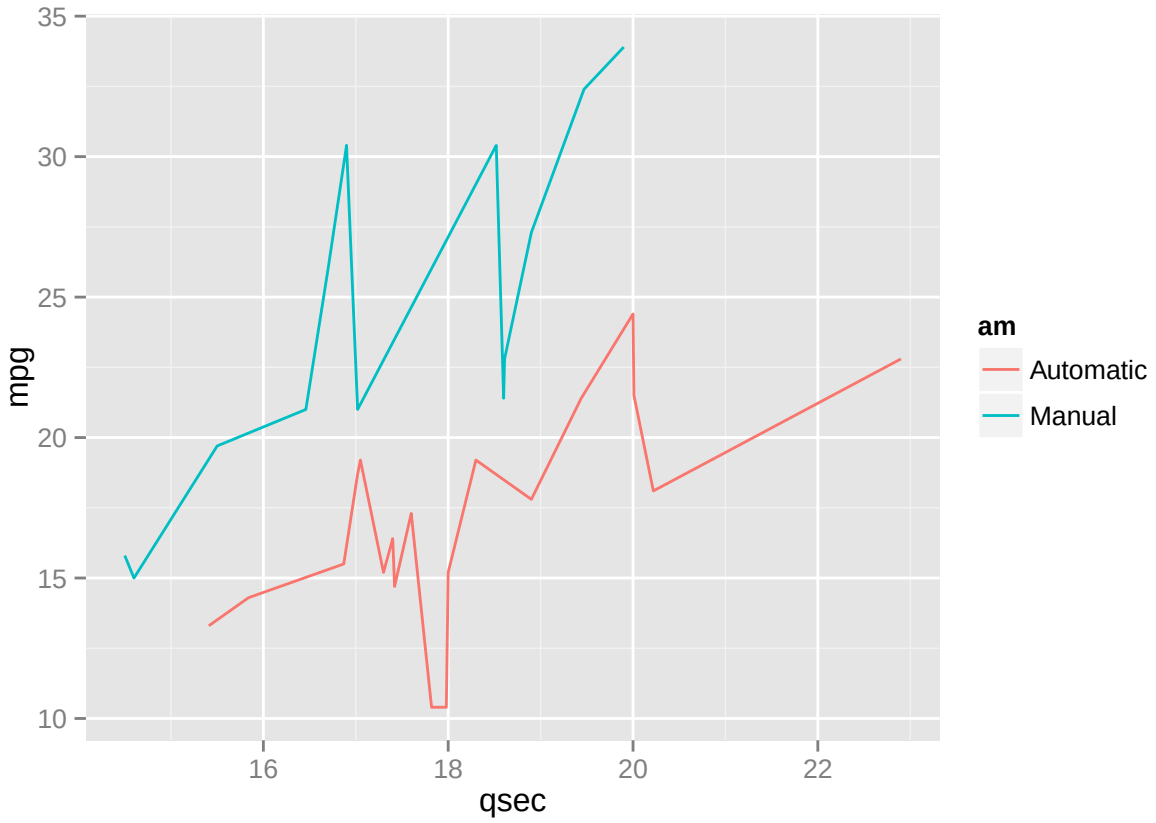
- Increasing weight for cars which have manual tranmission decreases the mpg more than increasing weight for cars which have automatic tranmission. Let's plot this.

```
plt<-ggplot(mtcars, aes(wt, mpg, group=am,color=am)) + geom_line()
print(plt)
```



- Increasing qsec for cars which have manual tranmission increases the mpg more than increasing qsec for cars which have automatic tranmission. Let's plot this.

```
plt<-ggplot(mtcars, aes(qsec, mpg, group=am,color=am)) + geom_line()
print(plt)
```


35
30
25
20
15
10
mpg
16
18
20
22
qsec
am
Automatic
Manual