mtcars data analysis - Regression Models Course Project

MSI

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Executive summary

Looking at the provided mtcars dataset, I can not draw a strong conlusion whether automatic transmission cars give better MPG outcome or the opposite because the samples are not matched for the typical car classifications (weight and/or horsepower). The manual transmmission cars in the sample are smaller cars, which give higher MPG than larger cars in general. Looking at a subset of midsize cars with similar weight, automatic cars tend to have a better MPG outcome, but the subset is too small and larger sample is needed to draw a final conclusion.

Exploratory analysis

```
data(mtcars)
am_count <- c(sum(mtcars$am==0), sum(mtcars$am==1))
am_mpg <- tapply(mtcars$mpg,factor(mtcars$am),mean);
am_wt <- tapply(mtcars$wt,factor(mtcars$am),mean)
```

The dataset contains 19 automatic and 13 manual cars. The average Miles Per Gallon (MPG) is respectively 17.1 and 24.4 for automatic and manual transmission cars.

The assumption that smaller cars (lower weight) give a better MPG outcome than larger cars (higher weight) can be observed in the dataset for both automatic and manual transmission cars (see figure 1).

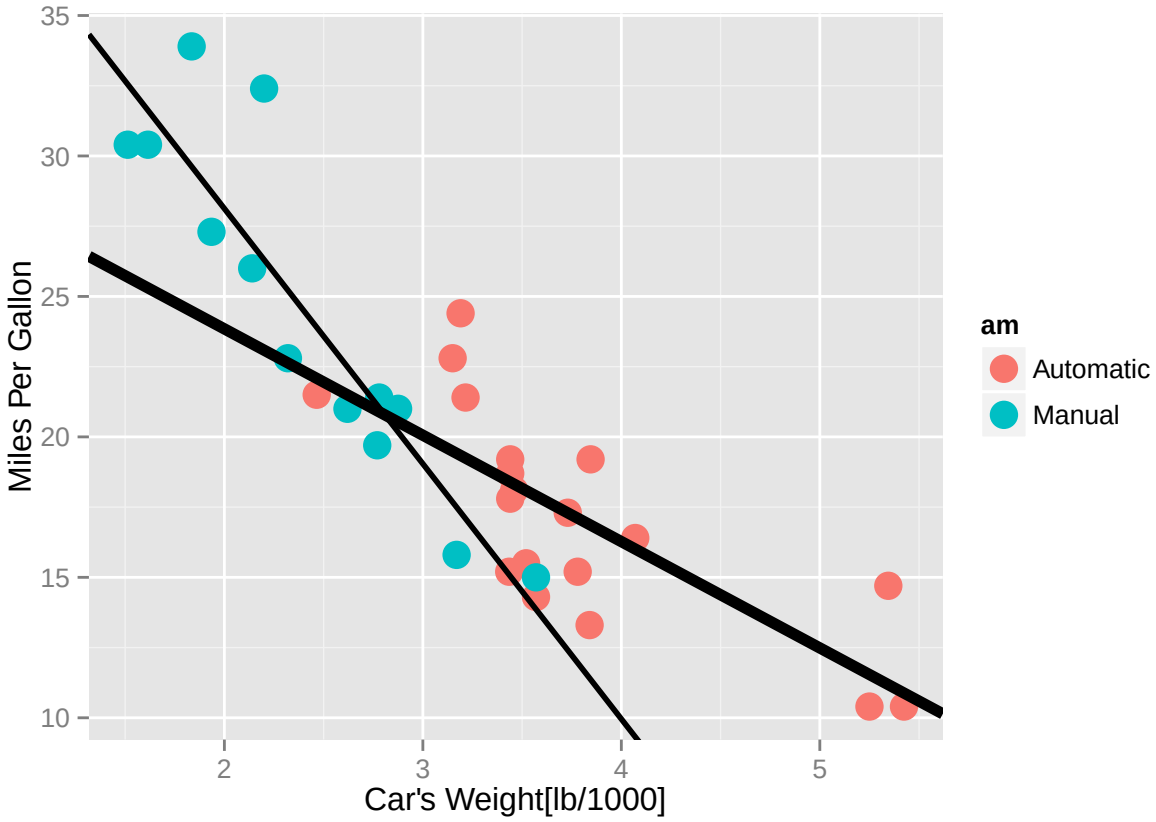
Looking at the small subset of automatic and manual in the mid-size range (weight close to 3), there is a trend that automatic cars have better MPG outcome.

```
The Mileage Per Gallon outcome (MPG) and transmission type variable (am) are of interest to answer the
```

- Is an automatic or manual transmission better for MPG?
- How much is the MPG difference between automatic and manual transmissions?

Detailed analysis

```
library(ggplot2)
mtcars$am <- factor(mtcars$am,levels=c(0,1),labels=c("Automatic","Manual"))
fit <- lm(mpg~wt*am,data=mtcars)
g <- ggplot(mtcars,aes(y=mpg,x=wt,colour=am))+geom_point(size=5)
g <- g+labs(x="Car's Weight[lb/1000]", y="Miles Per Gallon")
g1 <- g+geom_abline(intercept=coef(fit)[1],slope=coef(fit)[2],size=2)
g1+geom_abline(intercept=coef(fit)[1]+coef(fit)[3],slope=coef(fit)[2]+coef(fit)[4],size=1)
```


35
30
25
20
15
10
Miles Per Gallon
2
3
4
5
Car's Weight[lb/1000]
am
Automatic
Manual

Annexe plots

```
par(mfrow=c(2,2))
plot(lm(mpg~wt*am,data=mtcars))
```