Regression Models Assignment

Rnryback GitHub

21th January 2015

Executive Summary

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"

Based on the final model fitting results, we can conclude that:

1. As wt increases per 1000lb (0.5 tons), the mpg will decrease by 2.5.
2. MpG will decrease very slighly with HP increase.
3. cyl increases from 4 to 6 to 8, will cause MpG to decrease by 3 and 2 times respectively.
4. Automatic gearing has higher MpG compared to manual gearing.

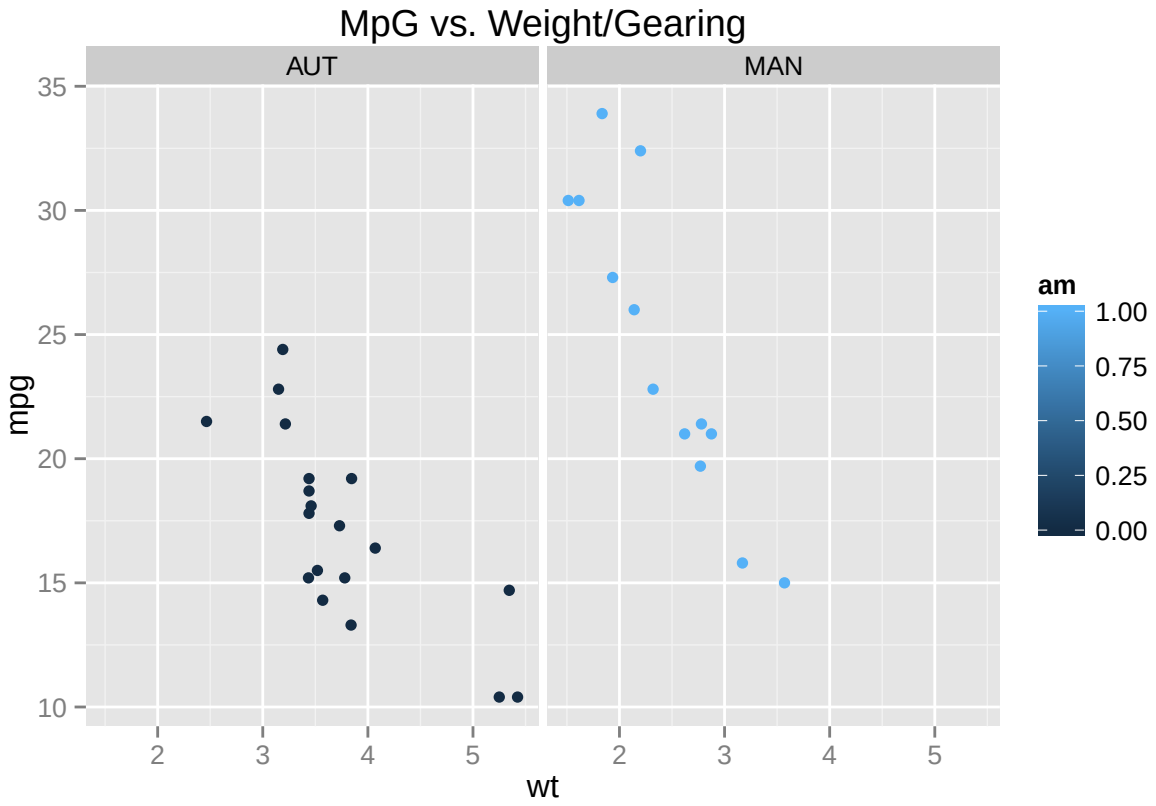
Data Analysis

```
library(ggplot2)
data(mtcars)
attach(mtcars)
```

```
## The following object is masked from package:ggplot2:
##
##     mpg
```

This first look at the data shows us that HP and MpG are inversely related and manual transmission cars are generally more fuel efficient.

```
mtcars$amf[am==0]='AUT'
mtcars$amf[am==1]='MAN'
print(qplot(x=wt, y=mpg, colour=am, facets=.~amf, data=mtcars,main="MpG vs. Weight/Gearing"))
```



Looking further we see that manual transmission cars tend to have smaller weight and use less fuel.

Making our model

We will perform linear regression with all variables, and then perfom stepwise model selection to select the best predictors. cyl, am, hp and wt will be included in the final model.

```
fit<-glm(mpg~as.factor(cyl) + as.factor(vs) + as.factor(am) + as.factor(gear) + as.factor(carb) + disp +
library(MASS)
step <- stepAIC(fit, direction="both")
step$anova
```

Conclussions

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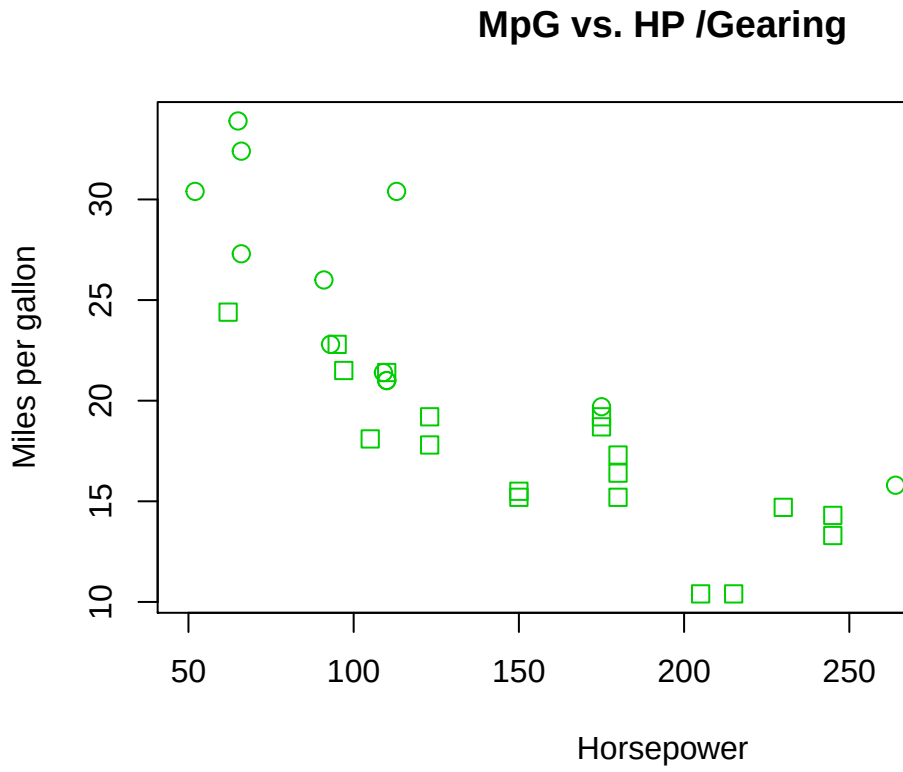
Appendix

Initial Explorations

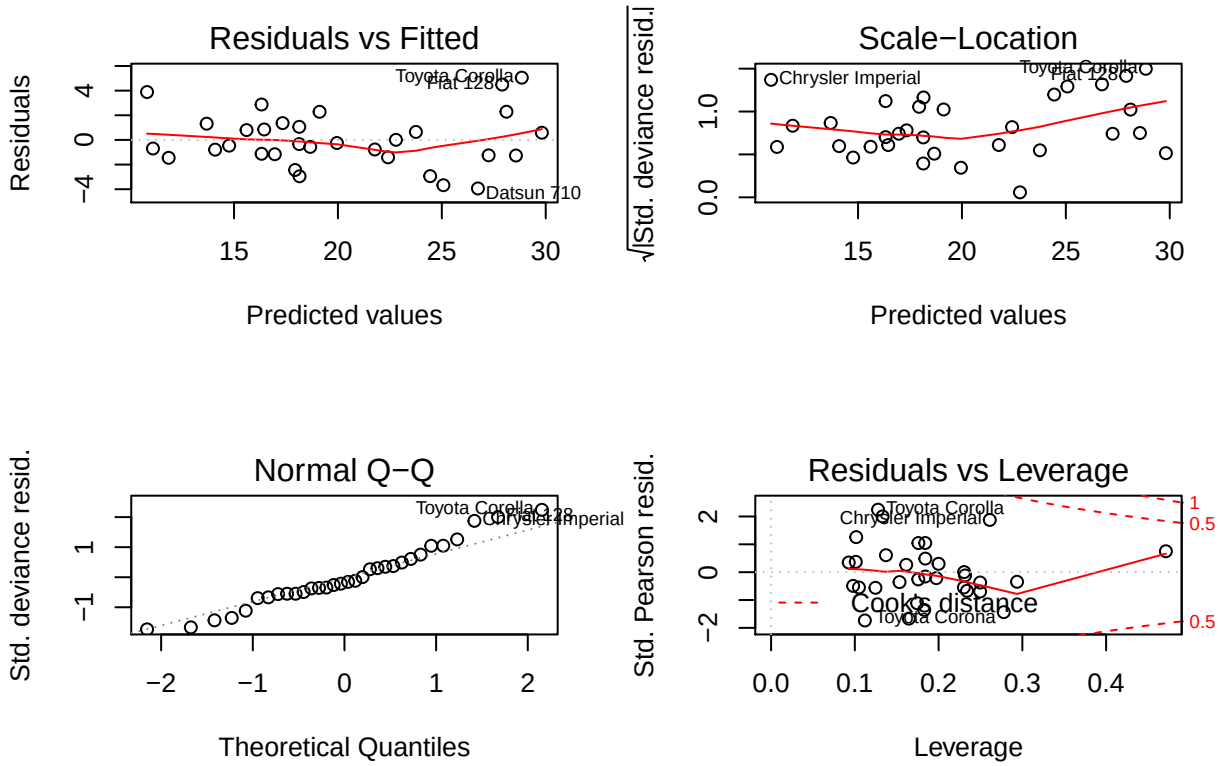
```
plot(hp, mpg, pch=am,col=259,bg=7,
  xlab="Horsepower", cex=1.2,
  ylab="Miles per gallon", main="MpG vs. HP /Gearing")
legend("topright", c("AUT","MAN"), pch=c(0,1))
```



dependencies and exploring the data show-1.pdf

Final model

```
fit2<-glm(mpg ~ as.factor(cyl) + as.factor(am) + hp + wt, data=mtcars)
layout(matrix(c(1,2,3,4),2,2))
plot(fit2)
```



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