Project Regression

Winston November 23, 2014

Executive Summary

This analysis looks at factors affecting the efficiency (**mpg**) of cars in the Motor Trend data set. Particularly, it addresses the hypothesis that manual transmissions are more efficient than automatic transmissions.

The conclusion of the analysis is that we cannot reject the null hypothesis. There is no significan difference, for the cars in this data set, in the miles per gallon of automatic versus manual transmissions.

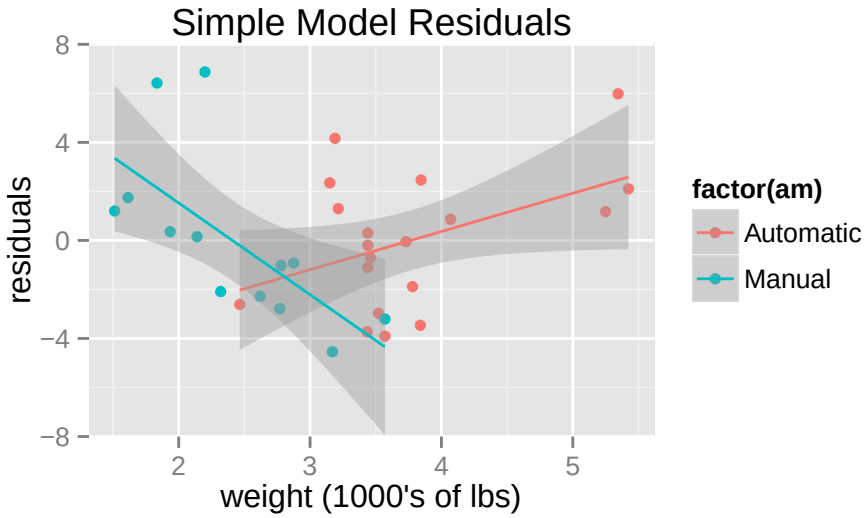
Exploratory data analysis

There are data for 32 cars in the **mtcars** data set representing *mpg, cyl, disp, hp, drat, wt, qsec, vs, am, gear, carb*. Of interest here are: **mpg** - Miles/(US) gallon, **disp** - Displacement (cu.in.), **wt** - Weight (lb/1000), **am** - Transmission (0 = automatic, 1 = manual).

A exploratory graph (shown in the Appendix) of the influence of three variables, **wt**, **disp**, and **am** on **mpg** show depenencies on each.

A simple linear model is insufficient

A model of mpg fitted against weight accounts for about 75.3% of the overall variation. However, there are are systematic variations unaccounted for in the model. This can be seen by the below plot of the residuals, factored for automatic versus manual transmission.



The residuals for manual transmission, with $> 95\%$ confidence, show a systematic dependency not accounted for in the model.