MPG Comparisons between Manual and Automatic Transmissions

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Executive Summary

In this brief study, we must explore the effect that automatic versus manual transmissions has over miles-per-gallon fuel efficiency among a sample group of 1974 model automobiles.

Assumptions

- The field 'qsec' (or, from a stop, how many seconds it took for the vehicle to reach a quarter mile's distance) is likely a function of the car's power; i.e., a result, like miles per gallon, of the vehicle's configuration rather than a potential confounding cause OF miles per gallon. For that reason, I'm excluding it in any modelling of miles per gallon per vehicle.
- Given the yes-or-no nature of whether or not a car is manufactured with or without automatic transmission, this data has been categorized, so named within the data, and is likely to be modelled using binomial logistic regression.

Examining the Data

Looking at *Table 1*, we get a very quick sense of what the data that we ahve to work with looks like. Given that not all these columns (already exlcuding 'vs' and 'qsec') are easily read or in quite the right format, the first step I've taken here is to rename the columns and change the transmission data to a named factor.

Following this, *Table 2* gives us a brief summarization of the better-named data that remains, excluding a few extra columns for brevity.

Null Hypthothesis (H_0)

Alternative Hypothesis (H_a)

Conclusion

Source

Henderson and Velleman (1981), *Building multiple regression models interactively.* Biometrics, 37, 391–411.

Appendix

Figure 1 - Some of the data

	mpg	cyl	disp	hp	drat	wt	am	gear	carb
Mazda RX4	21.0	6	160	110	3.90	2.620	1	4	4

	mpg	cyl	disp	hp	drat	wt	am	gear	carb
Mazda RX4 Wag	21.0	6	160	110	3.90	2.875	1	4	4
Datsun 710	22.8	4	108	93	3.85	2.320	1	4	1
Hornet 4 Drive	21.4	6	258	110	3.08	3.215	0	3	1
Hornet Sportabout	18.7	8	360	175	3.15	3.440	0	3	2
Valiant	18.1	6	225	105	2.76	3.460	0	3	1

Figure 2 - Summary of data after retitling

MPG	cylinders	horsepower	tons	manual
Min. :10.40	Min. :4.000	Min. : 52.0	Min. :0.7565	Min. :0.0000
1st Qu.:15.43	1st Qu.:4.000	1st Qu.: 96.5	1st Qu.:1.2906	1st Qu.:0.0000
Median :19.20	Median :6.000	Median :123.0	Median :1.6625	Median :0.0000
Mean :20.09	Mean :6.188	Mean :146.7	Mean :1.6086	Mean :0.4062
3rd Qu.:22.80	3rd Qu.:8.000	3rd Qu.:180.0	3rd Qu.:1.8050	3rd Qu.:1.0000
Max. :33.90	Max. :8.000	Max. :335.0	Max. :2.7120	Max. :1.0000

Figure 3 - A simple bionomial regression