Motor trend: automatic or manual transmission?

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Summary

```
cars <- mtcars
cars <- transform(cars, cyl = factor(cyl), am = factor(am)  )
```

Data

Data from 32 cars of the 1973 and 1974 models have been collected and stored in a package of R 1, and the following variables are recorded:

- *mpg* Miles/(US) gallon
- *cyl* Number of cylinders
- *disp* Displacement
- *hp* Gross horsepower
- *drat* Rear axie ratio
- *wt* Weight (1000 lbs)
- *qsec* 1/4 mile time
- *vs* V/S
- *am* Transmission (0 = automatic, 1 = manual)
- *gear* Number of forward gears
- *carb* Number of carburetors

Table 1 shows the descriptive statistics of the variables, after coding some of the variables as categorical. In particular, we are interested in the relation of the performance by gasoline, since in fact this in Mexico has just had a considerable increase 2, which is reflected in the variable mpg with respect to the type of transmission of the cars.

For this reason, we performed a Student t test (since we know neither the variance nor the population mean) with the following hypothesis:

- H_0 The performance of automobiles (mpg) with automatic transmission is on average equal to the average performance of cars with manual transmission

```
student.test <- t.test(subset(cars, am == 0 )$mpg, subset(cars, am == 1 )$mpg)
```

So, with a confidence of 95% we reject the previous hypothesis, since the $ p - $ - value of the test is less than 0.05, in fact it is 0.0013736 and the means are 17.1473684, 24.3923077 for the groups automatic and manual respectively, so we proceed to fit a multiple regression model which relates mpg to the other features.

Although nine other features are available as possible regressors some of them have high correlation between them and natural relations

relaciones naturales como por ejemplo _____citar ejemplos de dependencia entre variables_____ proporcionan evidencia para no consideerar a las variables: XXX dentro del estudio como puede verse en la figura 1

Adjuncts

```
kable(summary(cars))
```

mpg	cyl	disp	hp	drat	wt	qsec	vs
Min. :10.40	4:11	Min. : 71.1	Min. : 52.0	Min. :2.760	Min. :1.513	Min. :14.50	Min. :0.0000
1st Qu.:15.43	6: 7	1st Qu.:120.8	1st Qu.: 96.5	1st Qu.:3.080	1st Qu.:2.581	1st Qu.:16.89	1st Qu.:0.000
Median :19.20	8:14	Median :196.3	Median :123.0	Median :3.695	Median :3.325	Median :17.71	Median :0.000
Mean :20.09	NA	Mean :230.7	Mean :146.7	Mean :3.597	Mean :3.217	Mean :17.85	Mean :0.4375
3rd Qu.:22.80	NA	3rd Qu.:326.0	3rd Qu.:180.0	3rd Qu.:3.920	3rd Qu.:3.610	3rd Qu.:18.90	3rd Qu.:1.000
Max. :33.90	NA	Max. :472.0	Max. :335.0	Max. :4.930	Max. :5.424	Max. :22.90	Max. :1.0000

Table 1: Descriptive statistics of the variables. Note