Bing-Je_Wu_HW2

Bing-Je Wu

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Copy the dataset from built-in mtcars dataset

```
myCars <- mtcars
```

Step 1. What is hp (horse power)

```
myCars[which.max(myCars$hp),]
```

```
##               mpg cyl disp  hp drat   wt qsec vs am gear carb
## Maserati Bora  15   8  301 335 3.54 3.57 14.6  0  1    5    8
```

1) What is the highest hp?

   The highest hp is 335 (hourse power)

2) What car has highest hp?

   Maserati has the highest house power among those vehicle

Step 2. Explore mpg (miles per gallon)

```
myCars[which.max(myCars$mpg),]
```

```
##                 mpg cyl disp hp drat    wt qsec vs am gear carb
## Toyota Corolla 33.9   4 71.1 65 4.22 1.835 19.9  1  1    4    1
```

3) What is the highest mpg?

   The highest mpg is 33.9 (miles per gallon)

4) What car has highest hp?

   Toyota Corolla has the highest mpg among those vehicle

5) Create a sorted dataframe based on mpg

```
head(myCars[order(myCars$mpg, decreasing = TRUE),], 10)
```

```
##                 mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Toyota Corolla 33.9   4  71.1  65 4.22 1.835 19.90  1  1    4    1
## Fiat 128       32.4   4  78.7  66 4.08 2.200 19.47  1  1    4    1
## Honda Civic    30.4   4  75.7  52 4.93 1.615 18.52  1  1    4    2
## Lotus Europa   30.4   4  95.1 113 3.77 1.513 16.90  1  1    5    2
## Fiat X1-9      27.3   4  79.0  66 4.08 1.935 18.90  1  1    4    1
## Porsche 914-2  26.0   4 120.3  91 4.43 2.140 16.70  0  1    5    2
## Merc 240D      24.4   4 146.7  62 3.69 3.190 20.00  1  0    4    2
## Datsun 710     22.8   4 108.0  93 3.85 2.320 18.61  1  1    4    1
## Merc 230       22.8   4 140.8  95 3.92 3.150 22.90  1  0    4    2
## Toyota Corona  21.5   4 120.1  97 3.70 2.465 20.01  1  0    3    1
```

```
myCars_by_mpg <- myCars[order(myCars$mpg, decreasing = TRUE),]
```

Step 3. Which car has the best combination of hp and mpg?

```
myCars_by_mpg[myCars_by_mpg$mpg > mean(myCars_by_mpg$mpg),c(1,4)]
```

```
##                 mpg  hp
## Toyota Corolla 33.9  65
## Fiat 128       32.4  66
## Honda Civic    30.4  52
## Lotus Europa   30.4 113
## Fiat X1-9      27.3  66
## Porsche 914-2  26.0  91
## Merc 240D      24.4  62
## Datsun 710     22.8  93
## Merc 230       22.8  95
## Toyota Corona  21.5  97
## Hornet 4 Drive 21.4 110
## Volvo 142E     21.4 109
## Mazda RX4      21.0 110
## Mazda RX4 Wag  21.0 110
```

6) What logic did you use?

   For me, mpg should be put on the first priorty for considering the best combination.
   So, I will calculate the mean of the mpg fisrt and filter out other data with lower mpg.
   Then, among the remaining data, find the maximum value of hp and get the best combination.

7) Which car?

   Lotus Europa has the best combination of hp and mpg.

Step 4. Which car has the "best" combination of hp and mpg where mpg and hp must be given equal weight?

```
summary(myCars)
```

```
##       mpg             cyl             disp             hp
##  Min.   :10.40   Min.   :4.000   Min.   : 71.1   Min.   : 52.0
##  1st Qu.:15.43   1st Qu.:4.000   1st Qu.:120.8   1st Qu.: 96.5
##  Median :19.20   Median :6.000   Median :196.3   Median :123.0
##  Mean   :20.09   Mean   :6.188   Mean   :230.7   Mean   :146.7
##  3rd Qu.:22.80   3rd Qu.:8.000   3rd Qu.:326.0   3rd Qu.:180.0
##  Max.   :33.90   Max.   :8.000   Max.   :472.0   Max.   :335.0
##       drat             wt             qsec             vs
##  Min.   :2.760   Min.   :1.513   Min.   :14.50   Min.   :0.0000
##  1st Qu.:3.080   1st Qu.:2.581   1st Qu.:16.89   1st Qu.:0.0000
##  Median :3.695   Median :3.325   Median :17.71   Median :0.0000
##  Mean   :3.597   Mean   :3.217   Mean   :17.85   Mean   :0.4375
##  3rd Qu.:3.920   3rd Qu.:3.610   3rd Qu.:18.90   3rd Qu.:1.0000
##  Max.   :4.930   Max.   :5.424   Max.   :22.90   Max.   :1.0000
##        am              gear            carb
##  Min.   :0.0000   Min.   :3.000   Min.   :1.000
```

```
##  1st Qu.:0.0000   1st Qu.:3.000   1st Qu.:2.000
##  Median :0.0000   Median :4.000   Median :2.000
##  Mean   :0.4062   Mean   :3.688   Mean   :2.812
##  3rd Qu.:1.0000   3rd Qu.:4.000   3rd Qu.:4.000
##  Max.   :1.0000   Max.   :5.000   Max.   :8.000
```

The medians for mpg and hp are 19.2 and 123.0.

```
myCars_by_mpg[,c(1,4)]
```

```
##                     mpg  hp
## Toyota Corolla      33.9  65
## Fiat 128            32.4  66
## Honda Civic         30.4  52
## Lotus Europa        30.4 113
## Fiat X1-9           27.3  66
## Porsche 914-2       26.0  91
## Merc 240D           24.4  62
## Datsun 710          22.8  93
## Merc 230            22.8  95
## Toyota Corona       21.5  97
## Hornet 4 Drive      21.4 110
## Volvo 142E          21.4 109
## Mazda RX4           21.0 110
## Mazda RX4 Wag       21.0 110
## Ferrari Dino        19.7 175
## Merc 280            19.2 123
## Pontiac Firebird    19.2 175
## Hornet Sportabout   18.7 175
## Valiant             18.1 105
## Merc 280C           17.8 123
## Merc 450SL          17.3 180
## Merc 450SE          16.4 180
## Ford Pantera L      15.8 264
## Dodge Challenger    15.5 150
## Merc 450SLC         15.2 180
## AMC Javelin         15.2 150
## Maserati Bora       15.0 335
## Chrysler Imperial   14.7 230
## Duster 360          14.3 245
## Camaro Z28          13.3 245
## Cadillac Fleetwood  10.4 205
## Lincoln Continental 10.4 215
```

Thus, "Merc 280" is the car has the best combination fo hp and mpg with equal weight.