

# Identification of Automobile price using Regression Model

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## **Abstract**

In the analysis, the objective of the analysis helps us to understand each variable and its effect on the dependent variable. Predictive modeling and its output will be performed using linear regression and trying to understand the performance of the linear regression model using RMSE,  $R^2$ , and other metrics

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# Introduction

The analysis involves 2 parts. i.e data analysis and machine learning. In data analysis, all 26 features will be analyzed along with their dependency on the dependent variable.

## About Data

This dataset consists of data From 1985 Ward's Automotive Yearbook. Here are the sources

## Sources

- 1) 1985 Model Import Car and Truck Specifications, 1985 Ward's Automotive Yearbook.
- 2) Personal Auto Manuals, Insurance Services Office, 160 Water Street, New York, NY 10038
- 3) Insurance Collision Report, Insurance Institute for Highway Safety, Watergate 600, Washington, DC 20037

## Content

This data set consists of three types of entities: (a) the specification of an auto in terms of various characteristics, (b) its assigned insurance risk rating, (c) its normalized losses in use as compared to other cars. The second rating corresponds to the degree to which the auto is riskier than its price indicates. Cars are initially assigned a risk factor symbol associated with their price. Then, if it is riskier (or less), this symbol is adjusted by moving it up (or down) the scale. Actuarians call this process "symboling". A value of +3 indicates that the auto is risky, -3 that it is probably pretty safe.

The third factor is the relative average loss payment per insured vehicle year. This value is normalized for all autos within a particular size classification (two-door small, station wagons, sports/specialty, etc...), and represents the average loss per car per year.

## Objective of the Study

In the Analysis, we can find how each variable is affecting the output i.e price and using these variables how can create a predictive model.

## Overview of the Data

The Data consists of 205 rows and 26 variables out of which there are 25 independent variables and the rest are dependent variables.

we can see the head of the data below:

```
##      symboling normalized.losses      make fuel.type aspiration num.of.doors
## 1           3                ? alfa-romero    gas      std         two
## 2           3                ? alfa-romero    gas      std         two
## 3           1                ? alfa-romero    gas      std         two
## 4           2               164         audi    gas      std         four
## 5           2               164         audi    gas      std         four
## 6           2                ?         audi    gas      std         two
##      body.style drive.wheels engine.location wheel.base length width height
## 1 convertible      rwd      front      88.6  168.8  64.1  48.8
## 2 convertible      rwd      front      88.6  168.8  64.1  48.8
## 3  hatchback      rwd      front      94.5  171.2  65.5  52.4
## 4      sedan      fwd      front      99.8  176.6  66.2  54.3
## 5      sedan      4wd      front      99.4  176.6  66.4  54.3
## 6      sedan      fwd      front      99.8  177.3  66.3  53.1
##      curb.weight engine.type num.of.cylinders engine.size fuel.system bore stroke
## 1          2548      dohc          four          130      mpfi 3.47  2.68
## 2          2548      dohc          four          130      mpfi 3.47  2.68
## 3          2823      ohcv          six          152      mpfi 2.68  3.47
## 4          2337      ohc          four          109      mpfi 3.19  3.4
## 5          2824      ohc          five          136      mpfi 3.19  3.4
## 6          2507      ohc          five          136      mpfi 3.19  3.4
```

```
##   compression.ratio horsepower peak.rpm city.mpg highway.mpg price
## 1           9.0           111     5000     21         27 13495
## 2           9.0           111     5000     21         27 16500
## 3           9.0           154     5000     19         26 16500
## 4          10.0           102     5500     24         30 13950
## 5           8.0           115     5500     18         22 17450
## 6           8.5           110     5500     19         25 15250
```

most of the variable here are either categorical, numeric or integer we can view the data structure below:

```
## 'data.frame':   205 obs. of  26 variables:
## $ symboling      : int  3 3 1 2 2 2 1 1 0 ...
## $ normalized.losses: chr  "?" "?" "?" "164" ...
## $ make           : chr  "alfa-romero" "alfa-romero" "alfa-romero" "audi" ...
## $ fuel.type      : chr  "gas" "gas" "gas" "gas" ...
## $ aspiration      : chr  "std" "std" "std" "std" ...
## $ num.of.doors    : chr  "two" "two" "two" "four" ...
## $ body.style      : chr  "convertible" "convertible" "hatchback" "sedan" ...
## $ drive.wheels    : chr  "rwd" "rwd" "rwd" "fwd" ...
## $ engine.location : chr  "front" "front" "front" "front" ...
## $ wheel.base      : num  88.6 88.6 94.5 99.8 99.4 ...
## $ length          : num  169 169 171 177 177 ...
## $ width           : num  64.1 64.1 65.5 66.2 66.4 66.3 71.4 71.4 71.4 67.9 ...
## $ height          : num  48.8 48.8 52.4 54.3 54.3 53.1 55.7 55.7 55.9 52 ...
## $ curb.weight     : int  2548 2548 2823 2337 2824 2507 2844 2954 3086 3053 ...
## $ engine.type     : chr  "dohc" "dohc" "ohcv" "ohc" ...
## $ num.of.cylinders : chr  "four" "four" "six" "four" ...
## $ engine.size     : int  130 130 152 109 136 136 136 136 131 131 ...
## $ fuel.system      : chr  "mpfi" "mpfi" "mpfi" "mpfi" ...
## $ bore            : chr  "3.47" "3.47" "2.68" "3.19" ...
## $ stroke           : chr  "2.68" "2.68" "3.47" "3.4" ...
## $ compression.ratio: num  9 9 9 10 8 8.5 8.5 8.5 8.3 7 ...
## $ horsepower      : chr  "111" "111" "154" "102" ...
## $ peak.rpm        : chr  "5000" "5000" "5000" "5500" ...
## $ city.mpg        : int  21 21 19 24 18 19 19 19 17 16 ...
## $ highway.mpg     : int  27 27 26 30 22 25 25 25 20 22 ...
## $ price           : chr  "13495" "16500" "16500" "13950" ...
```

# Data Analysis

As the data is been divided into 205 rows and 26 columns. There is a necessity for understanding the data. As the column normalized.losses has an observation called “?” and which is a possible data not captured. Treatment needs to be performed.

## Data Cleaning

The column needs to be inspected before performing any transformation

```
##
##  ? 101 102 103 104 106 107 108 110 113 115 118 119 121 122 125 128 129 134 137
## 41  3  5  5  6  4  1  2  2  2  3  4  2  1  4  3  6  2  6  3
## 142 145 148 150 153 154 158 161 164 168 186 188 192 194 197 231 256 65  74  77
##  1  2  4  7  2  3  2 11  2  5  1  2  2  2  2  1  1  5  5  1
## 78 81 83 85 87 89 90 91 93 94 95 98
##  1  2  3  5  2  2  1  8  4  5  5  1
```

As per the above observation, there are 41 variables with “?”. Similarly, there are “?” in bore, stroke, and horsepower, peak.rpm, price, and normalized.losses. We replace all “?” to NA.

The column and its null values can be seen below:

```
##      symboling normalized.losses      make      fuel.type
##      0              41              0              0
##      aspiration  num.of.doors    body.style    drive.wheels
##      0              2              0              0
##      engine.location  wheel.base    length      width
##      0              0              0              0
##      height      curb.weight    engine.type  num.of.cylinders
##      0              0              0              0
##      engine.size    fuel.system    bore      stroke
##      0              0              4              4
##      compression.ratio  horsepower    peak.rpm    city.mpg
##      0              2              2              0
##      highway.mpg      price
##      0              4
```

The data imputation can be performed with the imputation of mean, median, and mode. For categorical data, mode can be a stable imputation and for continuous data mean can be a better option. After imputation, there are no null values in the data which can be observed below

```
##      symboling normalized.losses      make      fuel.type
##      0              0              0              0
##      aspiration  num.of.doors    body.style    drive.wheels
##      0              0              0              0
##      engine.location  wheel.base    length      width
##      0              0              0              0
##      height      curb.weight    engine.type  num.of.cylinders
##      0              0              0              0
##      engine.size    fuel.system    bore      stroke
##      0              0              0              0
##      compression.ratio  horsepower    peak.rpm    city.mpg
##      0              0              0              0
##      highway.mpg      price
##      0              0
```

As per the above observation, all the NAs are imputed and the data is available for further steps.

## Discriptive Analysis

As the data has been imported and imputed there is a necessity to understand the variables in the data.

A package called “psych” is used to perform analysis over the data which provides a descriptive analysis of each variable in the data.

##	vars	n	mean	sd	median	trimmed	mad	min
## symboling	1	205	0.83	1.25	1.00	0.81	1.48	-2.00
## normalized.losses	2	205	122.00	31.68	122.00	119.93	29.65	65.00
## make*	3	205	13.20	6.27	13.00	13.48	8.90	1.00
## fuel.type*	4	205	1.90	0.30	2.00	2.00	0.00	1.00
## aspiration*	5	205	1.18	0.39	1.00	1.10	0.00	1.00
## num.of.doors*	6	205	1.43	0.50	1.00	1.42	0.00	1.00
## body.style*	7	205	3.61	0.86	4.00	3.64	1.48	1.00
## drive.wheels*	8	205	2.33	0.56	2.00	2.34	0.00	1.00
## engine.location*	9	205	1.01	0.12	1.00	1.00	0.00	1.00
## wheel.base	10	205	98.76	6.02	97.00	98.08	4.00	86.60
## length	11	205	174.05	12.34	173.20	173.79	10.23	141.10
## width	12	205	65.91	2.15	65.50	65.66	2.08	60.30
## height	13	205	53.72	2.44	54.10	53.70	2.37	47.80
## curb.weight	14	205	2555.57	520.68	2414.00	2513.05	572.28	1488.00
## engine.type*	15	205	4.01	1.05	4.00	4.04	0.00	1.00
## num.of.cylinders*	16	205	3.12	0.80	3.00	3.06	0.00	1.00
## engine.size	17	205	126.91	41.64	120.00	120.58	34.10	61.00
## fuel.system*	18	205	4.25	2.01	6.00	4.32	1.48	1.00
## bore	19	205	3.33	0.27	3.31	3.33	0.39	2.54
## stroke	20	205	3.26	0.31	3.29	3.28	0.21	2.07
## compression.ratio	21	205	10.14	3.97	9.00	9.04	0.59	7.00
## horsepower	22	205	104.26	39.52	95.00	99.28	37.06	48.00
## peak.rpm	23	205	5125.37	476.98	5200.00	5126.67	444.78	4150.00
## city.mpg	24	205	25.22	6.54	24.00	24.76	7.41	13.00
## highway.mpg	25	205	30.75	6.89	30.00	30.40	7.41	16.00
## price	26	205	13207.13	7868.77	10595.00	11714.03	4974.12	5118.00
##	max	range	skew	kurtosis	se			
## symboling	3.00	5.0	0.21	-0.71	0.09			
## normalized.losses	256.00	191.0	0.84	1.30	2.21			
## make*	22.00	21.0	-0.24	-1.20	0.44			
## fuel.type*	2.00	1.0	-2.69	5.28	0.02			
## aspiration*	2.00	1.0	1.65	0.72	0.03			
## num.of.doors*	2.00	1.0	0.26	-1.94	0.03			
## body.style*	5.00	4.0	-0.66	0.93	0.06			
## drive.wheels*	3.00	2.0	-0.06	-0.71	0.04			
## engine.location*	2.00	1.0	8.02	62.70	0.01			
## wheel.base	120.90	34.3	1.03	0.92	0.42			
## length	208.10	67.0	0.15	-0.14	0.86			
## width	72.30	12.0	0.89	0.62	0.15			
## height	59.80	12.0	0.06	-0.49	0.17			
## curb.weight	4066.00	2578.0	0.67	-0.10	36.37			
## engine.type*	7.00	6.0	-0.53	3.13	0.07			
## num.of.cylinders*	7.00	6.0	2.11	10.66	0.06			
## engine.size	326.00	265.0	1.92	5.07	2.91			
## fuel.system*	8.00	7.0	-0.24	-1.66	0.14			
## bore	3.94	1.4	0.02	-0.82	0.02			
## stroke	4.17	2.1	-0.68	2.04	0.02			
## compression.ratio	23.00	16.0	2.57	5.00	0.28			
## horsepower	288.00	240.0	1.38	2.53	2.76			
## peak.rpm	6600.00	2450.0	0.07	0.03	33.31			
## city.mpg	49.00	36.0	0.65	0.50	0.46			
## highway.mpg	54.00	38.0	0.53	0.37	0.48			

```
## price          45400.00 40282.0  1.80    3.18 549.58
```

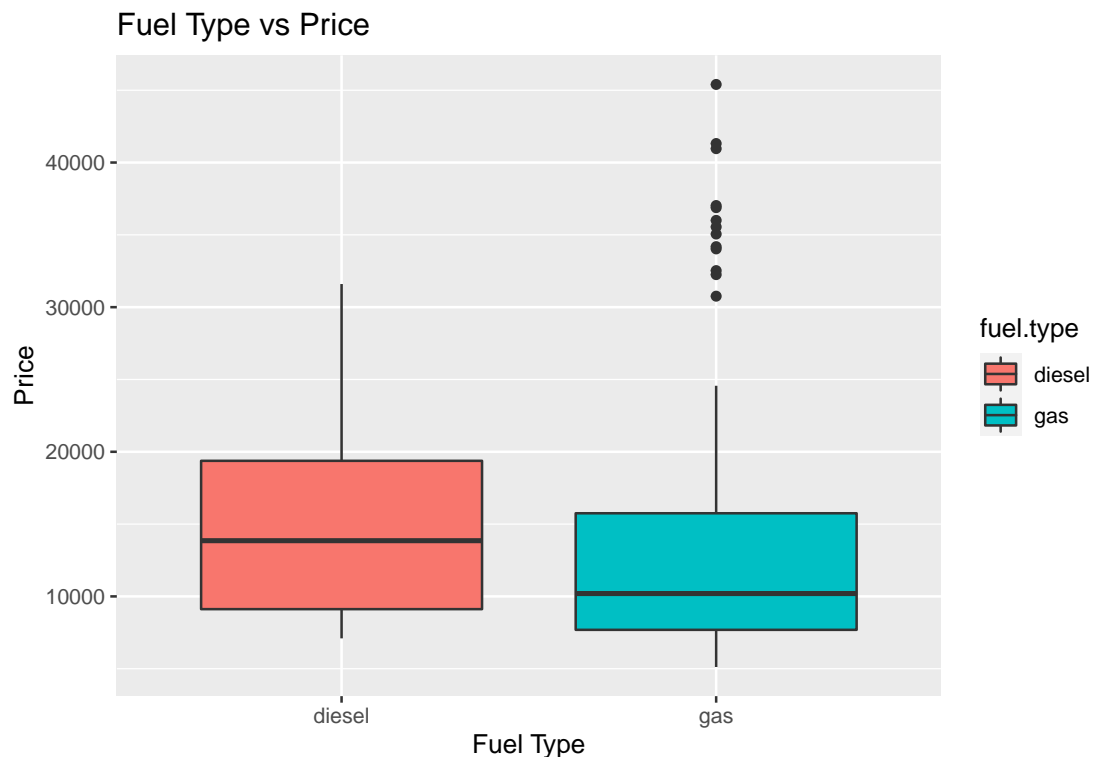
As per the above observation, we can see the key information of each variable in the data is shown above. It contains information like the number of variables, an average of variables, standard deviation, median, trimmed mean, mad, min, max, range, skewness, and kurtosis. We can see that the variables like symboling, make, fuel type, body style, and drive wheels have negative skewness. And none of the variables are normally distributed. There is a necessity to bring all the variables into normally distributed variables before applying any linear models. Now we will try to understand how independent variables are affecting the dependent variables using EDA. Wherein the price is the dependent variable and all the other variables are the dependent one.

## Feature Analysis

There are nearly X variables in the data, so there is a necessity to identify the most significant variables contributing to the price.

### Fuel Type vs Price

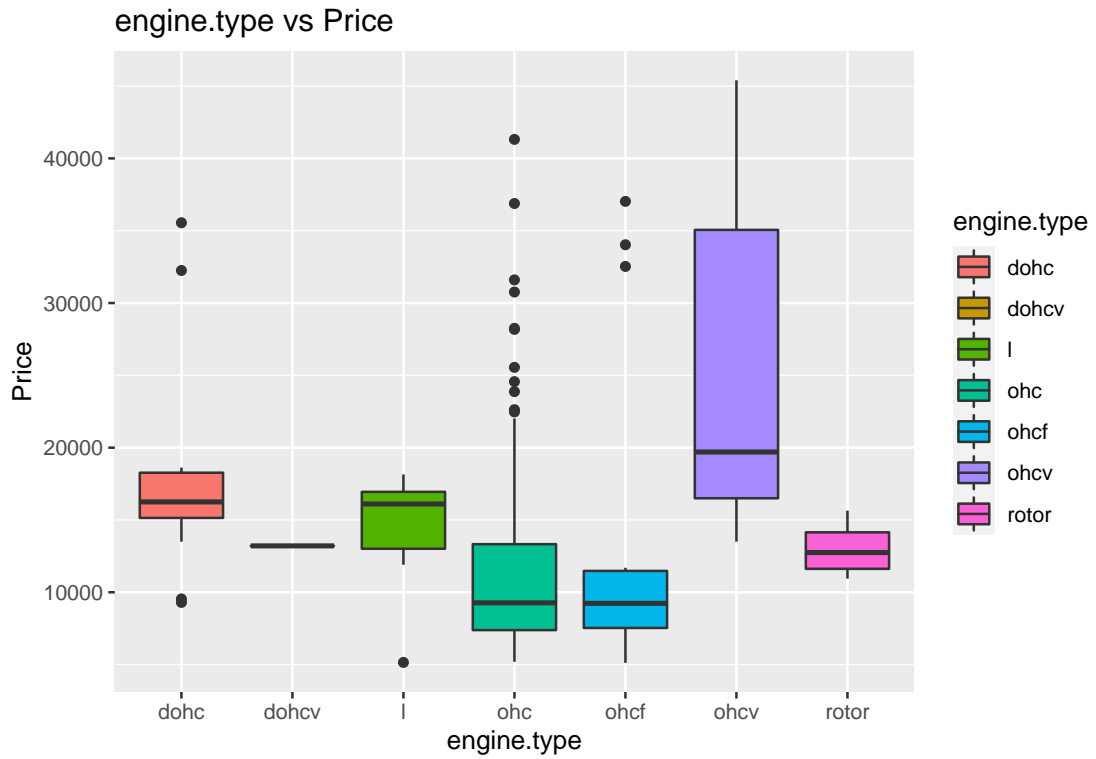
In this analysis, the fuel type and its effect on the price is analyzed using visualization.



As per the above visualization. Diesel tends to fetch a higher price than petrol. But petrol cars have many outliers which exceed the diesel price

### Engine Type vs Price

There are 7 types of engine and each has its own pricing system.

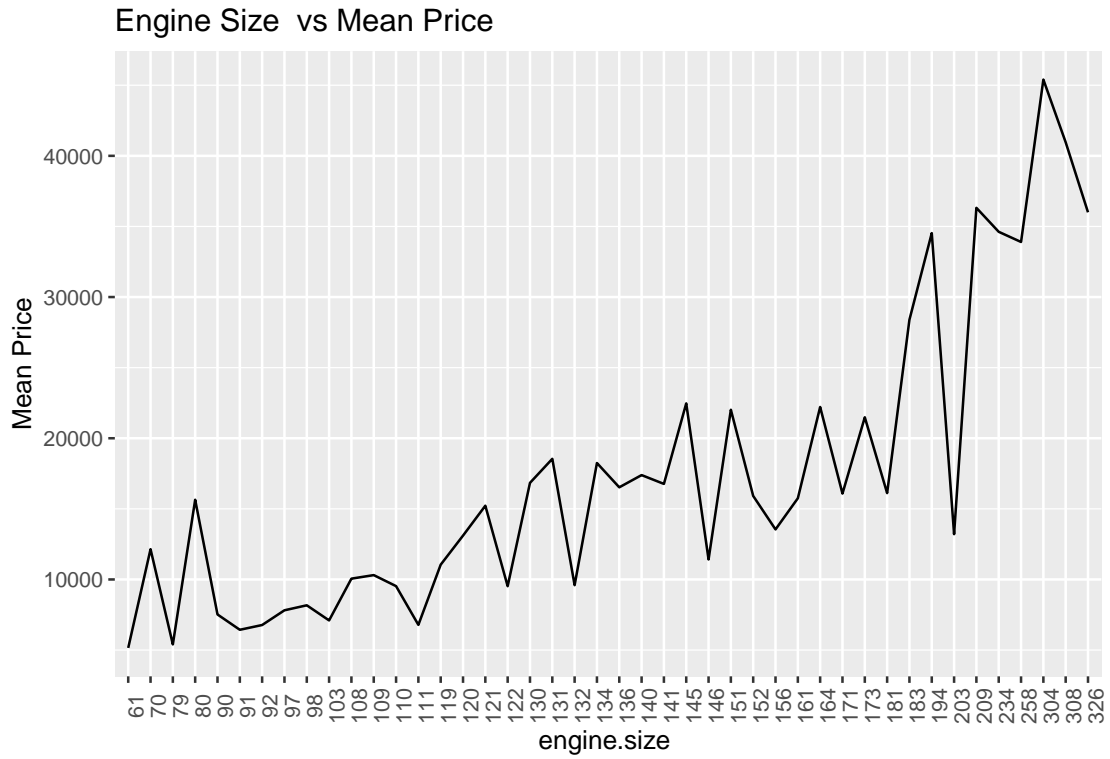


Out of all the different types of engines, “ohcv” is one such engine time that has the highest price, and “ohcf” has the lowest price compared to all.

### Engine Size vs Price

All the engines do not come with standard size and they range from 61 to 326. Out of which we have considered the mean price of the engine to see the relationship.



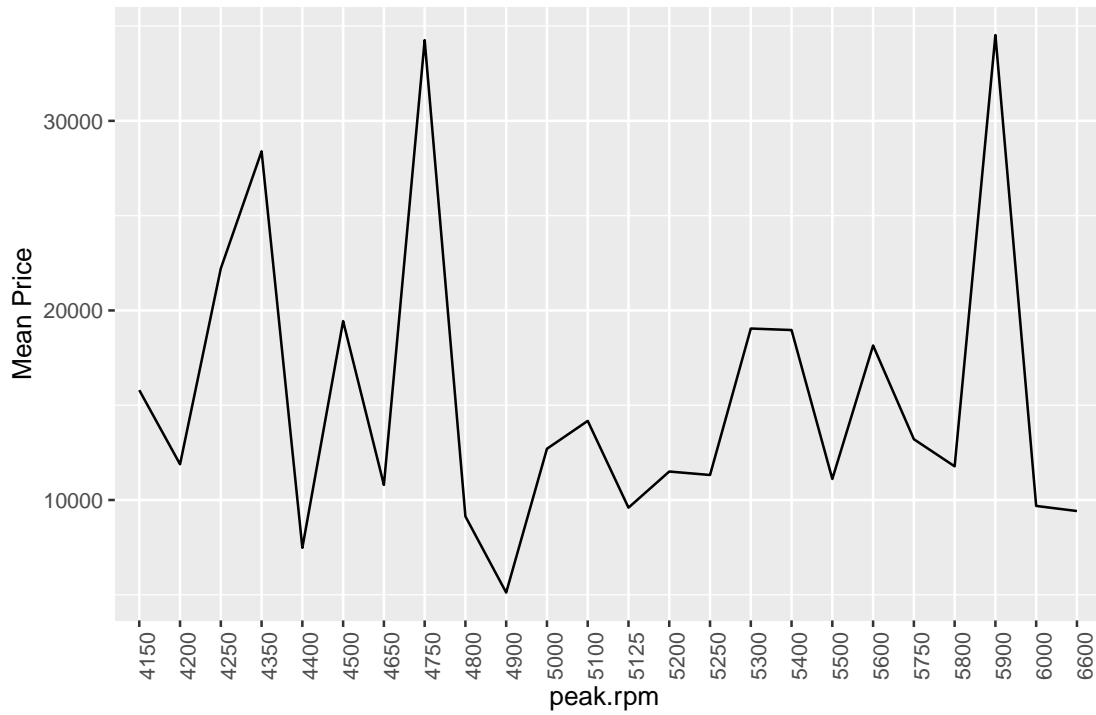


As per the above observation, it can be seen that there is an exponential growth in the relationship between price and engine size.

### Peak RPM vs Price

Similarly to engine size, rpm ranges from 4150 to 6600. A mean price is considered to analyze the same as before

Peak RPM vs Mean Price

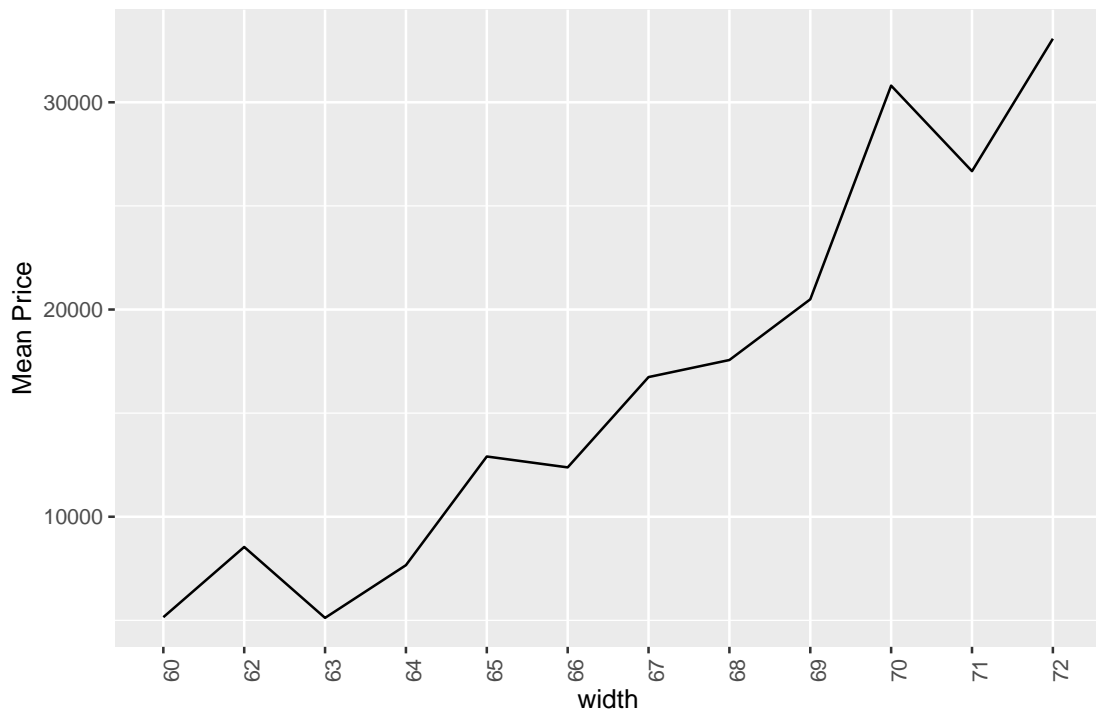


RPM do not have a specific trend but some of the rpm are significant

### Car Width and Price

Car width is another feature which has the range between 60 to 72.

width vs Mean Price

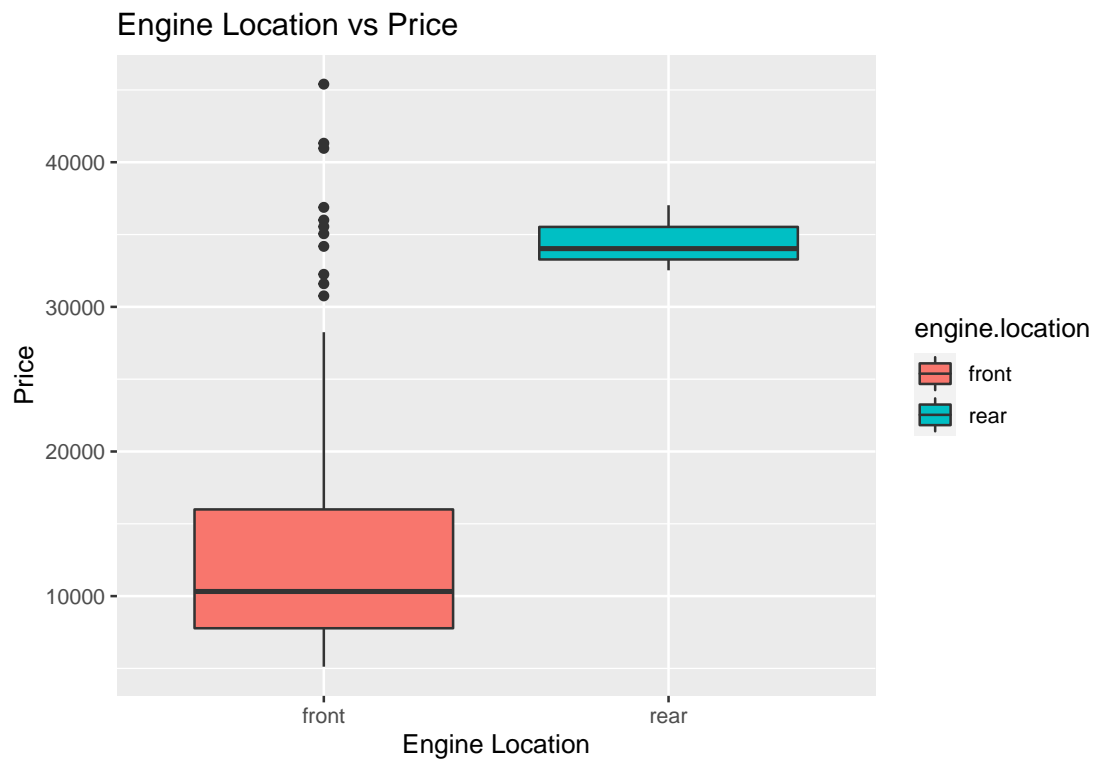


As per the observation, only 60 and 63 has the lowest mean price and we can see a linear trend in

the data which is exponentially growing.

## Engine Location and Price

There are two types of engine and out of which there are options like rare and front. when we compare the result we can see the visualization below



As per the above observation, it can be seen that rare engine vehicles fetch higher price than normal.

# Machine Learning

As per the above analysis the variable affecting the price have been found. The variables can be used for model building.

## Data Preparation

As most of the columns are not normally distributed.

There is a necessity for data preparation. there are many techniques to get the data to a normally distributed form. One such techniques to get the data to normally distribution is the

**Data Transformation** There are multiple option to choose the data transformation. Out of which log transformation is one such technique which can reduce the skewness.

Along with it there is a necessary to convert the column which are character to factor.

Creating dummy variables / one hot encoding

**Data Split** The data has 205 rows and these rows will be split to 70:30 ratio.

## Modeling- Linear Regression

A linear model will be applied wherein the price is the y variable also known as the dependent variable.

All the variables are been considered for the model.

```
##
## Call:
## lm(formula = price ~ ., data = training)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5173.2  -964.3   15.4   750.8  7647.3
##
## Coefficients: (8 not defined because of singularities)
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -188313.64    95832.87  -1.965  0.05264 .
## symboling        -522.74     443.32  -1.179  0.24160
## normalized.losses -3747.01    1471.58  -2.546  0.01267 *
## make.audi       13254.49     4961.00   2.672  0.00902 **
## make.bmw       16238.61     4908.73   3.308  0.00137 **
## make.chevrolet   4050.02     4538.30   0.892  0.37466
## make.dodge       3700.81     4160.38   0.890  0.37620
## make.honda       5964.16     4394.76   1.357  0.17830
## make.isuzu       11887.88     4728.63   2.514  0.01380 *
## make.jaguar       6421.47     4634.31   1.386  0.16944
## make.mazda       7269.56     4023.02   1.807  0.07426 .
## make.mercedes.benz 15191.56     4744.75   3.202  0.00192 **
## make.mercury      8059.56     5079.70   1.587  0.11627
## make.mitsubishi   2942.49     4133.70   0.712  0.47850
## make.nissan       7493.86     4141.53   1.809  0.07388 .
## make.peugot       3454.36     3839.40   0.900  0.37078
## make.plymouth     3674.60     4262.08   0.862  0.39100
## make.porsche    -12141.74     7218.14  -1.682  0.09617 .
## make.renault      5872.01     4609.43   1.274  0.20613
## make.saab        12830.87     4550.49   2.820  0.00597 **
## make.subaru       4247.61     3250.45   1.307  0.19477
## make.toyota       5058.36     3694.27   1.369  0.17449
## make.volkswagen   8184.90     4320.37   1.894  0.06152 .
## make.volvo       6913.91     4366.08   1.584  0.11697
## fuel.type.gas    -7791.30     5496.50  -1.418  0.15995
## aspiration.turbo   3085.26     1222.51   2.524  0.01345 *
```

```
## num.of.doors.two          -35.53      630.35 -0.056  0.95518
## body.style.hardtop        -3481.07    1858.96 -1.873  0.06452 .
## body.style.hatchback     -4849.05    1651.56 -2.936  0.00426 **
## body.style.sedan         -4208.07    1757.18 -2.395  0.01880 *
## body.style.wagon         -4422.15    1836.30 -2.408  0.01817 *
## drive.wheels.fwd         -974.06     1423.47 -0.684  0.49563
## drive.wheels.rwd         1416.32     1994.81  0.710  0.47962
## engine.location.rear     31694.23    5513.39  5.749  1.34e-07 ***
## wheel.base               9322.63    13367.64  0.697  0.48743
## length                   -17847.07   12026.58 -1.484  0.14147
## width                     51700.83   20227.66  2.556  0.01235 *
## height                   -38966.56   13857.69 -2.812  0.00610 **
## curb.weight              14763.27    5752.72  2.566  0.01201 *
## engine.type.dohcv        NA          NA      NA      NA
## engine.type.l            NA          NA      NA      NA
## engine.type.ohc         -2658.77    2016.61 -1.318  0.19086
## engine.type.ohcf        NA          NA      NA      NA
## engine.type.ohcv        -6595.12    2420.89 -2.724  0.00781 **
## engine.type.rotor        -7135.81    7396.57 -0.965  0.33738
## num.of.cylinders.five    -12023.68   3849.49 -3.123  0.00244 **
## num.of.cylinders.four    -8259.18    4865.67 -1.697  0.09323 .
## num.of.cylinders.six     -6089.16    3518.31 -1.731  0.08709 .
## num.of.cylinders.three   NA          NA      NA      NA
## num.of.cylinders.twelve  1329.19    6513.05  0.204  0.83877
## num.of.cylinders.two     NA          NA      NA      NA
## engine.size              13996.07    5983.29  2.339  0.02164 *
## fuel.system.2bbl         1886.79    1846.20  1.022  0.30965
## fuel.system.4bbl        NA          NA      NA      NA
## fuel.system.idi         NA          NA      NA      NA
## fuel.system.mfi         -579.82    3414.58 -0.170  0.86556
## fuel.system.mphi        779.22     1994.74  0.391  0.69703
## fuel.system.spdi        1014.46    2624.28  0.387  0.70003
## fuel.system.spfi        NA          NA      NA      NA
## bore                     -12370.72   9118.73 -1.357  0.17845
## stroke                   -360.73    4451.46 -0.081  0.93560
## compression.ratio        -8872.95    5735.31 -1.547  0.12552
## horsepower               -8261.65    4239.34 -1.949  0.05458 .
## peak.rpm                 13922.24    4668.29  2.982  0.00372 **
## city.mpg                 -1901.32    5955.23 -0.319  0.75030
## highway.mpg              -353.38    5480.00 -0.064  0.94873
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1945 on 86 degrees of freedom
## Multiple R-squared:  0.9639, Adjusted R-squared:  0.9399
## F-statistic: 40.26 on 57 and 86 DF, p-value: < 2.2e-16
```

As per the above observation, the variables like make, body style, engine location, width, height, engine type are significant. Moreover, The Adjusted R-squared is .93 which means 93 percent of the data fit the model.

## Forward and Backward Linear Model Selection

We can select forward and backward section model in the process using stepAIC.

```
## Start: AIC=2222.74
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##      make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
##      make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
##      make.nissan + make.peugot + make.plymouth + make.porsche +
```

```

## make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
## make.volvo + fuel.type.gas + aspiration.turbo + num.of.doors.two +
## body.style.hardtop + body.style.hatchback + body.style.sedan +
## body.style.wagon + drive.wheels.fwd + drive.wheels.rwd +
## engine.location.rear + wheel.base + length + width + height +
## curb.weight + engine.type.dohcv + engine.type.l + engine.type.ohc +
## engine.type.ohcf + engine.type.ohcv + engine.type.rotor +
## num.of.cylinders.five + num.of.cylinders.four + num.of.cylinders.six +
## num.of.cylinders.three + num.of.cylinders.twelve + num.of.cylinders.two +
## engine.size + fuel.system.2bbl + fuel.system.4bbl + fuel.system.idi +
## fuel.system.mfi + fuel.system.mphi + fuel.system.spdi + fuel.system.spfi +
## bore + stroke + compression.ratio + horsepower + peak.rpm +
## city.mpg + highway.mpg
##
##
## Step: AIC=2222.74
## price ~ symboling + normalized.losses + make.audi + make.bmw +
## make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
## make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
## make.nissan + make.peugot + make.plymouth + make.porsche +
## make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
## make.volvo + fuel.type.gas + aspiration.turbo + num.of.doors.two +
## body.style.hardtop + body.style.hatchback + body.style.sedan +
## body.style.wagon + drive.wheels.fwd + drive.wheels.rwd +
## engine.location.rear + wheel.base + length + width + height +
## curb.weight + engine.type.dohcv + engine.type.l + engine.type.ohc +
## engine.type.ohcf + engine.type.ohcv + engine.type.rotor +
## num.of.cylinders.five + num.of.cylinders.four + num.of.cylinders.six +
## num.of.cylinders.three + num.of.cylinders.twelve + num.of.cylinders.two +
## engine.size + fuel.system.2bbl + fuel.system.4bbl + fuel.system.idi +
## fuel.system.mfi + fuel.system.mphi + fuel.system.spdi + bore +
## stroke + compression.ratio + horsepower + peak.rpm + city.mpg +
## highway.mpg
##
##
## Step: AIC=2222.74
## price ~ symboling + normalized.losses + make.audi + make.bmw +
## make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
## make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
## make.nissan + make.peugot + make.plymouth + make.porsche +
## make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
## make.volvo + fuel.type.gas + aspiration.turbo + num.of.doors.two +
## body.style.hardtop + body.style.hatchback + body.style.sedan +
## body.style.wagon + drive.wheels.fwd + drive.wheels.rwd +
## engine.location.rear + wheel.base + length + width + height +
## curb.weight + engine.type.dohcv + engine.type.l + engine.type.ohc +
## engine.type.ohcf + engine.type.ohcv + engine.type.rotor +
## num.of.cylinders.five + num.of.cylinders.four + num.of.cylinders.six +
## num.of.cylinders.three + num.of.cylinders.twelve + num.of.cylinders.two +
## engine.size + fuel.system.2bbl + fuel.system.4bbl + fuel.system.mfi +
## fuel.system.mphi + fuel.system.spdi + bore + stroke + compression.ratio +
## horsepower + peak.rpm + city.mpg + highway.mpg
##
##
## Step: AIC=2222.74
## price ~ symboling + normalized.losses + make.audi + make.bmw +
## make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
## make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
## make.nissan + make.peugot + make.plymouth + make.porsche +

```

```

## make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
## make.volvo + fuel.type.gas + aspiration.turbo + num.of.doors.two +
## body.style.hardtop + body.style.hatchback + body.style.sedan +
## body.style.wagon + drive.wheels.fwd + drive.wheels.rwd +
## engine.location.rear + wheel.base + length + width + height +
## curb.weight + engine.type.dohcv + engine.type.l + engine.type.ohc +
## engine.type.ohcf + engine.type.ohcv + engine.type.rotor +
## num.of.cylinders.five + num.of.cylinders.four + num.of.cylinders.six +
## num.of.cylinders.three + num.of.cylinders.twelve + num.of.cylinders.two +
## engine.size + fuel.system.2bbl + fuel.system.mfi + fuel.system.mphi +
## fuel.system.spdi + bore + stroke + compression.ratio + horsepower +
## peak.rpm + city.mpg + highway.mpg
##
##
## Step: AIC=2222.74
## price ~ symboling + normalized.losses + make.audi + make.bmw +
## make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
## make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
## make.nissan + make.peugot + make.plymouth + make.porsche +
## make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
## make.volvo + fuel.type.gas + aspiration.turbo + num.of.doors.two +
## body.style.hardtop + body.style.hatchback + body.style.sedan +
## body.style.wagon + drive.wheels.fwd + drive.wheels.rwd +
## engine.location.rear + wheel.base + length + width + height +
## curb.weight + engine.type.dohcv + engine.type.l + engine.type.ohc +
## engine.type.ohcf + engine.type.ohcv + engine.type.rotor +
## num.of.cylinders.five + num.of.cylinders.four + num.of.cylinders.six +
## num.of.cylinders.three + num.of.cylinders.twelve + engine.size +
## fuel.system.2bbl + fuel.system.mfi + fuel.system.mphi + fuel.system.spdi +
## bore + stroke + compression.ratio + horsepower + peak.rpm +
## city.mpg + highway.mpg
##
##
## Step: AIC=2222.74
## price ~ symboling + normalized.losses + make.audi + make.bmw +
## make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
## make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
## make.nissan + make.peugot + make.plymouth + make.porsche +
## make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
## make.volvo + fuel.type.gas + aspiration.turbo + num.of.doors.two +
## body.style.hardtop + body.style.hatchback + body.style.sedan +
## body.style.wagon + drive.wheels.fwd + drive.wheels.rwd +
## engine.location.rear + wheel.base + length + width + height +
## curb.weight + engine.type.dohcv + engine.type.l + engine.type.ohc +
## engine.type.ohcf + engine.type.ohcv + engine.type.rotor +
## num.of.cylinders.five + num.of.cylinders.four + num.of.cylinders.six +
## num.of.cylinders.twelve + engine.size + fuel.system.2bbl +
## fuel.system.mfi + fuel.system.mphi + fuel.system.spdi + bore +
## stroke + compression.ratio + horsepower + peak.rpm + city.mpg +
## highway.mpg
##
##
## Step: AIC=2222.74
## price ~ symboling + normalized.losses + make.audi + make.bmw +
## make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
## make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
## make.nissan + make.peugot + make.plymouth + make.porsche +
## make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
## make.volvo + fuel.type.gas + aspiration.turbo + num.of.doors.two +

```

```

## body.style.hardtop + body.style.hatchback + body.style.sedan +
## body.style.wagon + drive.wheels.fwd + drive.wheels.rwd +
## engine.location.rear + wheel.base + length + width + height +
## curb.weight + engine.type.dohcv + engine.type.l + engine.type.ohc +
## engine.type.ohcv + engine.type.rotor + num.of.cylinders.five +
## num.of.cylinders.four + num.of.cylinders.six + num.of.cylinders.twelve +
## engine.size + fuel.system.2bbl + fuel.system.mfi + fuel.system.mpf +
## fuel.system.spdi + bore + stroke + compression.ratio + horsepower +
## peak.rpm + city.mpg + highway.mpg
##
##
## Step: AIC=2222.74
## price ~ symboling + normalized.losses + make.audi + make.bmw +
## make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
## make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
## make.nissan + make.peugot + make.plymouth + make.porsche +
## make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
## make.volvo + fuel.type.gas + aspiration.turbo + num.of.doors.two +
## body.style.hardtop + body.style.hatchback + body.style.sedan +
## body.style.wagon + drive.wheels.fwd + drive.wheels.rwd +
## engine.location.rear + wheel.base + length + width + height +
## curb.weight + engine.type.dohcv + engine.type.ohc + engine.type.ohcv +
## engine.type.rotor + num.of.cylinders.five + num.of.cylinders.four +
## num.of.cylinders.six + num.of.cylinders.twelve + engine.size +
## fuel.system.2bbl + fuel.system.mfi + fuel.system.mpf + fuel.system.spdi +
## bore + stroke + compression.ratio + horsepower + peak.rpm +
## city.mpg + highway.mpg
##
##
## Step: AIC=2222.74
## price ~ symboling + normalized.losses + make.audi + make.bmw +
## make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
## make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
## make.nissan + make.peugot + make.plymouth + make.porsche +
## make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
## make.volvo + fuel.type.gas + aspiration.turbo + num.of.doors.two +
## body.style.hardtop + body.style.hatchback + body.style.sedan +
## body.style.wagon + drive.wheels.fwd + drive.wheels.rwd +
## engine.location.rear + wheel.base + length + width + height +
## curb.weight + engine.type.ohc + engine.type.ohcv + engine.type.rotor +
## num.of.cylinders.five + num.of.cylinders.four + num.of.cylinders.six +
## num.of.cylinders.twelve + engine.size + fuel.system.2bbl +
## fuel.system.mfi + fuel.system.mpf + fuel.system.spdi + bore +
## stroke + compression.ratio + horsepower + peak.rpm + city.mpg +
## highway.mpg
##
##
##          Df Sum of Sq      RSS      AIC
## - num.of.doors.two      1      12014 325205745 2220.7
## - highway.mpg           1       15724 325209455 2220.7
## - stroke                 1       24832 325218563 2220.8
## - fuel.system.mfi        1      109031 325302763 2220.8
## - num.of.cylinders.twelve 1      157489 325351220 2220.8
## - city.mpg              1      385441 325579173 2220.9
## - fuel.system.spdi       1      565059 325758791 2221.0
## - fuel.system.mpf        1      577025 325770756 2221.0
## - drive.wheels.fwd       1     1770595 326964327 2221.5
## - wheel.base            1     1839125 327032856 2221.6
## - drive.wheels.rwd       1     1906193 327099925 2221.6
## - make.mitsubishi        1     1916009 327109741 2221.6

```



```

## - make.plymouth      1  2810732 328004464 2222.0
## - make.dodge         1  2992071 328185803 2222.1
## - make.chevrolet     1  3011415 328205146 2222.1
## - make.peugot        1  3060933 328254665 2222.1
## - engine.type.rotor   1  3519401 328713133 2222.3
## - fuel.system.2bbl    1  3949420 329143152 2222.5
## <none>                325193732 2222.7
## - symboling           1  5257381 330451112 2223.1
## - make.renault        1  6136540 331330271 2223.4
## - make.subaru         1  6457221 331650953 2223.6
## - engine.type.ohc     1  6572988 331766720 2223.6
## - bore                1  6959288 332153020 2223.8
## - make.honda          1  6964220 332157951 2223.8
## - make.toyota         1  7089339 332283071 2223.8
## - make.jaguar         1  7260106 332453838 2223.9
## - fuel.type.gas       1  7597868 332791600 2224.1
## - length              1  8327090 333520821 2224.4
## - compression.ratio   1  9050386 334244117 2224.7
## - make.volvo          1  9482171 334675903 2224.9
## - make.mercury        1  9518965 334712696 2224.9
## - make.porsche        1  10699298 335893029 2225.4
## - num.of.cylinders.four 1  10895115 336088847 2225.5
## - num.of.cylinders.six 1  11326323 336520054 2225.7
## - make.mazda          1  12346826 337540557 2226.1
## - make.nissan          1  12380335 337574067 2226.1
## - body.style.hardtop   1  13259583 338453314 2226.5
## - make.volkswagen     1  13571528 338765260 2226.6
## - horsepower          1  14360898 339554629 2227.0
## - engine.size          1  20690731 345884463 2229.6
## - body.style.sedan     1  21685844 346879576 2230.0
## - body.style.wagon     1  21929239 347122970 2230.1
## - make.isuzu          1  23899110 349092841 2230.9
## - aspiration.turbo     1  24083837 349277569 2231.0
## - normalized.losses    1  24515739 349709470 2231.2
## - width                1  24702858 349896589 2231.3
## - curb.weight          1  24903645 350097376 2231.4
## - make.audi            1  26991755 352185487 2232.2
## - engine.type.ohcv     1  28063266 353256998 2232.7
## - height               1  29898277 355092009 2233.4
## - make.saab           1  30063438 355257170 2233.5
## - body.style.hatchback 1  32596336 357790068 2234.5
## - peak.rpm             1  33631547 358825279 2234.9
## - num.of.cylinders.five 1  36890311 362084043 2236.2
## - make.mercedes.benz   1  38763389 363957121 2236.9
## - make.bmw            1  41381213 366574945 2238.0
## - engine.location.rear 1  124958787 450152519 2267.6
##
## Step:  AIC=2220.74
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
##   make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
##   make.nissan + make.peugot + make.plymouth + make.porsche +
##   make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
##   make.volvo + fuel.type.gas + aspiration.turbo + body.style.hardtop +
##   body.style.hatchback + body.style.sedan + body.style.wagon +
##   drive.wheels.fwd + drive.wheels.rwd + engine.location.rear +
##   wheel.base + length + width + height + curb.weight + engine.type.ohc +
##   engine.type.ohcv + engine.type.rotor + num.of.cylinders.five +
##   num.of.cylinders.four + num.of.cylinders.six + num.of.cylinders.twelve +

```

```

##      engine.size + fuel.system.2bbl + fuel.system.mfi + fuel.system.mphi +
##      fuel.system.spdi + bore + stroke + compression.ratio + horsepower +
##      peak.rpm + city.mpg + highway.mpg
##
##              Df Sum of Sq      RSS      AIC
## - highway.mpg          1      13633 325219379 2218.8
## - stroke                1      25958 325231704 2218.8
## - fuel.system.mfi       1     118444 325324190 2218.8
## - num.of.cylinders.twelve 1     146198 325351944 2218.8
## - city.mpg              1     395976 325601721 2218.9
## - fuel.system.spdi      1     553144 325758889 2219.0
## - fuel.system.mphi      1     565058 325770804 2219.0
## - drive.wheels.fwd      1    1774157 326979903 2219.5
## - wheel.base            1    1853779 327059525 2219.6
## - drive.wheels.rwd      1    1898958 327104703 2219.6
## - make.mitsubishi       1    1904858 327110603 2219.6
## - make.plymouth        1    2804937 328010682 2220.0
## - make.dodge            1    2981134 328186880 2220.1
## - make.chevrolet       1    2999803 328205548 2220.1
## - make.peugot          1    3057134 328262879 2220.1
## - engine.type.rotor     1    3573558 328779303 2220.3
## - fuel.system.2bbl      1    3977351 329183096 2220.5
## <none>                  325205745 2220.7
## - symboling             1    5470330 330676075 2221.1
## - make.renault          1    6128343 331334088 2221.4
## - make.subaru           1    6460512 331666257 2221.6
## - engine.type.ohc       1    6572443 331778188 2221.6
## - bore                  1    6963274 332169020 2221.8
## - make.honda            1    7009137 332214882 2221.8
## - make.toyota           1    7083899 332289645 2221.8
## - make.jaguar           1    7273933 332479679 2221.9
## - fuel.type.gas         1    7744209 332949955 2222.1
## - length                1    8346770 333552515 2222.4
## - compression.ratio     1    9145558 334351303 2222.7
## + num.of.doors.two      1     12014 325193732 2222.7
## - make.volvo            1    9500773 334706518 2222.9
## - make.mercury          1    9555471 334761217 2222.9
## - num.of.cylinders.four  1   10931832 336137577 2223.5
## - make.porsche          1   10954813 336160559 2223.5
## - num.of.cylinders.six  1   11379864 336585610 2223.7
## - make.mazda            1   12346308 337552053 2224.1
## - make.nissan            1   12417395 337623141 2224.1
## - body.style.hardtop     1   13257728 338463473 2224.5
## - make.volkswagen       1   13576454 338782200 2224.6
## - horsepower            1   14427469 339633214 2225.0
## - engine.size           1   20864545 346070291 2227.7
## - body.style.sedan       1   22551555 347757301 2228.4
## - body.style.wagon       1   22836582 348042327 2228.5
## - make.isuzu            1   23899581 349105327 2228.9
## - aspiration.turbo       1   24072706 349278452 2229.0
## - normalized.losses     1   24605954 349811699 2229.2
## - width                 1   24709402 349915147 2229.3
## - curb.weight            1   25279865 350485610 2229.5
## - make.audi              1   27021610 352227356 2230.2
## - engine.type.ohcv       1   28352533 353558279 2230.8
## - height                 1   29907731 355113477 2231.4
## - make.saab              1   30207777 355413523 2231.5
## - body.style.hatchback   1   32587930 357793676 2232.5
## - peak.rpm              1   33704452 358910197 2232.9

```

```

## - num.of.cylinders.five      1  36992580 362198325 2234.3
## - make.mercedes.benz         1  38889885 364095630 2235.0
## - make.bmw                   1  41500054 366705800 2236.0
## - engine.location.rear       1 127668614 452874359 2266.4
##
## Step: AIC=2218.75
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
##   make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
##   make.nissan + make.peugot + make.plymouth + make.porsche +
##   make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
##   make.volvo + fuel.type.gas + aspiration.turbo + body.style.hardtop +
##   body.style.hatchback + body.style.sedan + body.style.wagon +
##   drive.wheels.fwd + drive.wheels.rwd + engine.location.rear +
##   wheel.base + length + width + height + curb.weight + engine.type.ohc +
##   engine.type.ohcv + engine.type.rotor + num.of.cylinders.five +
##   num.of.cylinders.four + num.of.cylinders.six + num.of.cylinders.twelve +
##   engine.size + fuel.system.2bbl + fuel.system.mfi + fuel.system.mphi +
##   fuel.system.spdi + bore + stroke + compression.ratio + horsepower +
##   peak.rpm + city.mpg
##
##           Df Sum of Sq      RSS      AIC
## - stroke           1      25668 325245047 2216.8
## - fuel.system.mfi   1     110282 325329661 2216.8
## - num.of.cylinders.twelve 1     134141 325353520 2216.8
## - fuel.system.spdi  1      581668 325801047 2217.0
## - fuel.system.mphi  1      583024 325802403 2217.0
## - city.mpg         1     1551881 326771260 2217.4
## - drive.wheels.fwd  1     1819750 327039129 2217.6
## - wheel.base       1     1851736 327071115 2217.6
## - drive.wheels.rwd  1     1892317 327111696 2217.6
## - make.mitsubishi   1     1923543 327142921 2217.6
## - make.plymouth     1     2844331 328063710 2218.0
## - make.dodge        1      3011276 328230655 2218.1
## - make.chevrolet    1      3069728 328289107 2218.1
## - make.peugot       1      3127488 328346867 2218.1
## - engine.type.rotor  1      3652671 328872050 2218.4
## - fuel.system.2bbl   1      4026991 329246370 2218.5
## <none>                325219379 2218.8
## - symboling         1     5536047 330755425 2219.2
## - make.renault      1     6115955 331335334 2219.4
## - make.subaru       1     6508532 331727911 2219.6
## - engine.type.ohc   1     6761836 331981215 2219.7
## - bore              1     7017147 332236525 2219.8
## - make.honda        1     7142521 332361899 2219.9
## - make.toyota       1     7226561 332445940 2219.9
## - make.jaguar       1     7518397 332737775 2220.0
## - fuel.type.gas     1     7780101 332999480 2220.2
## - length           1     8336991 333556370 2220.4
## + highway.mpg       1      13633 325205745 2220.7
## + num.of.doors.two   1      9923 325209455 2220.7
## - compression.ratio  1     9426062 334645440 2220.9
## - make.volvo        1     9662010 334881389 2221.0
## - make.mercury      1     9667043 334886422 2221.0
## - num.of.cylinders.four 1    11250366 336469745 2221.7
## - make.porsche      1    12193908 337413287 2222.1
## - num.of.cylinders.six 1    12336245 337555624 2222.1
## - make.mazda        1    12460249 337679627 2222.2
## - make.nissan        1    12495637 337715016 2222.2

```

```

## - body.style.hardtop      1 13444017 338663396 2222.6
## - make.volkswagen         1 13607154 338826533 2222.7
## - horsepower              1 14442269 339661648 2223.0
## - engine.size             1 21004415 346223794 2225.8
## - body.style.wagon       1 22956933 348176312 2226.6
## - body.style.sedan        1 22987063 348206442 2226.6
## - make.isuzu              1 24192098 349411476 2227.1
## - aspiration.turbo        1 24315970 349535349 2227.1
## - normalized.losses      1 24613169 349832547 2227.2
## - width                   1 24785306 350004685 2227.3
## - curb.weight             1 25489336 350708715 2227.6
## - make.audi               1 27066072 352285451 2228.3
## - engine.type.ohcv        1 28522423 353741801 2228.8
## - height                  1 30089929 355309308 2229.5
## - make.saab               1 30266370 355485749 2229.6
## - body.style.hatchback    1 32762214 357981593 2230.6
## - peak.rpm                1 33767044 358986423 2231.0
## - num.of.cylinders.five   1 37634008 362853387 2232.5
## - make.mercedes.benz      1 39385608 364604987 2233.2
## - make.bmw                1 41659321 366878700 2234.1
## - engine.location.rear    1 137994354 463213733 2267.7
##
## Step: AIC=2216.76
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
##   make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
##   make.nissan + make.peugot + make.plymouth + make.porsche +
##   make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
##   make.volvo + fuel.type.gas + aspiration.turbo + body.style.hardtop +
##   body.style.hatchback + body.style.sedan + body.style.wagon +
##   drive.wheels.fwd + drive.wheels.rwd + engine.location.rear +
##   wheel.base + length + width + height + curb.weight + engine.type.ohc +
##   engine.type.ohcv + engine.type.rotor + num.of.cylinders.five +
##   num.of.cylinders.four + num.of.cylinders.six + num.of.cylinders.twelve +
##   engine.size + fuel.system.2bbl + fuel.system.mfi + fuel.system.mphi +
##   fuel.system.spdi + bore + compression.ratio + horsepower +
##   peak.rpm + city.mpg
##
##           Df Sum of Sq      RSS      AIC
## - fuel.system.mfi      1    112586 325357632 2214.8
## - num.of.cylinders.twelve 1    159221 325404267 2214.8
## - fuel.system.spdi      1    570284 325815331 2215.0
## - fuel.system.mphi      1    570500 325815547 2215.0
## - city.mpg              1    1667098 326912144 2215.5
## - drive.wheels.fwd      1    1825765 327070812 2215.6
## - wheel.base            1    1842356 327087403 2215.6
## - drive.wheels.rwd      1    1899813 327144860 2215.6
## - make.mitsubishi       1    1934085 327179132 2215.6
## - make.plymouth         1    2899188 328144234 2216.0
## - make.chevrolet        1    3052759 328297806 2216.1
## - make.dodge            1    3071955 328317002 2216.1
## - make.peugot           1    3123645 328368692 2216.1
## - engine.type.rotor     1    3664962 328910009 2216.4
## - fuel.system.2bbl      1    4002806 329247852 2216.5
## <none>                  325245047 2216.8
## - symboling             1    5513741 330758787 2217.2
## - make.renault          1    6315704 331560751 2217.5
## - engine.type.ohc       1    6845927 332090973 2217.8
## - make.subaru           1    6986669 332231715 2217.8

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## - make.toyota          1  7269369 332514416 2217.9
## - make.honda           1  7607947 332852994 2218.1
## - make.jaguar          1  7763073 333008120 2218.2
## - fuel.type.gas        1  7779098 333024144 2218.2
## - length               1  8319350 333564397 2218.4
## + stroke               1    25668 325219379 2218.8
## + highway.mpg          1    13343 325231704 2218.8
## + num.of.doors.two     1    10962 325234084 2218.8
## - compression.ratio    1   9400573 334645619 2218.9
## - make.volvo           1   9697286 334942333 2219.0
## - make.mercury         1   9814605 335059652 2219.0
## - bore                 1   9996290 335241337 2219.1
## - num.of.cylinders.four 1  11323975 336569021 2219.7
## - make.porsche         1  12259411 337504458 2220.1
## - num.of.cylinders.six  1  12312264 337557311 2220.1
## - make.mazda           1  12611299 337856346 2220.2
## - make.nissan           1  12741150 337986197 2220.3
## - body.style.hardtop    1  13450447 338695494 2220.6
## - make.volkswagen       1  14031733 339276780 2220.8
## - horsepower           1  14869877 340114924 2221.2
## - engine.size           1  20979446 346224492 2223.8
## - body.style.wagon      1  22970888 348215935 2224.6
## - body.style.sedan      1  22973467 348218514 2224.6
## - aspiration.turbo      1  24357336 349602383 2225.2
## - make.isuzu            1  24391553 349636600 2225.2
## - normalized.losses     1  24737431 349982477 2225.3
## - width                 1  24930370 350175416 2225.4
## - curb.weight           1  26032025 351277072 2225.8
## - make.audi             1  27986778 353231824 2226.7
## - engine.type.ohcv      1  30194658 355439705 2227.5
## - make.saab             1  30247596 355492643 2227.6
## - height                1  31301597 356546643 2228.0
## - body.style.hatchback  1  32792423 358037469 2228.6
## - peak.rpm              1  34158976 359404023 2229.1
## - num.of.cylinders.five  1  38155272 363400318 2230.7
## - make.mercedes.benz    1  39427297 364672343 2231.2
## - make.bmw              1  41803673 367048719 2232.2
## - engine.location.rear  1 137979076 463224122 2265.7
##
## Step:  AIC=2214.81
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
##   make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
##   make.nissan + make.peugot + make.plymouth + make.porsche +
##   make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
##   make.volvo + fuel.type.gas + aspiration.turbo + body.style.hardtop +
##   body.style.hatchback + body.style.sedan + body.style.wagon +
##   drive.wheels.fwd + drive.wheels.rwd + engine.location.rear +
##   wheel.base + length + width + height + curb.weight + engine.type.ohc +
##   engine.type.ohcv + engine.type.rotor + num.of.cylinders.five +
##   num.of.cylinders.four + num.of.cylinders.six + num.of.cylinders.twelve +
##   engine.size + fuel.system.2bbl + fuel.system.mpfi + fuel.system.spdi +
##   bore + compression.ratio + horsepower + peak.rpm + city.mpg
##
##               Df Sum of Sq      RSS      AIC
## - num.of.cylinders.twelve  1    167650 325525283 2212.9
## - fuel.system.spdi         1    1459786 326817418 2213.4
## - fuel.system.mpfi         1    1512123 326869756 2213.5
## - city.mpg                 1    1587660 326945292 2213.5

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## - drive.wheels.fwd      1  1851486 327209118 2213.6
## - wheel.base            1  1895006 327252638 2213.7
## - make.mitsubishi       1  1927486 327285118 2213.7
## - drive.wheels.rwd      1  2200346 327557978 2213.8
## - make.plymouth         1  2821305 328178937 2214.1
## - make.chevrolet        1  2954072 328311704 2214.1
## - make.dodge            1  2969327 328326959 2214.1
## - make.peugot          1  3089498 328447130 2214.2
## - engine.type.rotor     1  3553642 328911275 2214.4
## <none>                  325357632 2214.8
## - make.renault          1  6334577 331692210 2215.6
## - engine.type.ohc       1  6802924 332160556 2215.8
## - make.subaru           1  6995555 332353188 2215.9
## - make.toyota           1  7172174 332529806 2215.9
## - symboling             1  7174295 332531928 2215.9
## - make.jaguar           1  7660205 333017837 2216.2
## - fuel.system.2bbl      1  7782055 333139688 2216.2
## - fuel.type.gas         1  7918463 333276095 2216.3
## - make.honda            1  8031900 333389532 2216.3
## - length                1  8698104 334055736 2216.6
## + fuel.system.mfi       1  112586 325245047 2216.8
## + stroke                 1  27972 325329661 2216.8
## + num.of.doors.two      1  20807 325336825 2216.8
## + highway.mpg           1  5217 325352416 2216.8
## - compression.ratio     1  9291446 334649078 2216.9
## - make.volvo            1  9596137 334953770 2217.0
## - make.mercury          1  9790867 335148499 2217.1
## - bore                  1  10065977 335423610 2217.2
## - num.of.cylinders.four 1  11546627 336904259 2217.8
## - make.porsche          1  12239632 337597264 2218.1
## - num.of.cylinders.six  1  12244388 337602021 2218.1
## - make.mazda            1  12551913 337909545 2218.3
## - make.nissan            1  12659262 338016895 2218.3
## - body.style.hardtop    1  13440041 338797674 2218.6
## - make.volkswagen       1  14091179 339448811 2218.9
## - horsepower            1  16274310 341631942 2219.8
## - engine.size           1  22030858 347388491 2222.2
## - body.style.wagon      1  23441612 348799244 2222.8
## - body.style.sedan      1  23595242 348952874 2222.9
## - make.isuzu            1  24332476 349690108 2223.2
## - width                 1  24853167 350210799 2223.4
## - normalized.losses     1  25212581 350570213 2223.6
## - curb.weight           1  25943891 351301524 2223.9
## - aspiration.turbo       1  27286831 352644463 2224.4
## - make.audi             1  28452798 353810431 2224.9
## - engine.type.ohcv      1  30325156 355682788 2225.6
## - height                1  31257710 356615342 2226.0
## - make.saab             1  31277035 356634667 2226.0
## - body.style.hatchback  1  33020872 358378504 2226.7
## - peak.rpm              1  37389446 362747078 2228.5
## - num.of.cylinders.five 1  38741377 364099010 2229.0
## - make.mercedes.benz    1  39314982 364672614 2229.2
## - make.bmw              1  41894699 367252331 2230.2
## - engine.location.rear  1  138204899 463562531 2263.8
##
## Step: AIC=2212.88
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##      make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
##      make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +

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##      make.nissan + make.peugot + make.plymouth + make.porsche +
##      make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
##      make.volvo + fuel.type.gas + aspiration.turbo + body.style.hardtop +
##      body.style.hatchback + body.style.sedan + body.style.wagon +
##      drive.wheels.fwd + drive.wheels.rwd + engine.location.rear +
##      wheel.base + length + width + height + curb.weight + engine.type.ohc +
##      engine.type.ohcv + engine.type.rotor + num.of.cylinders.five +
##      num.of.cylinders.four + num.of.cylinders.six + engine.size +
##      fuel.system.2bbl + fuel.system.mphi + fuel.system.spdi +
##      bore + compression.ratio + horsepower + peak.rpm + city.mpg
##
##              Df Sum of Sq      RSS      AIC
## - fuel.system.mphi      1  1351954 326877236 2211.5
## - fuel.system.spdi      1  1373696 326898979 2211.5
## - city.mpg              1  1749317 327274600 2211.7
## - wheel.base           1  1751285 327276567 2211.7
## - make.mitsubishi      1  1911219 327436501 2211.7
## - drive.wheels.rwd     1  2033111 327558393 2211.8
## - drive.wheels.fwd     1  2109665 327634948 2211.8
## - make.plymouth        1  2784153 328309435 2212.1
## - make.chevrolet       1  2891653 328416936 2212.2
## - make.dodge           1  2927347 328452629 2212.2
## - make.peugot          1  3977025 329502308 2212.6
## <none>                  325525283 2212.9
## - engine.type.rotor    1  4803959 330329241 2213.0
## - make.renault         1  6313625 331838907 2213.7
## - engine.type.ohc      1  6730145 332255428 2213.8
## - symboling            1  7030886 332556169 2214.0
## - make.toyota          1  7225659 332750942 2214.1
## - make.subaru          1  7413414 332938697 2214.1
## - fuel.system.2bbl     1  7629905 333155188 2214.2
## - make.honda           1  7876583 333401866 2214.3
## - length               1  8600270 334125553 2214.6
## + num.of.cylinders.twelve 1  167650 325357632 2214.8
## + fuel.system.mfi      1  121015 325404267 2214.8
## + stroke               1   54857 325470425 2214.9
## + num.of.doors.two     1   4061 325521221 2214.9
## + highway.mpg          1    235 325525048 2214.9
## - fuel.type.gas        1  9343170 334868453 2215.0
## - make.mercury         1  9760734 335286016 2215.1
## - make.volvo           1  9774273 335299555 2215.1
## - bore                 1 10305079 335830362 2215.4
## - make.jaguar          1 11298419 336823701 2215.8
## - make.nissan           1 12624879 338150161 2216.4
## - make.mazda           1 12641726 338167009 2216.4
## - compression.ratio    1 12924821 338450104 2216.5
## - body.style.hardtop    1 13890067 339415350 2216.9
## - make.volkswagen       1 13988953 339514235 2216.9
## - num.of.cylinders.four 1 14366411 339891694 2217.1
## - make.porsche         1 16221556 341746838 2217.9
## - horsepower           1 18485997 344011280 2218.8
## - engine.size          1 22119790 347645072 2220.3
## - num.of.cylinders.six 1 22829754 348355036 2220.6
## - body.style.wagon     1 23452724 348978006 2220.9
## - body.style.sedan     1 23708946 349234228 2221.0
## - make.isuzu           1 24234431 349759713 2221.2
## - width                1 24995544 350520827 2221.5
## - curb.weight          1 25802805 351328087 2221.9
## - normalized.losses    1 26094318 351619600 2222.0

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## - aspiration.turbo      1 27211718 352737001 2222.4
## - make.audi            1 28452818 353978101 2222.9
## - make.saab            1 31136413 356661695 2224.0
## - engine.type.ohcv     1 31548238 357073521 2224.2
## - height              1 32213959 357739242 2224.5
## - body.style.hatchback 1 33173526 358698808 2224.9
## - peak.rpm            1 37267218 362792501 2226.5
## - make.mercedes.benz   1 39662201 365187483 2227.4
## - num.of.cylinders.five 1 42969889 368495172 2228.7
## - make.bmw            1 42978819 368504101 2228.7
## - engine.location.rear 1 194978188 520503470 2278.5
##
## Step: AIC=2211.48
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
##   make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
##   make.nissan + make.peugot + make.plymouth + make.porsche +
##   make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
##   make.volvo + fuel.type.gas + aspiration.turbo + body.style.hardtop +
##   body.style.hatchback + body.style.sedan + body.style.wagon +
##   drive.wheels.fwd + drive.wheels.rwd + engine.location.rear +
##   wheel.base + length + width + height + curb.weight + engine.type.ohc +
##   engine.type.ohcv + engine.type.rotor + num.of.cylinders.five +
##   num.of.cylinders.four + num.of.cylinders.six + engine.size +
##   fuel.system.2bbl + fuel.system.spdi + bore + compression.ratio +
##   horsepower + peak.rpm + city.mpg
##
##           Df Sum of Sq      RSS      AIC
## - fuel.system.spdi      1    368886 327246123 2209.6
## - drive.wheels.rwd      1    1819797 328697034 2210.3
## - city.mpg              1    1907794 328785030 2210.3
## - make.mitsubishi       1    2018625 328895862 2210.4
## - wheel.base            1    2124952 329002189 2210.4
## - drive.wheels.fwd      1    2596301 329473537 2210.6
## - make.chevrolet        1    2898648 329775885 2210.8
## - make.plymouth         1    2931805 329809042 2210.8
## - make.dodge            1    2948342 329825578 2210.8
## - make.peugot           1    4337472 331214709 2211.4
## <none>                  326877236 2211.5
## - make.honda            1    6913575 333790811 2212.5
## - engine.type.ohc       1    6915594 333792830 2212.5
## - symboling             1    7029122 333906358 2212.5
## - make.renault          1    7123614 334000850 2212.6
## - engine.type.rotor     1    7280273 334157510 2212.7
## - make.toyota           1    7564739 334441976 2212.8
## - make.subaru           1    7627034 334504270 2212.8
## + fuel.system.mphi      1    1351954 325525283 2212.9
## - fuel.type.gas         1    8024891 334902127 2213.0
## + fuel.system.mfi       1    1006973 325870263 2213.0
## - length                1    8623594 335500831 2213.2
## + stroke                1     11710 326865527 2213.5
## + num.of.cylinders.twelve 1     7481 326869756 2213.5
## + highway.mpg           1     3023 326874214 2213.5
## + num.of.doors.two      1        71 326877166 2213.5
## - fuel.system.2bbl      1    9636424 336513661 2213.7
## - make.mercury          1   10164883 337042120 2213.9
## - make.volvo            1   10269846 337147082 2213.9
## - bore                  1   10587498 337464734 2214.1
## - make.jaguar           1   11176286 338053523 2214.3

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## - compression.ratio      1 12195139 339072376 2214.8
## - make.mazda             1 13154354 340031590 2215.2
## - make.nissan             1 13220534 340097770 2215.2
## - body.style.hardtop     1 14265887 341143123 2215.6
## - num.of.cylinders.four  1 14382311 341259548 2215.7
## - make.volkswagen        1 14961811 341839048 2215.9
## - make.porsche           1 16883070 343760307 2216.7
## - horsepower             1 17141152 344018388 2216.8
## - engine.size            1 20841380 347718617 2218.4
## - num.of.cylinders.six   1 22708893 349586130 2219.2
## - make.isuzu             1 24450609 351327846 2219.9
## - body.style.sedan       1 24546261 351423498 2219.9
## - body.style.wagon       1 24612218 351489455 2219.9
## - width                  1 25510383 352387620 2220.3
## - aspiration.turbo       1 25893752 352770989 2220.5
## - curb.weight            1 26205799 353083036 2220.6
## - normalized.losses     1 28129129 355006366 2221.4
## - make.audi              1 29532392 356409628 2221.9
## - engine.type.ohcv       1 31735636 358612872 2222.8
## - make.saab              1 32183595 359060832 2223.0
## - body.style.hatchback   1 35088321 361965558 2224.2
## - height                 1 35704213 362581450 2224.4
## - peak.rpm               1 36053156 362930392 2224.6
## - make.mercedes.benz     1 40557222 367434458 2226.3
## - num.of.cylinders.five  1 43315094 370192330 2227.4
## - make.bmw               1 44038256 370915493 2227.7
## - engine.location.rear   1 200168613 527045850 2278.3
##
## Step: AIC=2209.64
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
##   make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
##   make.nissan + make.peugot + make.plymouth + make.porsche +
##   make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
##   make.volvo + fuel.type.gas + aspiration.turbo + body.style.hardtop +
##   body.style.hatchback + body.style.sedan + body.style.wagon +
##   drive.wheels.fwd + drive.wheels.rwd + engine.location.rear +
##   wheel.base + length + width + height + curb.weight + engine.type.ohc +
##   engine.type.ohcv + engine.type.rotor + num.of.cylinders.five +
##   num.of.cylinders.four + num.of.cylinders.six + engine.size +
##   fuel.system.2bbl + bore + compression.ratio + horsepower +
##   peak.rpm + city.mpg
##
##           Df Sum of Sq      RSS      AIC
## - drive.wheels.rwd      1  1720021 328966143 2208.4
## - city.mpg              1  1760159 329006281 2208.4
## - wheel.base            1  2134849 329380972 2208.6
## - make.mitsubishi       1  2292059 329538182 2208.7
## - drive.wheels.fwd      1  2513757 329759880 2208.7
## - make.dodge            1  2870889 330117012 2208.9
## - make.chevrolet        1  2889424 330135547 2208.9
## - make.plymouth         1  2908757 330154880 2208.9
## - make.peugot           1  4409231 331655353 2209.6
## <none>                  327246123 2209.6
## - engine.type.ohc       1  6693969 333940092 2210.6
## - symboling             1  6716389 333962512 2210.6
## - make.honda            1  6778416 334024539 2210.6
## - make.renault          1  7017730 334263852 2210.7
## - make.toyota           1  7508438 334754561 2210.9

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## - make.subaru          1  7640590 334886713 2211.0
## - engine.type.rotor    1  7727675 334973798 2211.0
## + fuel.system.mfi      1  1276250 325969873 2211.1
## - length               1  8403721 335649843 2211.3
## + fuel.system.spdi     1   368886 326877236 2211.5
## + fuel.system.mpf      1   347144 326898979 2211.5
## - fuel.type.gas        1  8989464 336235587 2211.6
## + num.of.cylinders.twelve 1   16072 327230050 2211.6
## + stroke               1   10812 327235311 2211.6
## + highway.mpg          1    6827 327239296 2211.6
## + num.of.doors.two     1    1103 327245020 2211.6
## - fuel.system.2bbl     1   9310097 336556220 2211.7
## - make.mercury         1  10010384 337256506 2212.0
## - make.volvo           1  10300592 337546715 2212.1
## - bore                 1  10467017 337713140 2212.2
## - make.jaguar          1  11378159 338624282 2212.6
## - make.mazda           1  13150743 340396866 2213.3
## - make.nissan           1  13198229 340444351 2213.3
## - compression.ratio    1  13757662 341003785 2213.6
## - body.style.hardtop    1  14115920 341362043 2213.7
## - make.volkswagen       1  14733220 341979343 2214.0
## - num.of.cylinders.four 1  14958711 342204834 2214.1
## - horsepower           1  16814011 344060134 2214.9
## - make.porsche         1  17043663 344289786 2214.9
## - engine.size          1  20472938 347719061 2216.4
## - num.of.cylinders.six  1  23691341 350937464 2217.7
## - body.style.sedan     1  24316932 351563055 2218.0
## - body.style.wagon     1  24439527 351685649 2218.0
## - make.isuzu           1  24477223 351723346 2218.0
## - width                1  25144009 352390132 2218.3
## - aspiration.turbo      1  25757682 353003804 2218.6
## - curb.weight          1  27154533 354400656 2219.1
## - normalized.losses    1  28431392 355677515 2219.6
## - make.audi            1  29246394 356492517 2220.0
## - engine.type.ohcv     1  31688205 358934328 2220.9
## - make.saab            1  31852471 359098594 2221.0
## - body.style.hatchback  1  34786338 362032461 2222.2
## - peak.rpm             1  35955931 363202054 2222.7
## - height               1  36327295 363573418 2222.8
## - make.mercedes.benz   1  40602768 367848891 2224.5
## - make.bmw             1  43940799 371186922 2225.8
## - num.of.cylinders.five 1  44304591 371550714 2225.9
## - engine.location.rear 1  201459547 528705670 2276.7
##
## Step:  AIC=2208.4
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
##   make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
##   make.nissan + make.peugot + make.plymouth + make.porsche +
##   make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
##   make.volvo + fuel.type.gas + aspiration.turbo + body.style.hardtop +
##   body.style.hatchback + body.style.sedan + body.style.wagon +
##   drive.wheels.fwd + engine.location.rear + wheel.base + length +
##   width + height + curb.weight + engine.type.ohc + engine.type.ohcv +
##   engine.type.rotor + num.of.cylinders.five + num.of.cylinders.four +
##   num.of.cylinders.six + engine.size + fuel.system.2bbl + bore +
##   compression.ratio + horsepower + peak.rpm + city.mpg
##
##                                     Df Sum of Sq      RSS      AIC

```

## - city.mpg	1	1745665	330711809	2207.2
## - make.mitsubishi	1	1954064	330920207	2207.2
## - make.dodge	1	2575528	331541672	2207.5
## - make.plymouth	1	2648212	331614356	2207.6
## - make.chevrolet	1	2797882	331764025	2207.6
## - wheel.base	1	2938787	331904930	2207.7
## <none>			328966143	2208.4
## - make.peugot	1	5416976	334383120	2208.8
## - symboling	1	5773113	334739256	2208.9
## - make.honda	1	6541158	335507302	2209.2
## - make.renault	1	6601583	335567727	2209.3
## - make.subaru	1	6761733	335727876	2209.3
## - engine.type.ohc	1	6875742	335841885	2209.4
## - engine.type.rotor	1	7226128	336192271	2209.5
## + drive.wheels.rwd	1	1720021	327246123	2209.6
## + fuel.system.mfi	1	1582178	327383965	2209.7
## - make.toyota	1	7655864	336622008	2209.7
## - length	1	7910388	336876532	2209.8
## - fuel.type.gas	1	8250806	337216949	2210.0
## - fuel.system.2bbl	1	8682547	337648690	2210.2
## + fuel.system.mphi	1	320941	328645202	2210.3
## + fuel.system.spdi	1	269110	328697034	2210.3
## + num.of.cylinders.twelve	1	37756	328928387	2210.4
## + highway.mpg	1	7303	328958841	2210.4
## + num.of.doors.two	1	6707	328959436	2210.4
## + stroke	1	6682	328959461	2210.4
## - bore	1	10174564	339140708	2210.8
## - make.mercury	1	10750796	339716939	2211.0
## - make.jaguar	1	11567653	340533796	2211.4
## - make.volvo	1	11918189	340884332	2211.5
## - compression.ratio	1	12303598	341269742	2211.7
## - drive.wheels.fwd	1	12373281	341339425	2211.7
## - make.nissan	1	12896083	341862226	2211.9
## - make.mazda	1	13091394	342057538	2212.0
## - num.of.cylinders.four	1	13939146	342905289	2212.4
## - make.volkswagen	1	14128851	343094995	2212.4
## - horsepower	1	15163810	344129953	2212.9
## - body.style.hardtop	1	15864457	344830600	2213.2
## - make.porsche	1	17078877	346045020	2213.7
## - engine.size	1	20083904	349050048	2214.9
## - num.of.cylinders.six	1	22211880	351178024	2215.8
## - make.isuzu	1	23962098	352928242	2216.5
## - aspiration.turbo	1	24142741	353108884	2216.6
## - body.style.wagon	1	25461688	354427832	2217.1
## - curb.weight	1	25465098	354431242	2217.1
## - body.style.sedan	1	26434309	355400453	2217.5
## - normalized.losses	1	26748539	355714682	2217.7
## - width	1	26922553	355888697	2217.7
## - make.audi	1	27825857	356792000	2218.1
## - make.saab	1	30630960	359597103	2219.2
## - engine.type.ohcv	1	31291335	360257478	2219.5
## - peak.rpm	1	35630980	364597123	2221.2
## - body.style.hatchback	1	38183295	367149439	2222.2
## - num.of.cylinders.five	1	42739001	371705144	2224.0
## - height	1	43439383	372405526	2224.3
## - make.mercedes.benz	1	43826511	372792654	2224.4
## - make.bmw	1	45987334	374953478	2225.2
## - engine.location.rear	1	202170311	531136455	2275.4
##				

```

## Step: AIC=2207.16
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
##   make.mazda + make.mercedes.benz + make.mercury + make.mitsubishi +
##   make.nissan + make.peugot + make.plymouth + make.porsche +
##   make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
##   make.volvo + fuel.type.gas + aspiration.turbo + body.style.hardtop +
##   body.style.hatchback + body.style.sedan + body.style.wagon +
##   drive.wheels.fwd + engine.location.rear + wheel.base + length +
##   width + height + curb.weight + engine.type.ohc + engine.type.ohcv +
##   engine.type.rotor + num.of.cylinders.five + num.of.cylinders.four +
##   num.of.cylinders.six + engine.size + fuel.system.2bbl + bore +
##   compression.ratio + horsepower + peak.rpm
##
##           Df Sum of Sq      RSS      AIC
## - make.mitsubishi      1  1041782 331753590 2205.6
## - make.plymouth        1  1490335 332202144 2205.8
## - make.chevrolet       1  1500698 332212506 2205.8
## - make.dodge           1  1511264 332223072 2205.8
## - make.peugot          1  4393139 335104948 2207.1
## <none>                  330711809 2207.2
## - wheel.base           1  4875958 335587766 2207.3
## - symboling            1  4884092 335595901 2207.3
## - make.honda           1  5036976 335748785 2207.3
## - make.subaru          1  5497297 336209105 2207.5
## - make.renault         1  5572442 336284251 2207.6
## - engine.type.ohc      1  5671190 336382999 2207.6
## - make.toyota          1  6083134 336794943 2207.8
## - engine.type.rotor    1  6976478 337688287 2208.2
## + city.mpg             1  1745665 328966143 2208.4
## + drive.wheels.rwd     1  1705527 329006281 2208.4
## + fuel.system.mfi      1  1300148 329411660 2208.6
## + highway.mpg          1  1038320 329673489 2208.7
## - length               1  8518670 339230479 2208.8
## + fuel.system.mpf      1  482067 330229742 2208.9
## + fuel.system.spdi     1  147038 330564771 2209.1
## - make.mercury         1  9179575 339891383 2209.1
## + stroke               1  103366 330608442 2209.1
## + num.of.doors.two     1  16768 330695040 2209.2
## + num.of.cylinders.twelve 1  3527 330708282 2209.2
## - bore                 1  9442530 340154339 2209.2
## - fuel.system.2bbl     1  10187554 340899363 2209.5
## - make.volvo           1  10279195 340991003 2209.6
## - make.jaguar          1  10281624 340993432 2209.6
## - fuel.type.gas        1  10419675 341131484 2209.6
## - make.nissan           1  11178044 341889852 2209.9
## - make.mazda           1  11416887 342128695 2210.1
## - drive.wheels.fwd     1  11502174 342213982 2210.1
## - make.volkswagen      1  12446624 343158433 2210.5
## - horsepower           1  13458183 344169991 2210.9
## - body.style.hardtop    1  14724643 345436452 2211.4
## - num.of.cylinders.four 1  16694303 347406112 2212.2
## - compression.ratio    1  18279372 348991181 2212.9
## - engine.size          1  18615294 349327103 2213.1
## - make.porsche         1  21415396 352127205 2214.2
## - make.isuzu           1  22795840 353507649 2214.8
## - aspiration.turbo      1  23209110 353920918 2214.9
## - body.style.wagon     1  25011518 355723326 2215.7
## - width                1  25190611 355902419 2215.7

```

```

## - num.of.cylinders.six      1  25453567 356165376 2215.8
## - body.style.sedan          1  25530260 356242069 2215.9
## - make.audi                 1  26082195 356794003 2216.1
## - normalized.losses        1  26836188 357547997 2216.4
## - make.saab                 1  28899514 359611323 2217.2
## - engine.type.ohcv          1  29564471 360276280 2217.5
## - body.style.hatchback      1  36942518 367654327 2220.4
## - curb.weight               1  39125376 369837185 2221.3
## - peak.rpm                  1  41280421 371992230 2222.1
## - make.mercedes.benz        1  42866934 373578742 2222.7
## - height                    1  43023886 373735694 2222.8
## - make.bmw                  1  44363219 375075028 2223.3
## - num.of.cylinders.five     1  44646613 375358421 2223.4
## - engine.location.rear      1  218560674 549272482 2278.2
##
## Step: AIC=2205.61
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.chevrolet + make.dodge + make.honda + make.isuzu + make.jaguar +
##   make.mazda + make.mercedes.benz + make.mercury + make.nissan +
##   make.peugot + make.plymouth + make.porsche + make.renault +
##   make.saab + make.subaru + make.toyota + make.volkswagen +
##   make.volvo + fuel.type.gas + aspiration.turbo + body.style.hardtop +
##   body.style.hatchback + body.style.sedan + body.style.wagon +
##   drive.wheels.fwd + engine.location.rear + wheel.base + length +
##   width + height + curb.weight + engine.type.ohc + engine.type.ohcv +
##   engine.type.rotor + num.of.cylinders.five + num.of.cylinders.four +
##   num.of.cylinders.six + engine.size + fuel.system.2bbl + bore +
##   compression.ratio + horsepower + peak.rpm
##
##           Df Sum of Sq      RSS      AIC
## - make.chevrolet      1    459570 332213161 2203.8
## - make.plymouth       1    527136 332280726 2203.8
## - make.dodge          1    736726 332490316 2203.9
## - symboling           1   4271568 336025158 2205.5
## - make.peugot         1   4409910 336163500 2205.5
## <none>                331753590 2205.6
## - engine.type.ohc     1   4912819 336666409 2205.7
## - make.subaru         1   6188581 337942171 2206.3
## - wheel.base          1   6562432 338316023 2206.4
## - engine.type.rotor   1   7038132 338791722 2206.6
## - make.renault        1   7154077 338907667 2206.7
## + fuel.system.mfi     1   1465672 330287919 2207.0
## + drive.wheels.rwd    1   1441574 330312016 2207.0
## + make.mitsubishi     1   1041782 330711809 2207.2
## + city.mpg            1    833383 330920207 2207.2
## - bore                1   8551303 340304893 2207.3
## + highway.mpg         1    572208 331181382 2207.4
## + fuel.system.mpf     1    364253 331389337 2207.4
## + fuel.system.spdi    1    313313 331440278 2207.5
## + num.of.doors.two    1     38002 331715588 2207.6
## + num.of.cylinders.twelve 1     7346 331746244 2207.6
## + stroke              1     348 331753242 2207.6
## - length              1   9955538 341709129 2207.9
## - drive.wheels.fwd    1  10463151 342216741 2208.1
## - fuel.system.2bbl    1  10961886 342715476 2208.3
## - fuel.type.gas       1  11547934 343301525 2208.5
## - horsepower          1  12433179 344186769 2208.9
## - make.jaguar         1  12833878 344587469 2209.1
## - body.style.hardtop   1  13975043 345728633 2209.6

```

```

## - make.honda          1 14392382 346145973 2209.7
## - make.mercury        1 14786580 346540170 2209.9
## - engine.size         1 17628976 349382566 2211.1
## - num.of.cylinders.four 1 18583820 350337410 2211.5
## - compression.ratio   1 18733492 350487082 2211.5
## - make.toyota         1 18780436 350534027 2211.5
## - aspiration.turbo     1 22464747 354218337 2213.1
## - make.volvo          1 23007104 354760695 2213.3
## - width               1 25003716 356757306 2214.1
## - num.of.cylinders.six 1 25899748 357653339 2214.4
## - body.style.wagon     1 26028317 357781908 2214.5
## - body.style.sedan     1 27150635 358904225 2214.9
## - normalized.losses    1 27546226 359299816 2215.1
## - engine.type.ohcv     1 28928727 360682317 2215.7
## - curb.weight         1 39347315 371100905 2219.8
## - make.porsche         1 39844402 371597993 2219.9
## - body.style.hatchback 1 41972197 373725787 2220.8
## - height              1 42868671 374622261 2221.1
## - make.volkswagen      1 44597744 376351335 2221.8
## - peak.rpm            1 46838117 378591708 2222.6
## - num.of.cylinders.five 1 48212302 379965892 2223.2
## - make.mazda          1 48696244 380449835 2223.3
## - make.nissan          1 52371565 384125155 2224.7
## - make.isuzu          1 53715157 385468747 2225.2
## - make.saab           1 67446172 399199762 2230.3
## - make.audi           1 73616246 405369836 2232.5
## - make.mercedes.benz   1 98845806 430599396 2241.2
## - make.bmw            1 130902751 462656341 2251.5
## - engine.location.rear 1 224111157 555864748 2277.9
##
## Step: AIC=2203.81
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.dodge + make.honda + make.isuzu + make.jaguar + make.mazda +
##   make.mercedes.benz + make.mercury + make.nissan + make.peugot +
##   make.plymouth + make.porsche + make.renault + make.saab +
##   make.subaru + make.toyota + make.volkswagen + make.volvo +
##   fuel.type.gas + aspiration.turbo + body.style.hardtop + body.style.hatchback +
##   body.style.sedan + body.style.wagon + drive.wheels.fwd +
##   engine.location.rear + wheel.base + length + width + height +
##   curb.weight + engine.type.ohc + engine.type.ohcv + engine.type.rotor +
##   num.of.cylinders.five + num.of.cylinders.four + num.of.cylinders.six +
##   engine.size + fuel.system.2bbl + bore + compression.ratio +
##   horsepower + peak.rpm
##
##           Df Sum of Sq      RSS      AIC
## - make.plymouth      1    327974 332541135 2201.9
## - make.dodge          1     460816 332673977 2202.0
## - make.peugot         1    4235463 336448624 2203.6
## <none>                332213161 2203.8
## - engine.type.ohc     1    4809719 337022879 2203.9
## - symboling           1    4891625 337104786 2203.9
## - make.subaru         1    5789357 338002517 2204.3
## - wheel.base          1    6954933 339168094 2204.8
## - make.renault        1    6980460 339193620 2204.8
## - engine.type.rotor   1    7086613 339299774 2204.8
## + drive.wheels.rwd    1    1596843 330616318 2205.1
## + fuel.system.mfi     1    1074684 331138476 2205.3
## - bore                1    8495992 340709152 2205.4
## + make.chevrolet      1     459570 331753590 2205.6

```

```

## + city.mpg                1    448801 331764360 2205.6
## + fuel.system.mpgfi       1    406227 331806934 2205.6
## + highway.mpg             1    387980 331825181 2205.6
## + fuel.system.spdi        1    184838 332028323 2205.7
## + num.of.doors.two        1    40656 332172505 2205.8
## + num.of.cylinders.twelve 1    29330 332183831 2205.8
## + make.mitsubishi         1         655 332212506 2205.8
## + stroke                  1         12 332213148 2205.8
## - length                  1   10544310 342757470 2206.3
## - fuel.type.gas           1   11124945 343338106 2206.6
## - fuel.system.2bbl        1   11175096 343388257 2206.6
## - drive.wheels.fwd        1   11645084 343858245 2206.8
## - make.jaguar             1   12380578 344593739 2207.1
## - horsepower              1   12492030 344705190 2207.1
## - body.style.hardtop      1   13735231 345948392 2207.7
## - make.honda              1   14283352 346496512 2207.9
## - make.mercury            1   14375643 346588803 2207.9
## - engine.size             1   17905872 350119033 2209.4
## - compression.ratio       1   18273947 350487107 2209.5
## - num.of.cylinders.four    1   18802912 351016073 2209.7
## - make.toyota             1   18862827 351075988 2209.8
## - make.volvo              1   23113397 355326558 2211.5
## - aspiration.turbo        1   23299378 355512539 2211.6
## - width                   1   24715943 356929104 2212.2
## - num.of.cylinders.six     1   25672381 357885541 2212.5
## - body.style.wagon        1   25895510 358108670 2212.6
## - body.style.sedan        1   26945911 359159072 2213.0
## - engine.type.ohcv        1   29260715 361473876 2214.0
## - normalized.losses       1   30750288 362963448 2214.6
## - curb.weight             1   39023945 371237105 2217.8
## - make.porsche            1   41282351 373495512 2218.7
## - body.style.hatchback     1   41842422 374055583 2218.9
## - height                  1   43950879 376164040 2219.7
## - make.volkswagen          1   44145118 376358279 2219.8
## - peak.rpm                1   48482015 380695175 2221.4
## - make.mazda              1   48613966 380827126 2221.5
## - num.of.cylinders.five    1   48895967 381109128 2221.6
## - make.nissan              1   52958237 385171397 2223.1
## - make.isuzu              1   54392759 386605919 2223.7
## - make.saab               1   67791468 400004628 2228.6
## - make.audi               1   73525318 405738478 2230.6
## - make.mercedes.benz      1   98738699 430951860 2239.3
## - make.bmw                1   133938409 466151570 2250.6
## - engine.location.rear    1   223767462 555980622 2276.0
##
## Step:  AIC=2201.95
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.dodge + make.honda + make.isuzu + make.jaguar + make.mazda +
##   make.mercedes.benz + make.mercury + make.nissan + make.peugot +
##   make.porsche + make.renault + make.saab + make.subaru + make.toyota +
##   make.volkswagen + make.volvo + fuel.type.gas + aspiration.turbo +
##   body.style.hardtop + body.style.hatchback + body.style.sedan +
##   body.style.wagon + drive.wheels.fwd + engine.location.rear +
##   wheel.base + length + width + height + curb.weight + engine.type.ohc +
##   engine.type.ohcv + engine.type.rotor + num.of.cylinders.five +
##   num.of.cylinders.four + num.of.cylinders.six + engine.size +
##   fuel.system.2bbl + bore + compression.ratio + horsepower +
##   peak.rpm
##

```

##	Df	Sum of Sq	RSS	AIC
## - make.dodge	1	242993	332784128	2200.1
## - make.peugot	1	4104866	336646000	2201.7
## <none>			332541135	2201.9
## - engine.type.ohc	1	4677295	337218430	2202.0
## - symboling	1	5508620	338049755	2202.3
## - make.subaru	1	5646909	338188043	2202.4
## - make.renault	1	6770527	339311661	2202.9
## - engine.type.rotor	1	6955434	339496568	2202.9
## - wheel.base	1	7114405	339655540	2203.0
## + drive.wheels.rwd	1	1652133	330889001	2203.2
## + fuel.system.mfi	1	844441	331696694	2203.6
## - bore	1	8768945	341310080	2203.7
## + fuel.system.mphi	1	545173	331995962	2203.7
## + city.mpg	1	351940	332189195	2203.8
## + highway.mpg	1	332939	332208195	2203.8
## + make.plymouth	1	327974	332213161	2203.8
## + make.chevrolet	1	260409	332280726	2203.8
## + make.mitsubishi	1	180613	332360522	2203.9
## + fuel.system.spdi	1	59269	332481866	2203.9
## + num.of.cylinders.twelve	1	45892	332495242	2203.9
## + num.of.doors.two	1	21452	332519683	2203.9
## + stroke	1	6359	332534776	2203.9
## - length	1	10581067	343122202	2204.5
## - fuel.type.gas	1	10801808	343342943	2204.6
## - fuel.system.2bbl	1	11371692	343912827	2204.8
## - drive.wheels.fwd	1	11854656	344395790	2205.0
## - make.jaguar	1	12053026	344594161	2205.1
## - horsepower	1	13149082	345690217	2205.5
## - body.style.hardtop	1	13649148	346190283	2205.8
## - make.mercury	1	14193693	346734828	2206.0
## - make.honda	1	14449567	346990701	2206.1
## - compression.ratio	1	17952071	350493206	2207.5
## - engine.size	1	18527806	351068940	2207.8
## - num.of.cylinders.four	1	18766277	351307411	2207.9
## - make.toyota	1	18886594	351427729	2207.9
## - make.volvo	1	22892546	355433680	2209.5
## - width	1	24389589	356930724	2210.2
## - aspiration.turbo	1	24479220	357020355	2210.2
## - num.of.cylinders.six	1	25428656	357969791	2210.6
## - body.style.wagon	1	26002574	358543708	2210.8
## - body.style.sedan	1	27124787	359665922	2211.2
## - engine.type.ohcv	1	29162434	361703569	2212.1
## - normalized.losses	1	30500147	363041282	2212.6
## - curb.weight	1	39165579	371706714	2216.0
## - make.porsche	1	41298206	373839341	2216.8
## - body.style.hatchback	1	41715498	374256633	2217.0
## - make.volkswagen	1	43876979	376418114	2217.8
## - height	1	44683329	377224463	2218.1
## - num.of.cylinders.five	1	48969537	381510672	2219.7
## - make.mazda	1	49205925	381747060	2219.8
## - peak.rpm	1	50866269	383407404	2220.4
## - make.nissan	1	54791470	387332605	2221.9
## - make.isuzu	1	55094827	387635962	2222.0
## - make.saab	1	67518795	400059929	2226.6
## - make.audi	1	73211270	405752405	2228.6
## - make.mercedes.benz	1	98491321	431032456	2237.3
## - make.bmw	1	136013825	468554960	2249.3
## - engine.location.rear	1	223555568	556096703	2274.0



```
##
## Step: AIC=2200.06
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.honda + make.isuzu + make.jaguar + make.mazda + make.mercedes.benz +
##   make.mercury + make.nissan + make.peugot + make.porsche +
##   make.renault + make.saab + make.subaru + make.toyota + make.volkswagen +
##   make.volvo + fuel.type.gas + aspiration.turbo + body.style.hardtop +
##   body.style.hatchback + body.style.sedan + body.style.wagon +
##   drive.wheels.fwd + engine.location.rear + wheel.base + length +
##   width + height + curb.weight + engine.type.ohc + engine.type.ohcv +
##   engine.type.rotor + num.of.cylinders.five + num.of.cylinders.four +
##   num.of.cylinders.six + engine.size + fuel.system.2bbl + bore +
##   compression.ratio + horsepower + peak.rpm
##
##           Df Sum of Sq      RSS      AIC
## - make.peugot           1  3980012 336764140 2199.8
## - engine.type.ohc        1  4548787 337332916 2200.0
## <none>                                332784128 2200.1
## - make.subaru           1  5479217 338263345 2200.4
## - symboling             1  5860259 338644387 2200.6
## - make.renault          1  6605441 339389569 2200.9
## - engine.type.rotor     1  6962561 339746690 2201.0
## - wheel.base            1  7553856 340337984 2201.3
## + drive.wheels.rwd      1  1673496 331110633 2201.3
## + fuel.system.mphi      1   667540 332116588 2201.8
## - bore                  1  8755417 341539545 2201.8
## + make.mitsubishi       1   411339 332372789 2201.9
## + fuel.system.mfi       1   405880 332378248 2201.9
## + city.mpg              1   386723 332397405 2201.9
## + highway.mpg           1   363442 332420686 2201.9
## + make.dodge            1   242993 332541135 2201.9
## + make.chevrolet        1   144532 332639596 2202.0
## + make.plymouth         1   110151 332673977 2202.0
## + num.of.cylinders.twelve 1    53314 332730814 2202.0
## + num.of.doors.two      1    23166 332760963 2202.1
## + stroke                1    11335 332772793 2202.1
## + fuel.system.spdi      1     685 332783443 2202.1
## - fuel.type.gas         1  10666500 343450628 2202.6
## - length                1  11211151 343995279 2202.8
## - fuel.system.2bbl      1  11304754 344088882 2202.9
## - make.jaguar           1  11810288 344594416 2203.1
## - drive.wheels.fwd      1  12058859 344842987 2203.2
## - horsepower            1  13313718 346097846 2203.7
## - body.style.hardtop    1  13571685 346355813 2203.8
## - make.mercury          1  13953774 346737902 2204.0
## - make.honda            1  14915669 347699797 2204.4
## - compression.ratio     1  17801545 350585673 2205.6
## - engine.size           1  18766414 351550543 2206.0
## - num.of.cylinders.four 1  18925156 351709284 2206.0
## - make.toyota           1  19028181 351812309 2206.1
## - make.volvo            1  22859754 355643882 2207.6
## - width                 1  24212813 356996941 2208.2
## - num.of.cylinders.six  1  25405695 358189823 2208.7
## - aspiration.turbo      1  25409807 358193935 2208.7
## - body.style.wagon      1  25828558 358612686 2208.8
## - body.style.sedan      1  27070571 359854699 2209.3
## - engine.type.ohcv      1  29193227 361977355 2210.2
## - normalized.losses     1  30420679 363204807 2210.7
## - curb.weight           1  39031872 371816000 2214.0
```

```

## - body.style.hatchback      1  41595001  374379129  2215.0
## - make.porsche              1  41853311  374637439  2215.1
## - make.volkswagen           1  43751122  376535250  2215.8
## - height                    1  45297637  378081765  2216.4
## - num.of.cylinders.five     1  49388377  382172505  2218.0
## - make.mazda                1  49576572  382360700  2218.1
## - peak.rpm                  1  52183329  384967457  2219.0
## - make.isuzu                1  56054483  388838612  2220.5
## - make.nissan                1  56203848  388987976  2220.5
## - make.saab                 1  67478157  400262285  2224.7
## - make.audi                 1  72977323  405761451  2226.6
## - make.mercedes.benz        1  98583838  431367966  2235.4
## - make.bmw                  1  138573138  471357266  2248.2
## - engine.location.rear      1  223578750  556362878  2272.1
##
## Step:  AIC=2199.77
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.honda + make.isuzu + make.jaguar + make.mazda + make.mercedes.benz +
##   make.mercury + make.nissan + make.porsche + make.renault +
##   make.saab + make.subaru + make.toyota + make.volkswagen +
##   make.volvoo + fuel.type.gas + aspiration.turbo + body.style.hardtop +
##   body.style.hatchback + body.style.sedan + body.style.wagon +
##   drive.wheels.fwd + engine.location.rear + wheel.base + length +
##   width + height + curb.weight + engine.type.ohc + engine.type.ohcv +
##   engine.type.rotor + num.of.cylinders.five + num.of.cylinders.four +
##   num.of.cylinders.six + engine.size + fuel.system.2bbl + bore +
##   compression.ratio + horsepower + peak.rpm
##
##
##           Df Sum of Sq      RSS      AIC
## - make.subaru          1  1973142  338737282  2198.6
## <none>                                336764140  2199.8
## - make.renault          1  5370422  342134562  2200.1
## + make.peugot           1  3980012  332784128  2200.1
## + engine.type.l         1  3980012  332784128  2200.1
## + drive.wheels.rwd      1  3638257  333125883  2200.2
## - symboling             1  5886167  342650307  2200.3
## - engine.type.rotor     1  6495769  343259909  2200.5
## + make.mitsubishi       1  1223309  335540831  2201.2
## + fuel.system.mpfi      1  1056429  335707711  2201.3
## + city.mpg              1    697552  336066588  2201.5
## + fuel.system.mfi       1    605081  336159059  2201.5
## - make.jaguar           1   8865709  345629849  2201.5
## - bore                  1   8939511  345703651  2201.5
## + highway.mpg           1   495575  336268565  2201.6
## + stroke                1   445126  336319014  2201.6
## + num.of.cylinders.twelve 1   374938  336389202  2201.6
## + make.dodge            1   118140  336646000  2201.7
## + make.chevrolet        1    99411  336664729  2201.7
## + num.of.doors.two      1    91801  336672339  2201.7
## + make.plymouth         1    75364  336688776  2201.7
## + fuel.system.spdi      1    21898  336742242  2201.8
## - fuel.type.gas         1   9992110  346756250  2202.0
## - make.mercury          1  11021417  347785557  2202.4
## - fuel.system.2bbl      1  11243269  348007409  2202.5
## - wheel.base            1  11436927  348201067  2202.6
## - body.style.hardtop    1  11444730  348208870  2202.6
## - make.honda            1  13583478  350347618  2203.5
## - length                1  13693453  350457594  2203.5
## - engine.type.ohc       1  13901238  350665378  2203.6

```

```

## - horsepower          1 14257269 351021409 2203.7
## - drive.wheels.fwd    1 14660117 351424257 2203.9
## - make.toyota         1 15079305 351843445 2204.1
## - num.of.cylinders.four 1 16695707 353459847 2204.7
## - compression.ratio   1 17503871 354268011 2205.1
## - make.volvo          1 18883322 355647462 2205.6
## - engine.size         1 18938422 355702562 2205.7
## - body.style.wagon    1 23727462 360491602 2207.6
## - body.style.sedan    1 24620061 361384201 2207.9
## - aspiration.turbo     1 25223771 361987912 2208.2
## - num.of.cylinders.six 1 26118284 362882424 2208.5
## - normalized.losses   1 28262563 365026703 2209.4
## - width               1 29635349 366399489 2209.9
## - engine.type.ohcv     1 30303278 367067418 2210.2
## - body.style.hatchback 1 38737126 375501266 2213.4
## - make.volkswagen     1 39901257 376665397 2213.9
## - curb.weight         1 40689012 377453152 2214.2
## - height              1 41471981 378236121 2214.5
## - make.porsche        1 45475103 382239243 2216.0
## - make.mazda          1 45825059 382589199 2216.1
## - num.of.cylinders.five 1 45835509 382599649 2216.2
## - peak.rpm            1 48209712 384973852 2217.0
## - make.nissan          1 52482406 389246546 2218.6
## - make.isuzu          1 54213745 390977885 2219.3
## - make.saab           1 63573413 400337553 2222.7
## - make.audi           1 69173298 405937438 2224.7
## - make.mercedes.benz  1 110675989 447440129 2238.7
## - make.bmw            1 137568335 474332475 2247.1
## - engine.location.rear 1 236168539 572932680 2274.3
##
## Step: AIC=2198.61
## price ~ symboling + normalized.losses + make.audi + make.bmw +
##   make.honda + make.isuzu + make.jaguar + make.mazda + make.mercedes.benz +
##   make.mercury + make.nissan + make.porsche + make.renault +
##   make.saab + make.toyota + make.volkswagen + make.volvo +
##   fuel.type.gas + aspiration.turbo + body.style.hardtop + body.style.hatchback +
##   body.style.sedan + body.style.wagon + drive.wheels.fwd +
##   engine.location.rear + wheel.base + length + width + height +
##   curb.weight + engine.type.ohc + engine.type.ohcv + engine.type.rotor +
##   num.of.cylinders.five + num.of.cylinders.four + num.of.cylinders.six +
##   engine.size + fuel.system.2bbl + bore + compression.ratio +
##   horsepower + peak.rpm
##
##              Df Sum of Sq      RSS      AIC
## <none>                338737282 2198.6
## - make.renault        1  4958772 343696054 2198.7
## - symboling           1  6199075 344936357 2199.2
## - bore                1  7076303 345813585 2199.6
## + make.subaru         1  1973142 336764140 2199.8
## + engine.type.ohcf     1  1973142 336764140 2199.8
## + stroke              1  1556197 337181085 2199.9
## + make.mitsubishi     1  1378687 337358594 2200.0
## + drive.wheels.rwd    1  1354094 337383188 2200.0
## + fuel.system.mphi     1  1074576 337662706 2200.2
## - engine.type.rotor    1   8506359 347243641 2200.2
## - make.jaguar         1   8798242 347535524 2200.3
## + city.mpg            1   721154 338016128 2200.3
## + fuel.system.mfi      1   623491 338113791 2200.3
## + highway.mpg         1   505228 338232053 2200.4

```

## + make.peugot	1	473937	338263345	2200.4
## + engine.type.l	1	473937	338263345	2200.4
## + num.of.cylinders.twelve	1	365935	338371347	2200.5
## + num.of.doors.two	1	149074	338588208	2200.6
## - fuel.type.gas	1	9445676	348182958	2200.6
## + make.plymouth	1	74996	338662285	2200.6
## + make.dodge	1	67520	338669762	2200.6
## + fuel.system.spdi	1	25910	338711372	2200.6
## + make.chevrolet	1	12973	338724309	2200.6
## - wheel.base	1	9877663	348614944	2200.8
## - body.style.hardtop	1	10147347	348884629	2200.9
## - make.mercury	1	10679185	349416467	2201.1
## - fuel.system.2bbl	1	10742292	349479574	2201.1
## - make.honda	1	13185059	351922341	2202.1
## - make.toyota	1	13218827	351956109	2202.1
## - horsepower	1	13621994	352359276	2202.3
## - drive.wheels.fwd	1	13673765	352411047	2202.3
## - length	1	13693665	352430947	2202.3
## - compression.ratio	1	16893765	355631047	2203.6
## - engine.size	1	17280201	356017483	2203.8
## - make.volvo	1	18554497	357291779	2204.3
## - num.of.cylinders.four	1	18951657	357688939	2204.4
## - engine.type.ohc	1	20384307	359121589	2205.0
## - body.style.wagon	1	22251047	360988328	2205.8
## - body.style.sedan	1	22923247	361660529	2206.0
## - aspiration.turbo	1	24006844	362744126	2206.5
## - num.of.cylinders.six	1	28220266	366957548	2208.1
## - width	1	29041685	367778967	2208.5
## - normalized.losses	1	33496288	372233570	2210.2
## - engine.type.ohcv	1	34516452	373253733	2210.6
## - body.style.hatchback	1	36786432	375523714	2211.5
## - make.volkswagen	1	39886185	378623467	2212.6
## - curb.weight	1	40887618	379624900	2213.0
## - height	1	41729380	380466662	2213.3
## - make.mazda	1	43996685	382733967	2214.2
## - peak.rpm	1	46824737	385562019	2215.3
## - num.of.cylinders.five	1	48170916	386908198	2215.8
## - make.nissan	1	50685539	389422821	2216.7
## - make.porsche	1	52399729	391137011	2217.3
## - make.isuzu	1	53090048	391827330	2217.6
## - make.saab	1	63395751	402133033	2221.3
## - make.audi	1	71190219	409927501	2224.1
## - make.mercedes.benz	1	112846908	451584189	2238.0
## - make.bmw	1	137463472	476200753	2245.7
## - engine.location.rear	1	238836101	577573383	2273.4

Now the model is better than a linear model and the AIC is the lowest at 2198. The lower the AIC better the model.

## Random Forest Regression

We can also use some hybrid model which can take regression or classification out of which random forest is one of the best

We take trees as 100 and mtry(number of tries) as 3 to choose the better accuracy.

## Model Performance Evaluation

Now the model will be predicted using the test data and the RMSE will be calculated which can be seen below

```

paste0("Linear Regression's RMSE",": ",RMSE(model_predict_lm,testing$price)) # Linear Regression

## [1] "Linear Regression's RMSE: 4713.39321759881"

paste0("Forward and Backwards selection model's RMSE:", " ",RMSE(model_predict_both,testing$price)) # Linear R

## [1] "Forward and Backwards selection model's RMSE: 4722.45384441309"

paste0("RandomForest's RMSE :", " ",RMSE(model_predict_randomForest,testing$price)) # Random Forest

## [1] "RandomForest's RMSE : 2924.71550826288"

```

## Conclusion

As per the model evaluation, it can be seen that the model which has the lowest RMSE is the best model. As per the observation, the random forest has the lowest RMSE followed by the linear model with the forward and backward selection model.

## Referenace

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