Picking the right Vehicle for a Taxi Company

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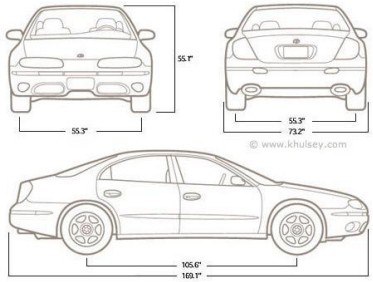
Motivation

Help a taxi company pick the best vehicle
Consideration:

1. Size
2. Fuel Economy
3. Transmission



Results - Hybrid

- 2015 Toyota Prius
- 94 Cubic Feet
- 72 city mpg
- MSRP: $24,200

Results

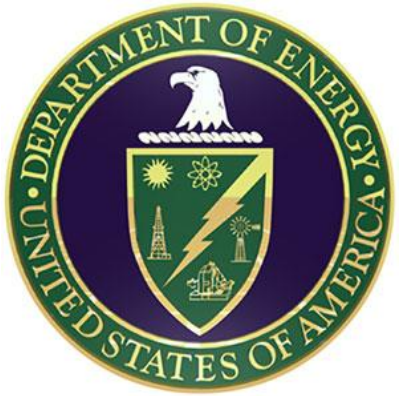
- 2014 Toyota Corolla
- 98 cubic feet
- 40 city mpg
- $22,970

Results - Large Vehicles

- 2011 Honda Odyssey
- 148 cubic feet
- 24 city mpg
- Original MSRP: $28,975
- Current Value $15,456

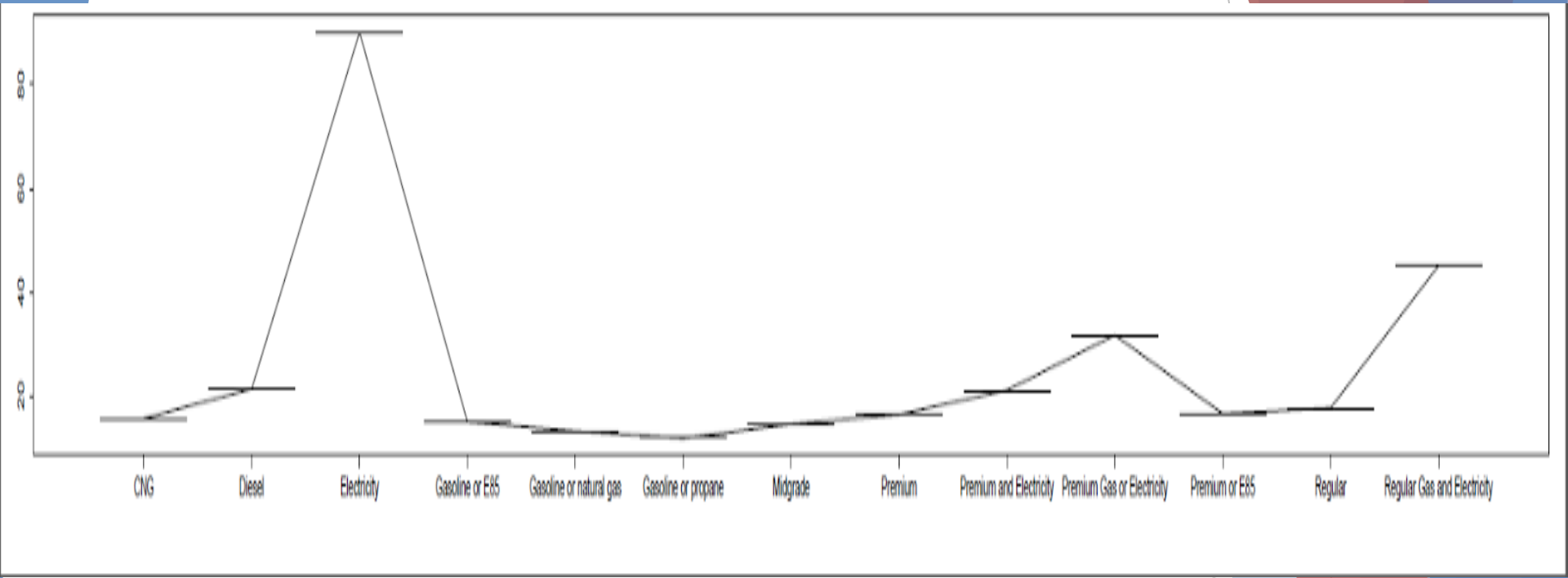
Data Sources and Numerical Summaries

- Data Source
  - Vehicles.csv from (http://catalog.data.gov/dataset/fuel-economy-data)
  - From the Department of Energy
- city08: Miles per gallon in a city
  - min: 6.00
  - 1st Qu. 15.00
  - Median: 17.00
  - Mean: 17.64
  - 3rd Qu. 20.00
  - Max. :138

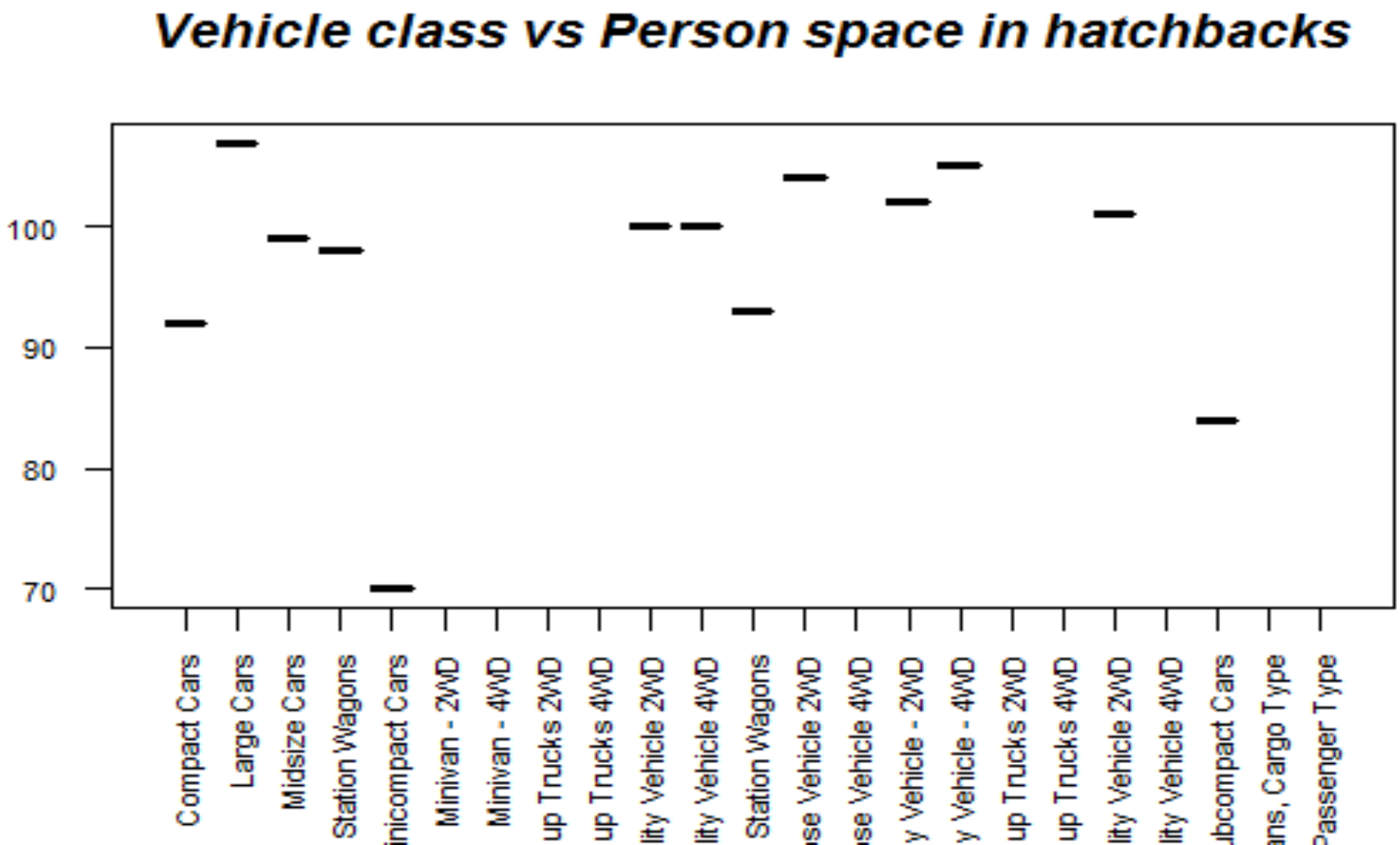


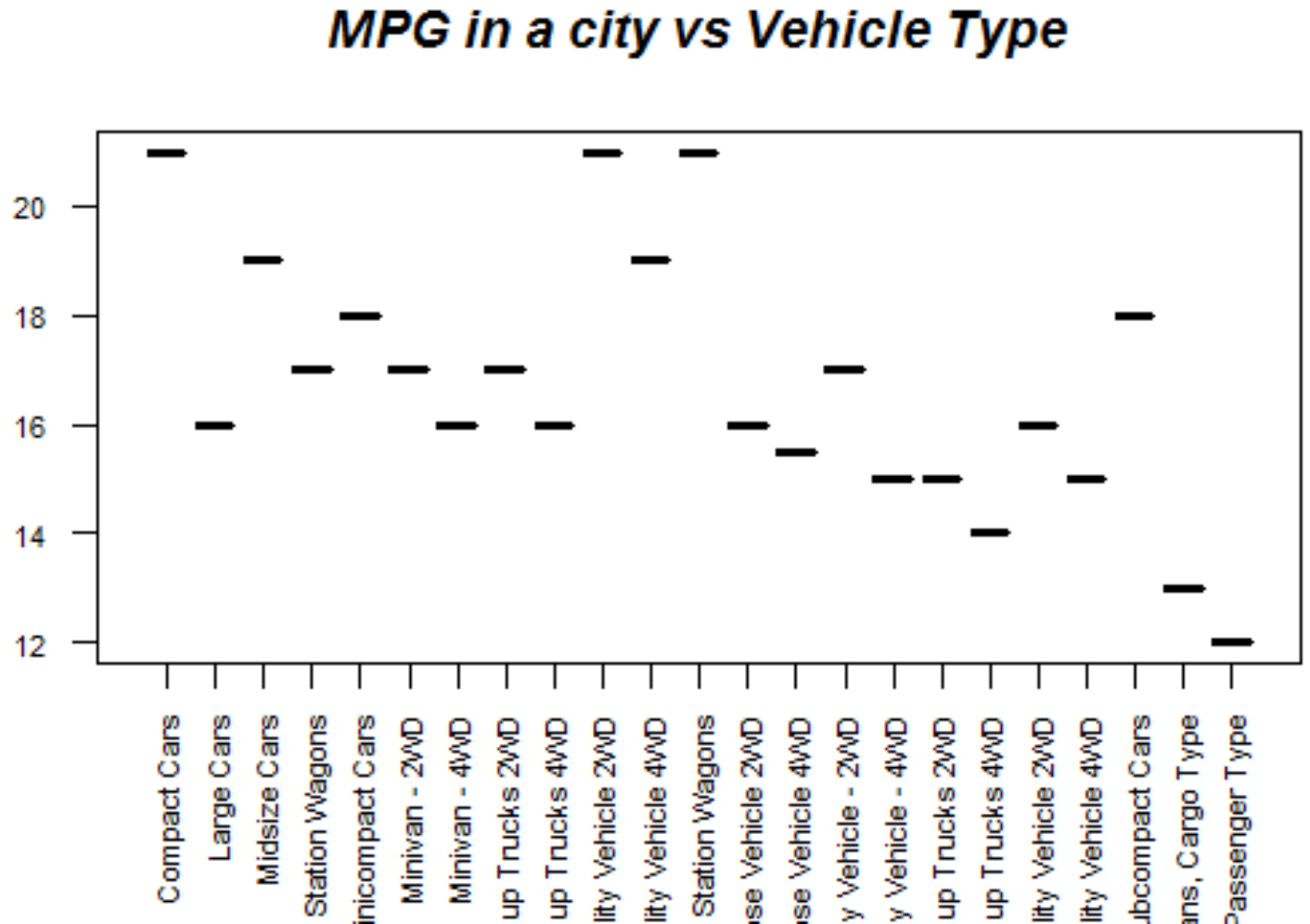
- VClass: (Vehicle Class)
  - Compact Cars : 5116
  - Subcompact Cars : 4615
  - Midsize Cars : 3974
  - Standard Pickup Trucks : 2354
  - Sport Utility Vehicle - 4WD: 2090
  - Two Seaters : 1723
  - (Other) :15536
- fuelType:
  - Regular: 6087
  - Premium: 3950
  - Gasoline or E85: 957
  - Diesel: 179
  - Premium or E85: 72
  - Midgrade: 48
  - other: 20

Mean City Mileage By Fuel Type



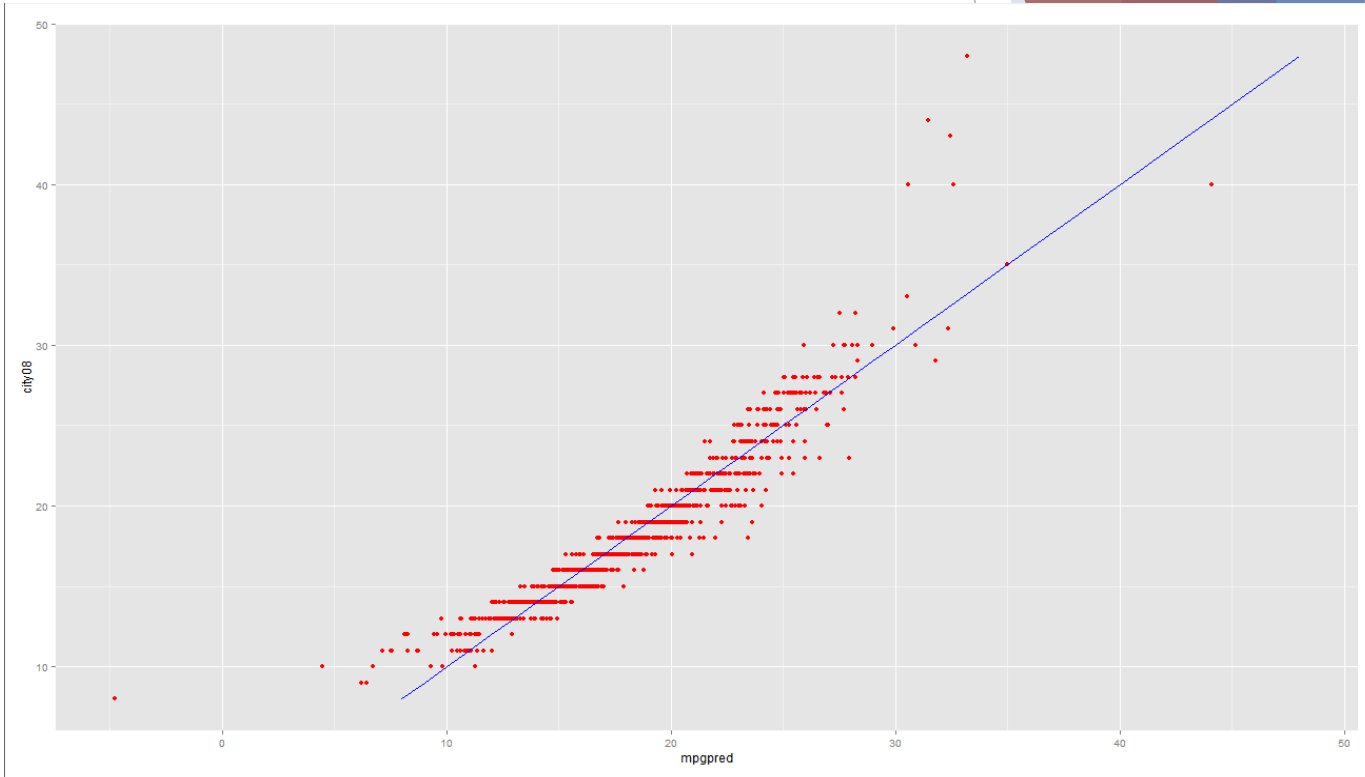
	row.names	fuelType	city08
1	3	Electricity	89.95588
2	13	Regular Gas and Electricity	45.10000
3	10	Premium Gas or Electricity	31.80000
4	2	Diesel	21.46584
5	9	Premium and Electricity	21.20000
6	12	Regular	17.79828
7	11	Premium or E85	16.69697
8	8	Premium	16.53334
9	1	CNG	15.77966
10	4	Gasoline or E85	15.11765
11	7	Midgrade	14.68750
12	5	Gasoline or natural gas	13.33333
13	6	Gasoline or propane	12.00000


Vehicle class vs Person space in hatchbacks
100
90
80
70
Compact Cars
Large Cars
Midsize Cars
Station Wagons
Subcompact Cars
Minivan - 2WD
Minivan - 4WD
Pickup Trucks 2WD
Pickup Trucks 4WD
Sport Utility Vehicle 2WD
Sport Utility Vehicle 4WD
Station Wagons
Van Passenger Vehicle 2WD
Van Passenger Vehicle 4WD
Van Cargo Vehicle - 2WD
Van Cargo Vehicle - 4WD
Pickup Trucks 2WD
Pickup Trucks 4WD
Sport Utility Vehicle 2WD
Sport Utility Vehicle 4WD
Subcompact Cars
Vans, Cargo Type
Vans, Passenger Type


MPG in a city vs Vehicle Type
20
18
16
14
12
Compact Cars
Large Cars
Midsize Cars
Station Wagons
Subcompact Cars
Minivan - 2WD
Minivan - 4WD
Pickup Trucks 2WD
Pickup Trucks 4WD
Special Purpose Vehicle 2WD
Special Purpose Vehicle 4WD
Van Cargo Vehicle - 2WD
Van Cargo Vehicle - 4WD
Van Passenger Vehicle - 2WD
Van Passenger Vehicle - 4WD
Pickup Trucks 2WD
Pickup Trucks 4WD
Special Purpose Vehicle 2WD
Special Purpose Vehicle 4WD
Station Wagons
Subcompact Cars
Vans, Cargo Type
Vans, Passenger Type

Linear Regression

Using Make, Vehicle Class, Fuel Type, Number of Cylinders, the drive and transmission type as features in determining City MPG.



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tranyAutomatic (variable gear ratios)       4.365172   2.249594    1.940 0.052356 .
tranyAutomatic 4-spd                       -2.253725   2.248393   -1.002 0.316188
tranyAutomatic 5-spd                       -2.524908   2.248399   -1.123 0.261473
tranyAutomatic 6-spd                       -2.031976   2.248900   -0.904 0.366260
tranyAutomatic 6spd                        -3.351201   3.177047   -1.055 0.291535
tranyAutomatic 7-spd                       -1.487953   2.255790   -0.660 0.509516
tranyAutomatic 8-spd                       -1.149087   2.261485   -0.508 0.611386
tranyAutomatic 9-spd                       -0.419259   2.301667   -0.182 0.855465
tranyManual 5-spd                          -1.614625   2.248402   -0.718 0.472699
tranyManual 6-spd                          -2.070277   2.247575   -0.921 0.357012
tranyManual 7-spd                          -0.435728   2.290377   -0.190 0.849123
tranyManual(M5)                            -1.128708   3.176767   -0.355 0.722372
VClassLarge Cars                           -1.053312   0.116268   -9.059  < 2e-16 ***
VClassMidsize Cars                         -0.201439   0.090300   -2.231 0.025719 *
VClassMidsize Station Wagons               -1.439048   0.214410   -6.712 2.03e-11 ***
VClassMinicompact Cars                     -0.642709   0.173242   -3.710 0.000208 ***
VClassMinivan - 2WD                        -3.790945   0.194764  -19.464  < 2e-16 ***
VClassMinivan - 4WD                        -3.355269   0.542691   -6.183 6.55e-10 ***
VClassSmall Pickup Trucks 2WD              -2.985240   0.205060  -14.558  < 2e-16 ***
VClassSmall Pickup Trucks 4WD              -3.448583   0.244474  -14.106  < 2e-16 ***
VClassSmall Sport Utility Vehicle 2WD      -2.154747   0.178260  -12.088  < 2e-16 ***
VClassSmall Sport Utility Vehicle 4WD      -1.494781   0.178366   -8.380  < 2e-16 ***
VClassSmall Station Wagons                 -0.468264   0.119558   -3.917 9.04e-05 ***
VClassSpecial Purpose Vehicle 2WD          -2.885015   0.449596   -6.417 1.45e-10 ***
VClassSpecial Purpose Vehicle 4WD          -1.994162   0.860827   -2.317 0.020547 *
VClassSport Utility Vehicle - 2WD          -2.803997   0.105359  -26.614  < 2e-16 ***
VClassSport Utility Vehicle - 4WD          -2.304341   0.117052  -19.687  < 2e-16 ***
VClassStandard Pickup Trucks 2WD           -2.965866   0.149310  -19.864  < 2e-16 ***
VClassStandard Pickup Trucks 4WD           -3.122669   0.167923  -18.596  < 2e-16 ***
VClassStandard Sport Utility Vehicle 2WD   -2.300863   0.264727   -8.691  < 2e-16 ***
VClassStandard Sport Utility Vehicle 4WD   -2.417140   0.202042  -11.964  < 2e-16 ***
VClassSubcompact Cars                      -0.679611   0.098671   -6.888 6.01e-12 ***
VClassVans, Cargo Type                     -3.792351   0.212518  -17.845  < 2e-16 ***
VClassVans, Passenger Type                 -4.396370   0.246921  -17.805  < 2e-16 ***
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Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.239 on 10045 degrees of freedom
Multiple R-squared:  0.7953, Adjusted R-squared:  0.7929
F-statistic:   328 on 119 and 10045 DF,  p-value: < 2.2e-16
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Analysis of Significant Factors

Make: Not much insight, most contribute significantly to MPG, with makes that have high end sports vehicles not meeting significances.

Drive: None are statistically significant

Number of Cylinders: Significant with a negative coefficient

Fuel Type: All significant except for [premium and electricity] and [premium or electricity]. Significant factors have negative coefficients with Midgrade and Regular having the largest coefficients (not in magnitude, less negative).

Transmission Type: Only a few automatic types are significant with an overall positive coefficient.

Vehicle Class: All are significant. We eliminate some of these though due to lack of necessary space.

Deployment/Recommendation

There are circumstances and constraints to evaluate when considering which car to purchase. Our recommendations are specific and may not be suitable for a particular company. In these cases the most important components to consider are:

- The number of cylinders: optimally around 4 to 6
- Drive: 2 wheel being better than 4 and front drive being even better
- Vehicle Class: Midsize or Station Wagon
- Transmission: Automatic
- Fuel Type: Regular or [Regular and Electricity]