

# Parking\_JFK

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## Aiport Parking at JFK

Load data on airport parking activity, ticket prices and consumer spending.

Remove things with too many blanks (NAs) and factor variables.

### Variable selection

When running remember to remove id column, response column, factors, anything with too many NAs.

First, check for strong correlations.

### 1. Kitchen sink (less useful)

```
##               term      estimate  std.error  statistic
## 1      (Intercept)  1.613672e+06  8.952553e+05  1.8024717
## 2      Cell.Service -1.569221e+00  1.954613e+00 -0.8028298
## 3      DOMESTIC.Enplanements -3.475196e-01  2.106457e-01 -1.6497827
## 4      INTERNATIONAL.Enplanements  5.045144e-01  1.573618e-01  3.2060795
## 5      JFK_Airtrain -1.252246e-01  3.446887e-01 -0.3632977
## 6  personal.consumption.expenditures -1.337968e+00  4.140082e+00 -0.3231744
## 7      all.goods    2.133976e+00  7.052804e+00  0.3025713
## 8      durable.goods -4.199836e-01  3.690041e+00 -0.1138154
## 9      nondurable.goods -2.393256e+00  3.703669e+00 -0.6461853
## 10     all.services  7.682370e-01  4.271735e+00  0.1798419
## 11     household.services  9.425703e-01  7.115910e-01  1.3245956
##      p.value
## 1  0.07940720
## 2  0.42706613
## 3  0.10723074
## 4  0.00272796
## 5  0.71839579
## 6  0.74833495
## 7  0.76386670
## 8  0.90998332
## 9  0.52204302
## 10 0.85823228
## 11 0.19321665
```

### 2. Stepwise

```
## Backward Elimination Method
## -----
```

```

##
## Candidate Terms:
##
## 1 . Cell.Service
## 2 . DOMESTIC.Enplanments
## 3 . INTERNATIONAL.Enplanements
## 4 . TOTAL.Enplanments
## 5 . JFK_Airtrain
## 6 . personal.consumption.expenditures
## 7 . all.goods
## 8 . durable.goods
## 9 . nondurable.goods
## 10 . all.services
## 11 . household.services
##
## We are eliminating variables based on p value...
##
## Variables Removed:
##
## - durable.goods
## - all.services
## - JFK_Airtrain
## - Cell.Service
##
## No more variables satisfy the condition of p value = 0.3
##
##
## Final Model Output
## -----
##
##                               Model Summary
## -----
## R                0.839          RMSE                37916.752
## R-Squared        0.703          Coef. Var            9.725
## Adj. R-Squared   0.661          MSE                1437680110.009
## Pred R-Squared   0.569          MAE                25417.052
## -----
## RMSE: Root Mean Square Error
## MSE: Mean Square Error
## MAE: Mean Absolute Error
##
##                               ANOVA
## -----
##                               Sum of
##                               Squares      DF      Mean Square      F      Sig.
## -----
## Regression      142997657638.634          6      23832942939.772      16.577      0.0000
## Residual        60382564620.373          42      1437680110.009
## Total           203380222259.007          48
## -----
##
##                               Parameter Estimates
## -----
##                               model      Beta      Std. Error      Std. Beta      t      Sig

```

```
## -----
##              (Intercept)      1940670.318      624521.635              3.107      0.003      68
##          DOMESTIC.Enplanments      -0.260          0.156      -0.348      -1.672      0.102
##      INTERNATIONAL.Enplanements      0.429          0.083          1.428      5.171      0.000
##          TOTAL.Enplanments              NA          0.474      -3.258      -1.525      0.135
## personal.consumption.expenditures      -0.722          0.639      11.952      1.642      0.108
##              all.goods          1.049          0.788      -9.122      -2.268      0.029
##              nondurable.goods      -1.788          0.593          2.024      1.653      0.106
##              household.services      0.981              NA      -1.564              NA              NA
## -----
```

```
##
```

```
##
```

```
##              Elimination Summary
```

```
## -----
##      Variable      Adj.      C(p)      AIC      RMSE
## Step      Removed      R-Square      R-Square
## -----
##      1      durable.goods      0.7102      0.6433      9.0130      1187.5424      38873.6613
##      2      all.services      0.7101      0.6521      7.0324      1185.5674      38394.4645
##      3      JFK_Airtrain      0.7086      0.6589      5.2201      1183.8087      38016.8562
##      4      Cell.Service      0.7031      0.6607      3.9464      1182.7311      37916.7524
## -----
```

```
## Backward Elimination Method
```

```
## -----
```

```
##
```

```
## Candidate Terms:
```

```
##
```

```
## 1 . Cell.Service
```

```
## 2 . DOMESTIC.Enplanments
```

```
## 3 . INTERNATIONAL.Enplanements
```

```
## 4 . TOTAL.Enplanments
```

```
## 5 . JFK_Airtrain
```

```
## 6 . personal.consumption.expenditures
```

```
## 7 . all.goods
```

```
## 8 . durable.goods
```

```
## 9 . nondurable.goods
```

```
## 10 . all.services
```

```
## 11 . household.services
```

```
##
```

```
##
```

```
## Variables Removed:
```

```
##
```

```
## - TOTAL.Enplanments
```

```
##
```

```
## No more variables to be removed.
```

```
##
```

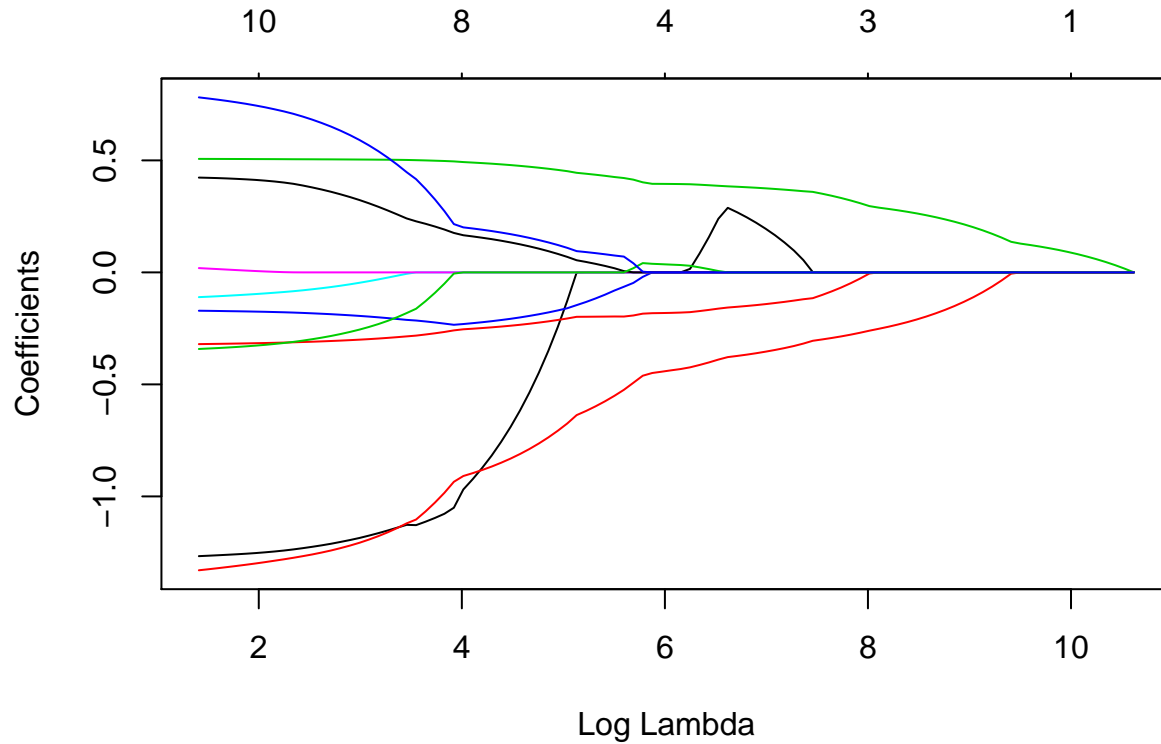
```
##
```

```
##              Backward Elimination Summary
```

```
## -----
##      Variable      AIC      RSS      Sum Sq      R-Sq      Adj. R-Sq
## -----
## Full Model      1189.526      58915216359.448      1.44465e+11      0.71032      0.63409
```

## INTERNATIONAL.Enplanements	1187.526	74851698145.534	128528524113.473	0.63196	0.54703
## TOTAL.Enplanements	1187.526	NA	NA	NA	NA
## -----					

### 3. Lasso



```
## 12 x 1 sparse Matrix of class "dgCMatrix"
##                                     1
## (Intercept)                       1.450614e+06
## Cell.Service                      -1.266763e+00
## DOMESTIC.Enplanements              -3.201383e-01
## INTERNATIONAL.Enplanements         5.066759e-01
## TOTAL.Enplanements                 .
## JFK_Airtrain                      -1.711005e-01
## personal.consumption.expenditures -1.104534e-01
## all.goods                          1.916618e-02
## durable.goods                     4.232946e-01
## nondurable.goods                  -1.329763e+00
## all.services                      -3.418267e-01
## household.services                 7.812882e-01
```

Stepwise guidance suggests sticking with international enplanements and goods, and personal consumption is close.