DATA311_Project

Parsa

2019-03-07

```
test <- read.csv("Admission_Predict_Ver1.1.csv")
summary (test)
```

```
##    Serial.No.      GRE.Score      TOEFL.Score    University.Rating
##  Min.   :  1.0   Min.   :290.0   Min.   : 92.0   Min.   :1.000
##  1st Qu.:125.8   1st Qu.:308.0   1st Qu.:103.0   1st Qu.:2.000
##  Median :250.5   Median :317.0   Median :107.0   Median :3.000
##  Mean   :250.5   Mean   :316.5   Mean   :107.2   Mean   :3.114
##  3rd Qu.:375.2   3rd Qu.:325.0   3rd Qu.:112.0   3rd Qu.:4.000
##  Max.   :500.0   Max.   :340.0   Max.   :120.0   Max.   :5.000
##       SOP             LOR             CGPA          Research
##  Min.   :1.000   Min.   :1.000   Min.   :6.800   Min.   :0.00
##  1st Qu.:2.500   1st Qu.:3.000   1st Qu.:8.127   1st Qu.:0.00
##  Median :3.500   Median :3.500   Median :8.560   Median :1.00
##  Mean   :3.374   Mean   :3.484   Mean   :8.576   Mean   :0.56
##  3rd Qu.:4.000   3rd Qu.:4.000   3rd Qu.:9.040   3rd Qu.:1.00
##  Max.   :5.000   Max.   :5.000   Max.   :9.920   Max.   :1.00
##  Chance.of.Admit
##  Min.   :0.3400
##  1st Qu.:0.6300
##  Median :0.7200
##  Mean   :0.7217
##  3rd Qu.:0.8200
##  Max.   :0.9700
```

```
head(test)
```

```
##   Serial.No. GRE.Score TOEFL.Score University.Rating SOP LOR CGPA Research
## 1          1       337         118                 4 4.5 4.5 9.65        1
## 2          2       324         107                 4 4.0 4.5 8.87        1
## 3          3       316         104                 3 3.0 3.5 8.00        1
## 4          4       322         110                 3 3.5 2.5 8.67        1
## 5          5       314         103                 2 2.0 3.0 8.21        0
## 6          6       330         115                 5 4.5 3.0 9.34        1
##   Chance.of.Admit
## 1            0.92
## 2            0.76
## 3            0.72
## 4            0.80
## 5            0.65
## 6            0.90
```

```
attach(test)


linear.full <- lm(Chance.of.Admit ~., data=test)
linear.null <- lm(Chance.of.Admit ~ 1, data=test)
```

```r
linear.rank.full <- lm(University.Rating ~., data=test)
linear.null.full <- lm(University.Rating ~ 1, data=test)
```

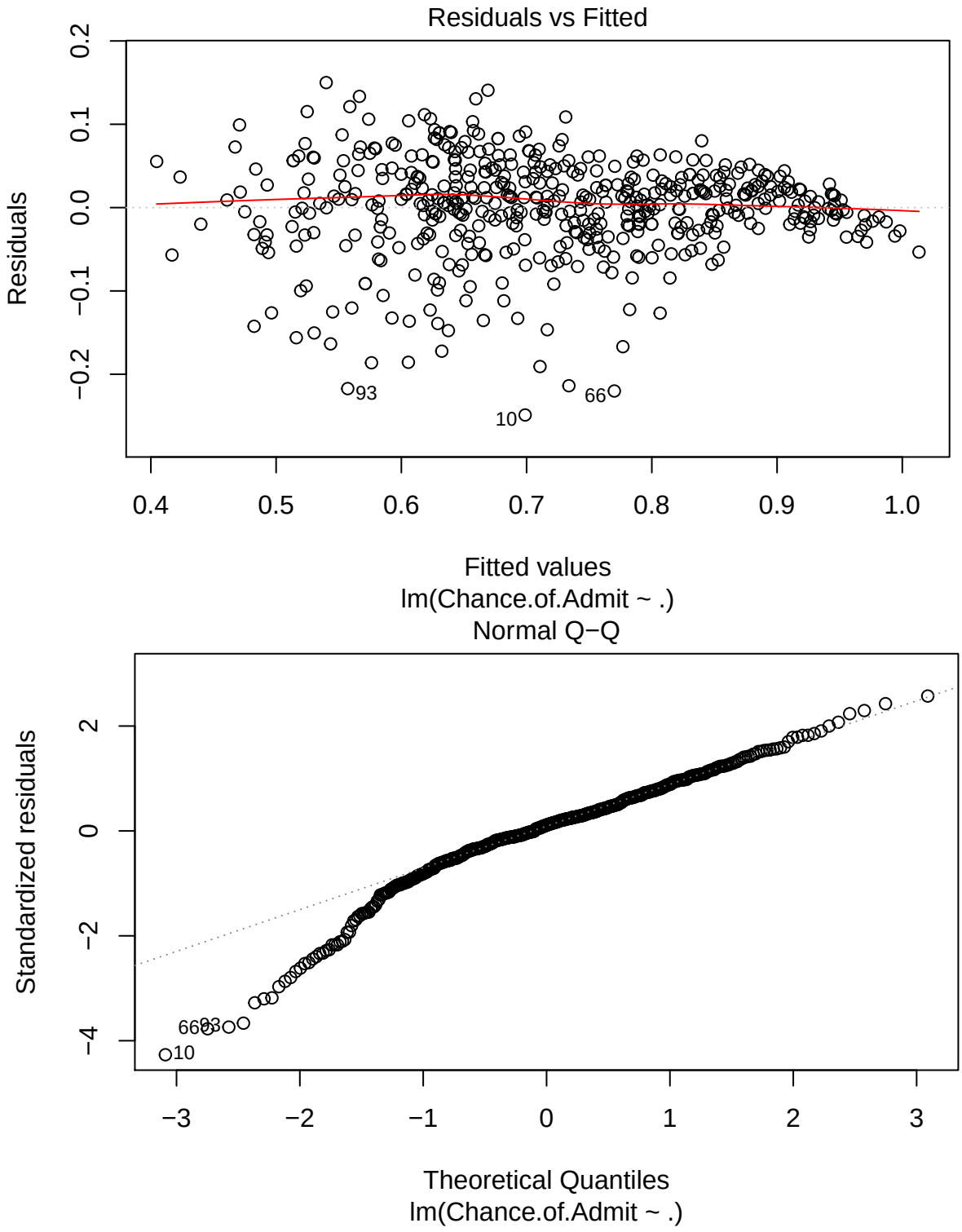
Linear Regression and some plots

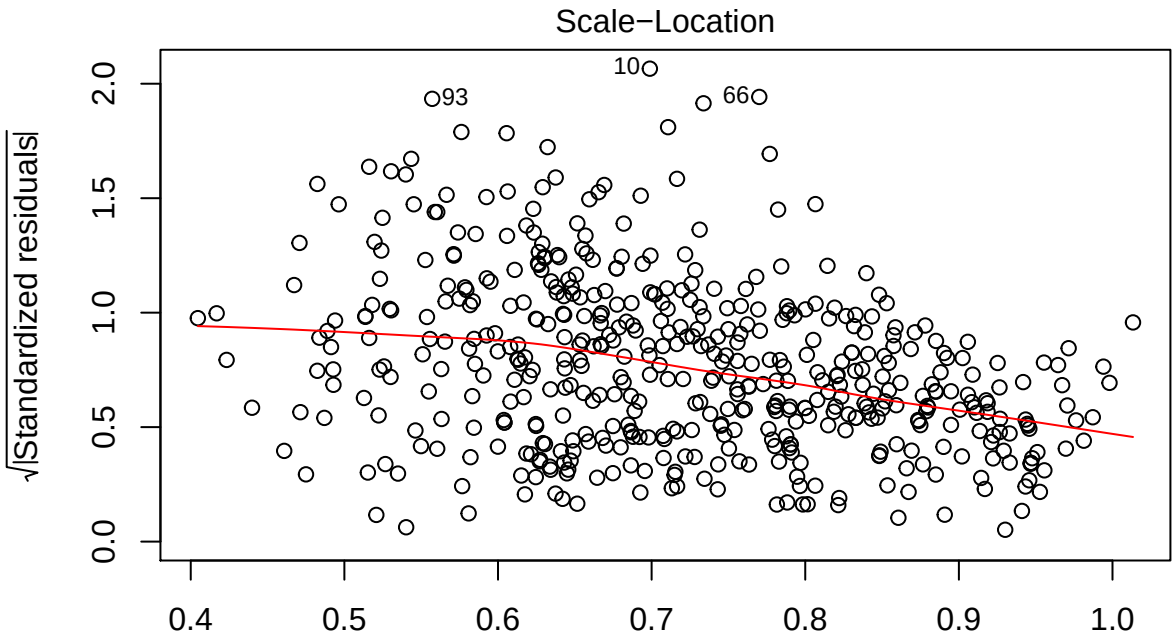
Here's a linear model with a few plots.

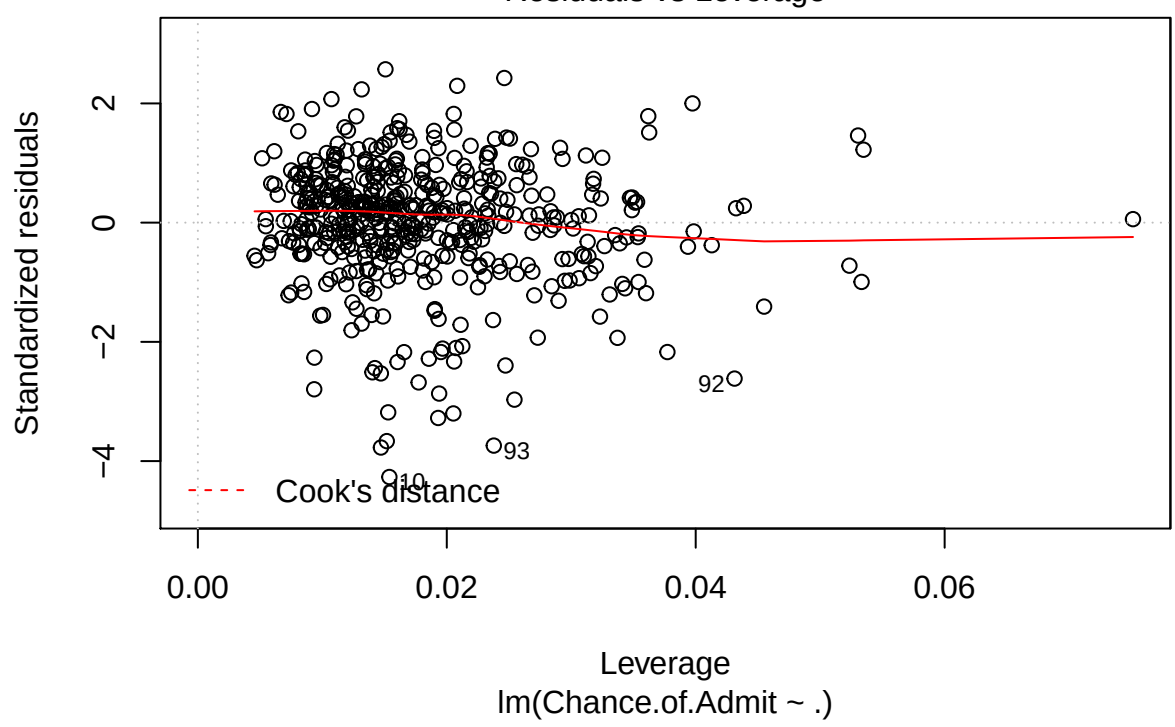
```r
linear <- lm(Chance.of.Admit ~., data=test)
summary(linear)
```

```
##
## Call:
## lm(formula = Chance.of.Admit ~ ., data = test)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.248847 -0.025984  0.006627  0.036671  0.150015
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)       -1.3379983  0.1030617 -12.982  < 2e-16 ***
## Serial.No.         0.0000868  0.0000187   4.641 4.44e-06 ***
## GRE.Score          0.0019217  0.0004923   3.903 0.000108 ***
## TOEFL.Score        0.0031928  0.0008594   3.715 0.000227 ***
## University.Rating  0.0053164  0.0037273   1.426 0.154405
## SOP                0.0045661  0.0045161   1.011 0.312489
## LOR                0.0149151  0.0040757   3.660 0.000280 ***
## CGPA               0.1155561  0.0095282  12.128  < 2e-16 ***
## Research           0.0225254  0.0064834   3.474 0.000557 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.05877 on 491 degrees of freedom
## Multiple R-squared:  0.8294, Adjusted R-squared:  0.8266
## F-statistic: 298.4 on 8 and 491 DF,  p-value: < 2.2e-16
```

```r
plot(linear)
```


Residuals vs Fitted
Residuals
0.2
0.1
0.0
−0.1
−0.2
93
66
10
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Fitted values
lm(Chance.of.Admit ~ .)
Normal Q−Q
Standardized residuals
2
0
−2
−4
66
93
10
−3
−2
−1
0
1
2
3
Theoretical Quantiles
lm(Chance.of.Admit ~ .)



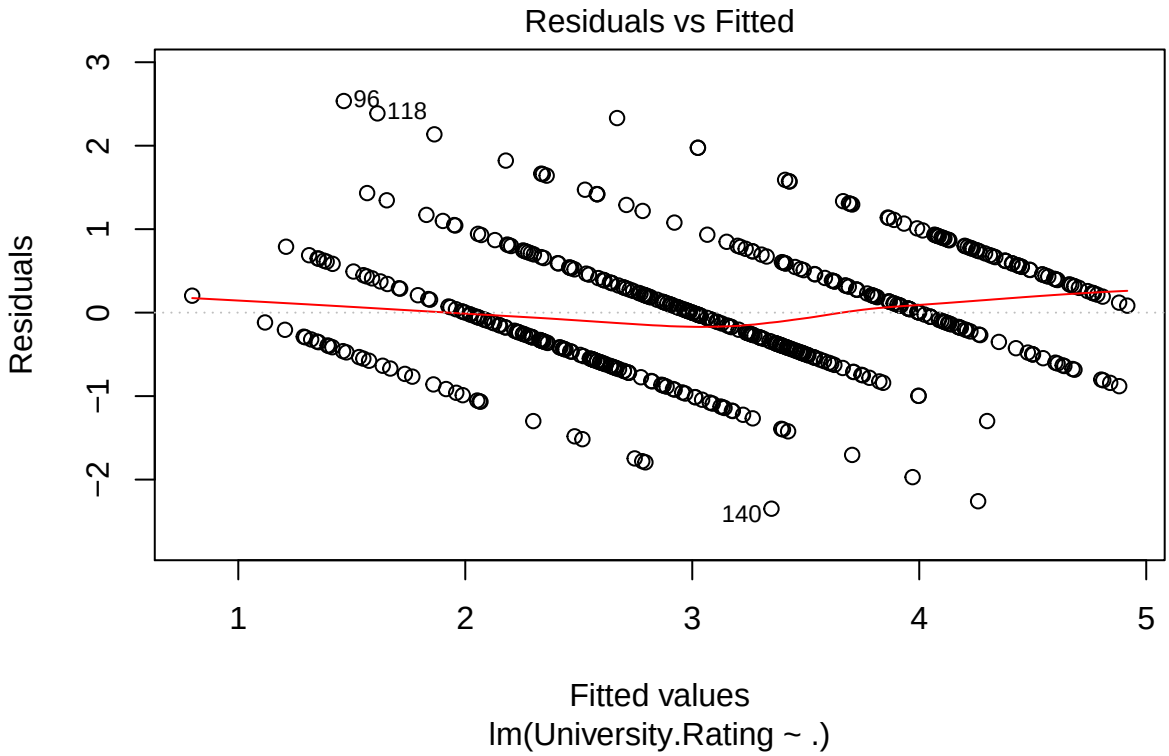


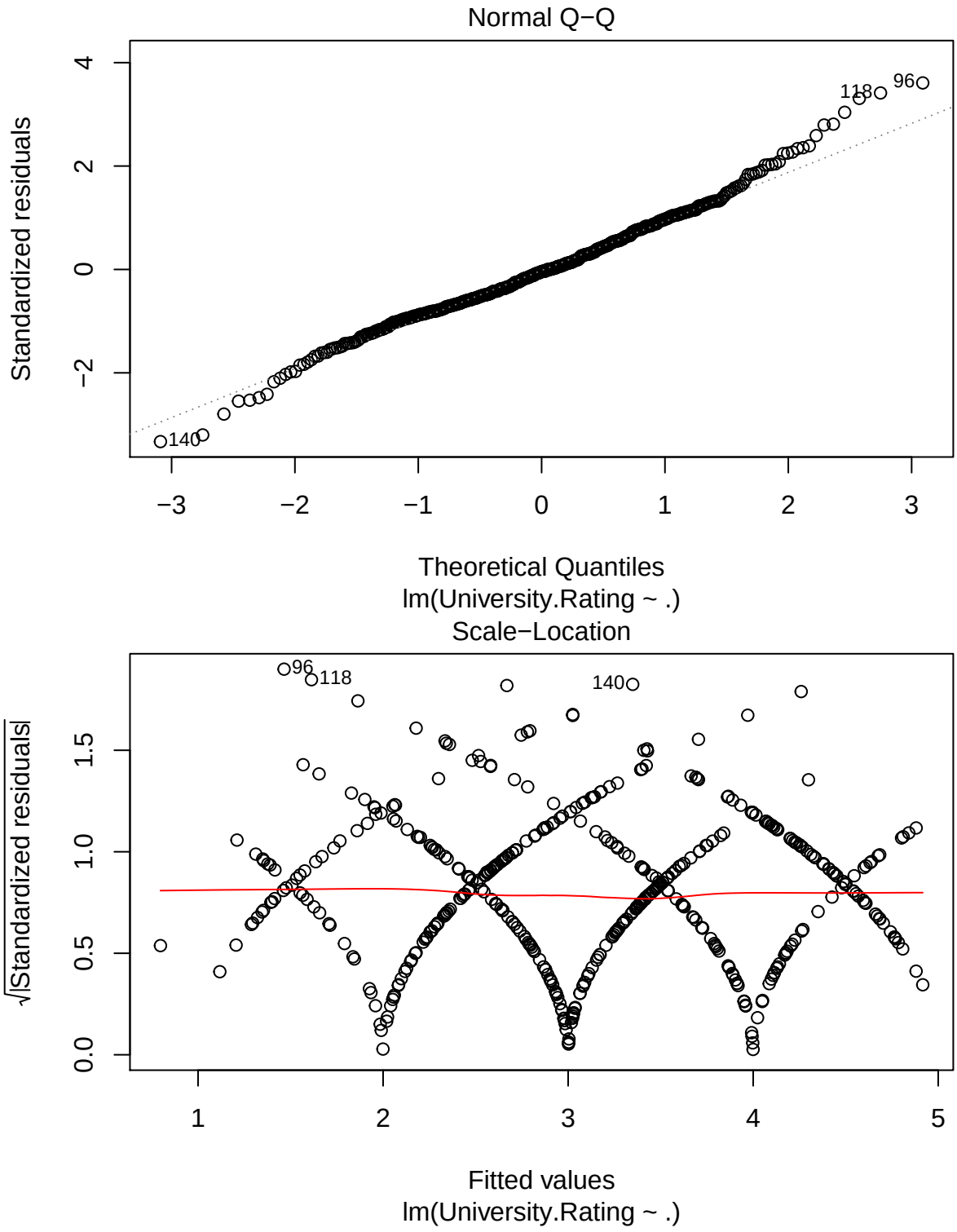

```
linear <- lm(University.Rating ~., data=test)
summary(linear)
```

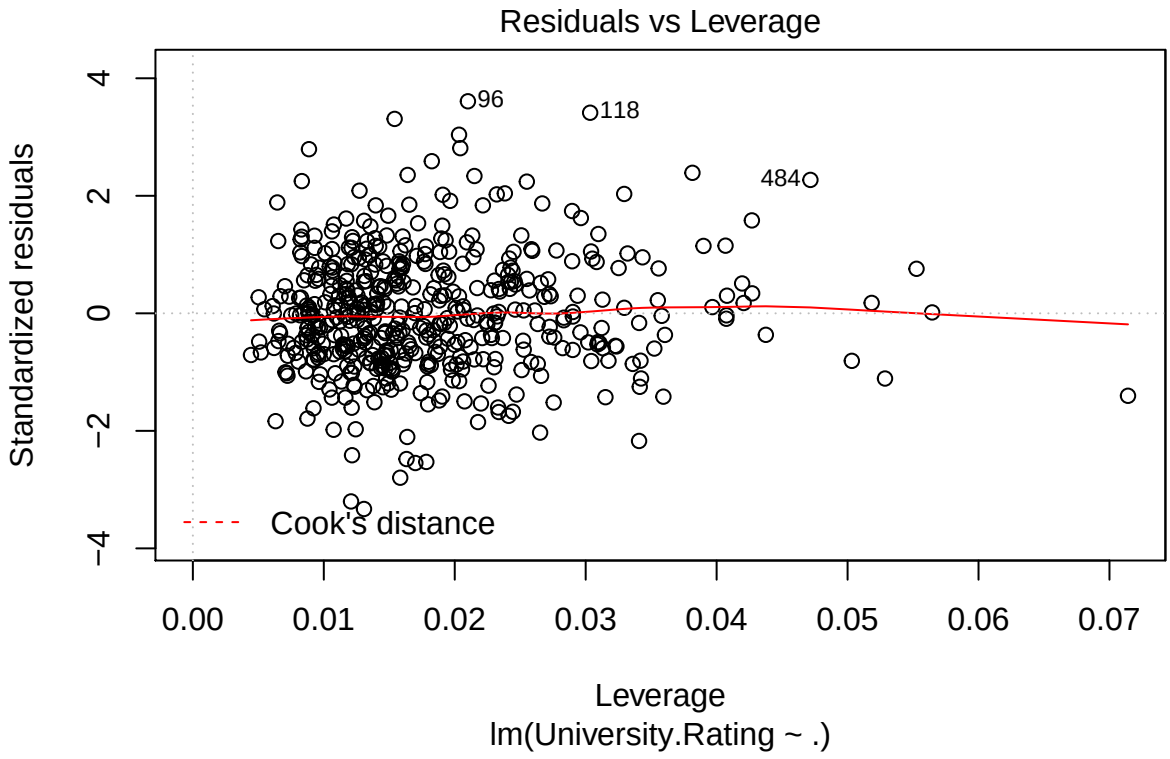
```
##
## Call:
## lm(formula = University.Rating ~ ., data = test)
```

```
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.34889 -0.46404 -0.02909  0.43638  2.53513
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)     -5.3520556  1.4229030  -3.761 0.000189 ***
## Serial.No.       0.0001131  0.0002308   0.490 0.624275
## GRE.Score        0.0050723  0.0060361   0.840 0.401135
## TOEFL.Score      0.0184033  0.0104963   1.753 0.080172 .
## SOP              0.4420126  0.0508516   8.692  < 2e-16 ***
## LOR              0.1376178  0.0495241   2.779 0.005665 **
## CGPA             0.2666732  0.1306889   2.041 0.041833 *
## Research         0.0744728  0.0792227   0.940 0.347657
## Chance.of.Admit  0.7761573  0.5441596   1.426 0.154405
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7101 on 491 degrees of freedom
## Multiple R-squared:  0.6205, Adjusted R-squared:  0.6144
## F-statistic: 100.4 on 8 and 491 DF,  p-value: < 2.2e-16
```

```
plot(linear)
```




Normal Q−Q
Standardized residuals
Theoretical Quantiles
lm(University.Rating ~ .)
Scale−Location
√|Standardized residuals|
Fitted values
lm(University.Rating ~ .)
96
118
140



Variable Selection for Chance of Admittion

By performing backwards selection, we will remove the least significant values until all values are significant.

```
linear <- lm(Chance.of.Admit~ ., data = test )
summary(linear)
```

```
##
## Call:
## lm(formula = Chance.of.Admit ~ ., data = test)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.248847 -0.025984  0.006627  0.036671  0.150015
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)       -1.3379983  0.1030617 -12.982  < 2e-16 ***
## Serial.No.         0.0000868  0.0000187   4.641 4.44e-06 ***
## GRE.Score          0.0019217  0.0004923   3.903 0.000108 ***
## TOEFL.Score        0.0031928  0.0008594   3.715 0.000227 ***
## University.Rating  0.0053164  0.0037273   1.426 0.154405
## SOP                0.0045661  0.0045161   1.011 0.312489
## LOR                0.0149151  0.0040757   3.660 0.000280 ***
## CGPA               0.1155561  0.0095282  12.128  < 2e-16 ***
## Research           0.0225254  0.0064834   3.474 0.000557 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 0.05877 on 491 degrees of freedom
## Multiple R-squared:  0.8294, Adjusted R-squared:  0.8266
## F-statistic: 298.4 on 8 and 491 DF,  p-value: < 2.2e-16
```

```
#Remove University Ranking because it has the highest non significant p value
linear <- lm(Chance.of.Admit~ Serial.No. + GRE.Score + TOEFL.Score + SOP +LOR + CGPA + Research , data =
summary(linear)
```

```
##
## Call:
## lm(formula = Chance.of.Admit ~ Serial.No. + GRE.Score + TOEFL.Score +
##     SOP + LOR + CGPA + Research, data = test)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.249225 -0.026058  0.005588  0.037182  0.150359
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -1.372e+00  1.004e-01 -13.673  < 2e-16 ***
## Serial.No.   8.776e-05  1.871e-05   4.691 3.53e-06 ***
## GRE.Score    1.957e-03  4.922e-04   3.975 8.09e-05 ***
## TOEFL.Score  3.304e-03  8.568e-04   3.857 0.000130 ***
## SOP          6.945e-03  4.201e-03   1.653 0.098981 .
## LOR          1.571e-02  4.041e-03   3.888 0.000115 ***
## CGPA         1.175e-01  9.444e-03  12.437  < 2e-16 ***
## Research     2.302e-02  6.481e-03   3.551 0.000420 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.05883 on 492 degrees of freedom
## Multiple R-squared:  0.8287, Adjusted R-squared:  0.8262
## F-statistic:   340 on 7 and 492 DF,  p-value: < 2.2e-16
```

```
#Remove SOP has the second highest non significant p value
linear <- lm(Chance.of.Admit~ Serial.No. + GRE.Score + TOEFL.Score +LOR + CGPA + Research , data = test
#All variables are now significant
summary(linear)
```

```
##
## Call:
## lm(formula = Chance.of.Admit ~ Serial.No. + GRE.Score + TOEFL.Score +
##     LOR + CGPA + Research, data = test)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.247948 -0.026442  0.005457  0.036306  0.152463
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -1.406e+00  9.844e-02 -14.280  < 2e-16 ***
## Serial.No.   8.348e-05  1.856e-05   4.498 8.58e-06 ***
## GRE.Score    1.941e-03  4.930e-04   3.937 9.42e-05 ***
## TOEFL.Score  3.478e-03  8.518e-04   4.083 5.18e-05 ***
## LOR          1.831e-02  3.729e-03   4.911 1.23e-06 ***
```

```
## CGPA         1.215e-01  9.132e-03  13.310  < 2e-16 ***
## Research     2.357e-02  6.484e-03   3.635 0.000307 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.05894 on 493 degrees of freedom
## Multiple R-squared:  0.8277, Adjusted R-squared:  0.8256
## F-statistic: 394.8 on 6 and 493 DF,  p-value: < 2.2e-16
```

CV for linear model - Chance of Admission

```
set.seed(7861)

cvlm <- list()
msecv <- NA
coef <-matrix(nrow = 500, ncol=length(linear$coefficients))
for(i in 1:nrow(test)){
  #Fit the linear model
cvlm[[i]] <- lm(Chance.of.Admit[-i] ~ Serial.No.[-i] + GRE.Score[-i] + TOEFL.Score[-i] +LOR[-i] + CGPA[
# Calculate MSE for ith model
msecv[i] <- (predict(cvlm[[i]], newdata = data.frame(Serial.No.[-i] + GRE.Score[-i] + TOEFL.Score[-i] +
#coef[[i]] <- cvlm[[i]]$coefficients
  for(j in 1:length(linear$coefficients)){
    coef[i,j] <- cvlm[[i]]$coefficients[j]
  }
#msecv[i]
}
#output mean of MSE
mean(msecv)
```

```
## [1] 0.0666215
```

The chance of being admitted to univeristy is +/- 6.66%.

Variable Selection for Research

```
linear <- lm(Research~ Serial.No. + GRE.Score + TOEFL.Score + University.Rating + SOP +LOR + CGPA, data
#summary(linear)

#Remove LOR
linear <- lm(Research~ Serial.No. + GRE.Score + TOEFL.Score + University.Rating  +LOR + CGPA, data = tes
summary(linear)
```

```
##
## Call:
## lm(formula = Research ~ Serial.No. + GRE.Score + TOEFL.Score +
##     University.Rating + LOR + CGPA, data = test)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
```

```
## -1.0861 -0.3358  0.0128  0.2852  0.9840
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)       -6.3639911  0.6526388  -9.751  < 2e-16 ***
## Serial.No.         0.0001593  0.0001284   1.240    0.215
## GRE.Score          0.0217245  0.0032763   6.631 8.79e-11 ***
## TOEFL.Score       -0.0051749  0.0059488  -0.870    0.385
## University.Rating  0.0365662  0.0240158   1.523    0.129
## LOR                0.0361827  0.0268979   1.345    0.179
## CGPA               0.0377370  0.0650001   0.581    0.562
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4084 on 493 degrees of freedom
## Multiple R-squared:  0.3325, Adjusted R-squared:  0.3243
## F-statistic: 40.92 on 6 and 493 DF,  p-value: < 2.2e-16
```

```
#Remove CGPA
linear <- lm(Research~ Serial.No. + GRE.Score + TOEFL.Score + University.Rating  +LOR, data = test )
summary(linear)
```

```
##
## Call:
## lm(formula = Research ~ Serial.No. + GRE.Score + TOEFL.Score +
##     University.Rating + LOR, data = test)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.0821 -0.3360  0.0127  0.2866  0.9834
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)       -6.4346661  0.6407546 -10.042  < 2e-16 ***
## Serial.No.         0.0001623  0.0001283   1.265   0.2064
## GRE.Score          0.0225289  0.0029669   7.593 1.57e-13 ***
## TOEFL.Score       -0.0041137  0.0056572  -0.727   0.4675
## University.Rating  0.0398047  0.0233433   1.705   0.0888 .
## LOR                0.0405427  0.0258109   1.571   0.1169
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4082 on 494 degrees of freedom
## Multiple R-squared:  0.332,  Adjusted R-squared:  0.3253
## F-statistic: 49.11 on 5 and 494 DF,  p-value: < 2.2e-16
```

```
#Remove LOR
linear <- lm(Research~ Serial.No. + GRE.Score + TOEFL.Score + University.Rating, data = test )
summary(linear)
```

```
##
## Call:
## lm(formula = Research ~ Serial.No. + GRE.Score + TOEFL.Score +
##     University.Rating, data = test)
##
## Residuals:
```

```
##     Min      1Q  Median      3Q     Max
## -1.1057 -0.3428  0.0090  0.2871  1.0214
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)       -6.5778405  0.6351775 -10.356  < 2e-16 ***
## Serial.No.         0.0001785  0.0001280   1.394   0.1638
## GRE.Score          0.0228912  0.0029623   7.727 6.16e-14 ***
## TOEFL.Score       -0.0029714  0.0056186  -0.529   0.5971
## University.Rating  0.0536923  0.0216362   2.482   0.0134 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4088 on 495 degrees of freedom
## Multiple R-squared:  0.3287, Adjusted R-squared:  0.3233
## F-statistic: 60.59 on 4 and 495 DF,  p-value: < 2.2e-16
```

```
#Remove TOEFL
linear <- lm(Research~ Serial.No. + GRE.Score + University.Rating, data = test )
summary(linear)
```

```
##
## Call:
## lm(formula = Research ~ Serial.No. + GRE.Score + University.Rating,
##     data = test)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.10835 -0.34957  0.00049  0.28952  1.02269
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)       -6.5389338  0.6304444 -10.372   <2e-16 ***
## Serial.No.         0.0001855  0.0001272   1.458   0.1455
## GRE.Score          0.0217887  0.0021030  10.361   <2e-16 ***
## University.Rating  0.0504027  0.0207077   2.434   0.0153 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4085 on 496 degrees of freedom
## Multiple R-squared:  0.3283, Adjusted R-squared:  0.3242
## F-statistic: 80.81 on 3 and 496 DF,  p-value: < 2.2e-16
```

```
#Remove Serial Number
linear <- lm(Research~ + GRE.Score + University.Rating, data = test )
summary(linear)
```

```
##
## Call:
## lm(formula = Research ~ +GRE.Score + University.Rating, data = test)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.14033 -0.35017  0.00906  0.29255  1.00181
##
## Coefficients:
```

```
##                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)       -6.415603   0.625451 -10.258   <2e-16 ***
## GRE.Score          0.021546   0.002099  10.266   <2e-16 ***
## University.Rating  0.050337   0.020731   2.428   0.0155 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4089 on 497 degrees of freedom
## Multiple R-squared:  0.3254, Adjusted R-squared:  0.3227
## F-statistic: 119.9 on 2 and 497 DF,  p-value: < 2.2e-16
```

CV for linear model - Research

```
set.seed(7861)

cvlm <- list()
msecv <- NA
for(i in 1:nrow(test)){
  #Fit the linear model
cvlm[[i]] <- lm(Research[-i] ~ GRE.Score[-i] + University.Rating[-i])
# Calculate MSE for ith model
msecv[i] <- (predict(cvlm[[i]], newdata = data.frame(GRE.Score[-i] + University.Rating[-i]))-Research[i]
#msecv[i]
}
#output mean of MSE
mean(msecv)
```

```
## [1] 0.4840036
```

Variable Selection for University Ranking

```
linear <- lm(University.Rating~ Serial.No. + GRE.Score + TOEFL.Score + SOP +LOR + CGPA + Research, data
summary(linear)
```

```
##
## Call:
## lm(formula = University.Rating ~ Serial.No. + GRE.Score + TOEFL.Score +
##     SOP + LOR + CGPA + Research, data = test)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.34352 -0.46556 -0.03557  0.44046  2.44809
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -6.4170319  1.2125399  -5.292 1.82e-07 ***
## Serial.No.   0.0001812  0.0002260   0.802  0.42307
## GRE.Score    0.0065910  0.0059476   1.108  0.26833
## TOEFL.Score  0.0209679  0.0103520   2.025  0.04336 *
## SOP          0.4474027  0.0507642   8.813  < 2e-16 ***
```

```
## LOR          0.1498125  0.0488318   3.068  0.00227 **
## CGPA         0.3578395  0.1141124   3.136  0.00182 **
## Research     0.0923371  0.0783086   1.179  0.23891
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7109 on 492 degrees of freedom
## Multiple R-squared:  0.619,  Adjusted R-squared:  0.6135
## F-statistic: 114.2 on 7 and 492 DF,  p-value: < 2.2e-16
```

```
#Remove Serial Number
linear <- lm(University.Rating~  GRE.Score + TOEFL.Score + SOP +LOR + CGPA + Research, data = test )
summary(linear)
```

```
##
## Call:
## lm(formula = University.Rating ~ GRE.Score + TOEFL.Score + SOP +
##     LOR + CGPA + Research, data = test)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.36251 -0.47140 -0.04223  0.45376  2.41297
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -6.295220   1.202548  -5.235 2.45e-07 ***
## GRE.Score    0.006468   0.005943   1.088  0.27705
## TOEFL.Score  0.020128   0.010295   1.955  0.05114 .
## SOP          0.441757   0.050255   8.790  < 2e-16 ***
## LOR          0.154072   0.048524   3.175  0.00159 **
## CGPA         0.364222   0.113793   3.201  0.00146 **
## Research     0.096184   0.078133   1.231  0.21890
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7106 on 493 degrees of freedom
## Multiple R-squared:  0.6185, Adjusted R-squared:  0.6138
## F-statistic: 133.2 on 6 and 493 DF,  p-value: < 2.2e-16
```

```
#Remove GRE
linear <- lm(University.Rating~   TOEFL.Score + SOP +LOR + CGPA + Research, data = test )
summary(linear)
```

```
##
## Call:
## lm(formula = University.Rating ~ TOEFL.Score + SOP + LOR + CGPA +
##     Research, data = test)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.37560 -0.47448 -0.03629  0.45065  2.41676
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -5.243653   0.715856  -7.325 9.79e-13 ***
## TOEFL.Score  0.025353   0.009109   2.783  0.00559 **
```

```
## SOP          0.440906   0.050259   8.773  < 2e-16 ***
## LOR          0.151540   0.048478   3.126  0.00188 **
## CGPA         0.414718   0.103920   3.991 7.59e-05 ***
## Research     0.120784   0.074805   1.615  0.10702
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7107 on 494 degrees of freedom
## Multiple R-squared:  0.6176, Adjusted R-squared:  0.6137
## F-statistic: 159.5 on 5 and 494 DF,  p-value: < 2.2e-16
```

```
#Remove Research
linear <- lm(University.Rating~   TOEFL.Score + SOP +LOR + CGPA, data = test )
summary(linear)
```

```
##
## Call:
## lm(formula = University.Rating ~ TOEFL.Score + SOP + LOR + CGPA,
##     data = test)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.46231 -0.46269 -0.04935  0.45262  2.39211
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -5.62010    0.67792  -8.290 1.07e-15 ***
## TOEFL.Score  0.02695    0.00907   2.971  0.00311 **
## SOP          0.44423    0.05030   8.832  < 2e-16 ***
## LOR          0.15563    0.04849   3.210  0.00142 **
## CGPA         0.44360    0.10254   4.326 1.83e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7119 on 495 degrees of freedom
## Multiple R-squared:  0.6155, Adjusted R-squared:  0.6124
## F-statistic: 198.1 on 4 and 495 DF,  p-value: < 2.2e-16
```

CV for linear model - University Rating

```
set.seed(7861)

cvlm <- list()
msecv <- NA
for(i in 1:nrow(test)){
  #Fit the linear model
cvlm[[i]] <- lm(University.Rating[-i] ~ TOEFL.Score[-i] + SOP[-i] + LOR[-1] + CGPA[-i])
# Calculate MSE for ith model
msecv[i] <- (predict(cvlm[[i]], newdata = data.frame(TOEFL.Score[-i] + SOP[-i] + LOR[-1] + CGPA[-i]))-U
#msecv[i]
}
#output mean of MSE
mean(msecv)
```

```
## [1] 3.373402
```