

Predicting Overall Rating of Fifa 19 Players

Nkosi,Malu,Teddy

November 14, 2019

Table of Contents

Abstract.....	2
Introduction	2
Exploratory Analysis.....	3
Check distributions of the predictor variables.....	3
Pairwise correlations.....	4
Model 1.....	4
Residual Analysis - First Order Model	6
Residual vs Fitted plot.....	8
Normal Q-Q plot:	8
Scale-location:	8
Residuals vs Leverage:	8
Model 2 - Remove non-significant predictors.....	9
Model 3 Residual Analysis	21
Interpretations for these graphs.....	23
The residuals vs fitted residuals:	23
Normal Q-Q plot:	23
Scale-location graph:	23
Residuals vs Leverage:	23
Intepretations of Confidence Intervals.....	26
Stepwise Regression	26
Interactions	53
Final Model	84
Residual and Influence Analysis.....	85
Interaction Plots	91
Conclusions	93

Abstract

The dataset used in this model came from the game FIFA 19. It contained various attributes about each player and their information stored within the game. The problem at hand was to see if a multiple linear regression model could be used to predict a player's Overall rating in the game. The attributes chosen were all continuous which we thought were crucial in determining a player's rating within the game. The model found that certain predictors and not all were very significant in predicting a player's Overall Rating. Absence of one variable did not affect other predictors as much because some variables were already insignificant.

Introduction

This dataset is from Kaggle.com under a dataset called FIFA 19 complete player dataset. It has 18207 players and so a random sample was done to get a sample of players. The random sample produced 99 players for each position i.e Striker, Midfielder and Defender. Therefore the model then used 297 players total. The predictor variables were:

- Aggression
- Jumping
- FKAccuracy
- Strength
- Curve
- Stamina
- SprintSpeed
- Volleys
- Dribbling
- Finishing
- Agility
- LongPassing
- Interceptions
- Penalties
- Longshots
- Crossing
- Positioning
- Balance
- StandingTackle
- SlidingTackle
- ShotPower
- HeadingAccuracy
- ShortPassing
- BallControl

- Acceleration
- Reactions
- Vision
- Composure
- Marking

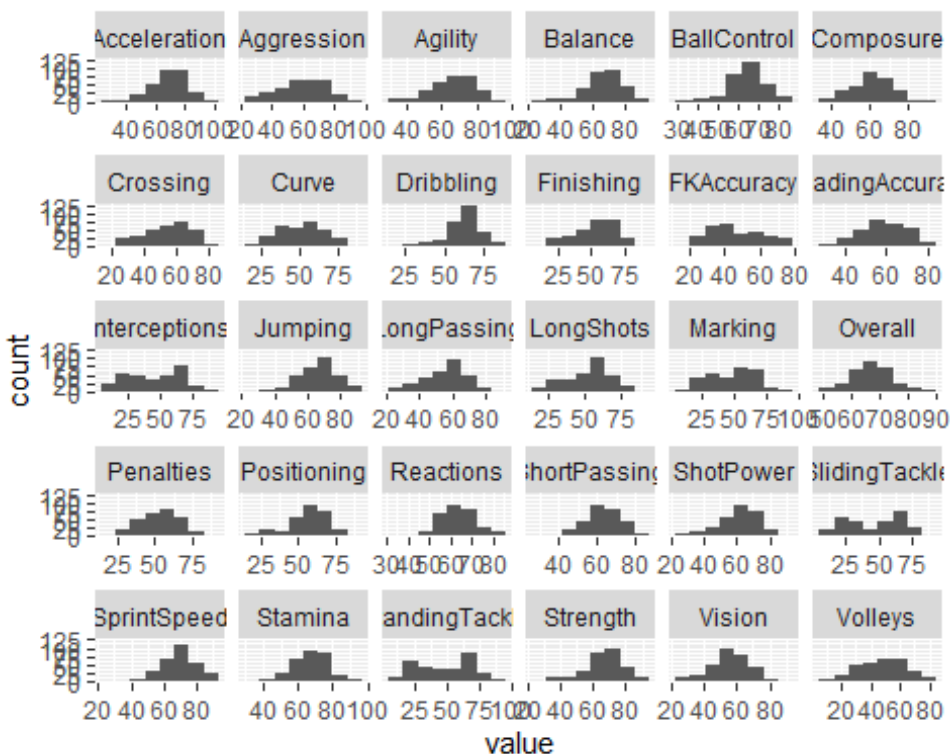
The response variable was Overall rating. We were interested in determining which variables can best predict the overall rating of each player regardless of the position.

```
# Reading in the data
library(readxl)
latestfifa19 <- read_excel("C:/Users/Nkosilenhle/Desktop/latestfifa19.xlsx")
```

Exploratory Analysis

Check distributions of the predictor variables

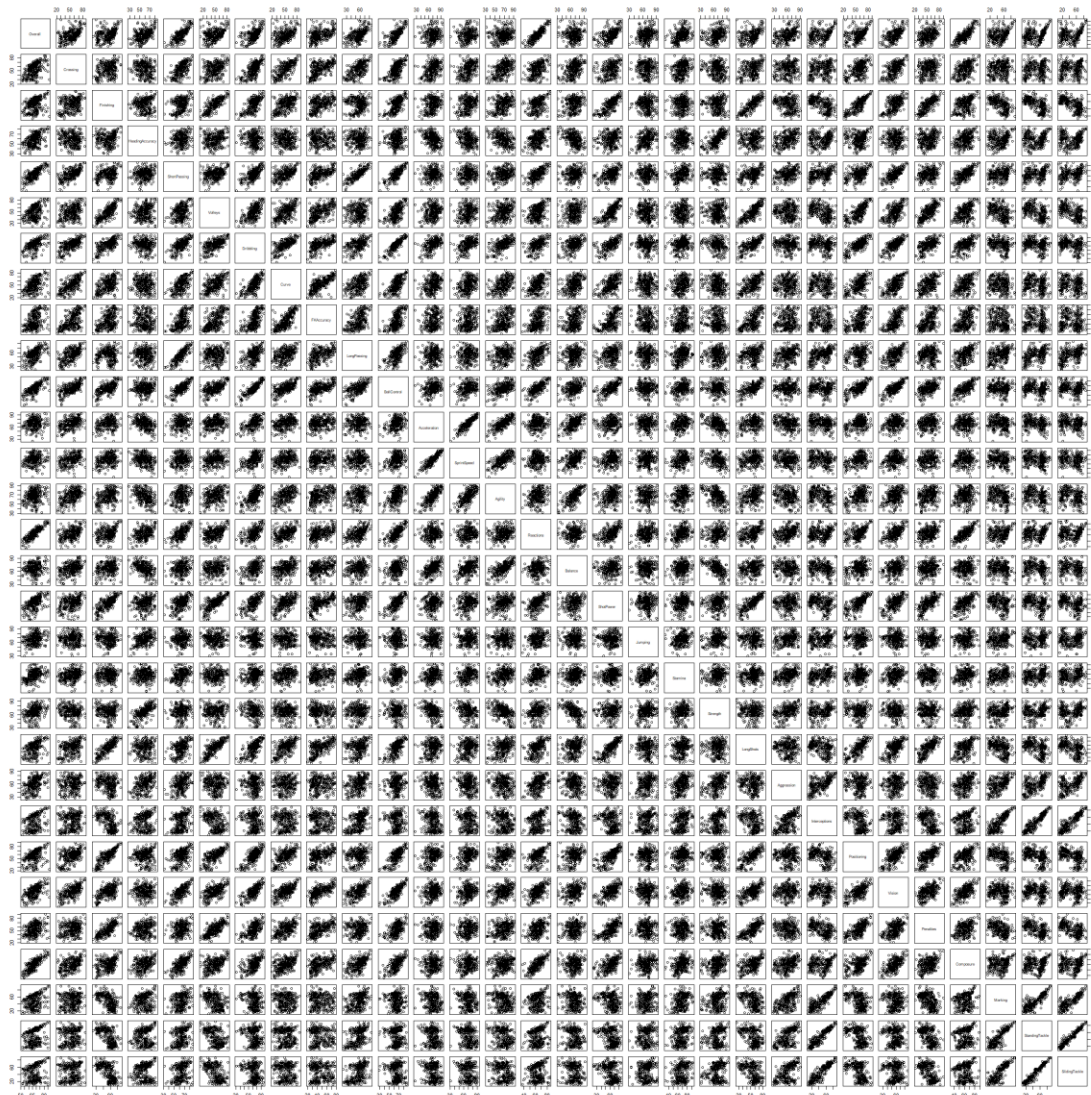
```
library(tidyr)
library(ggplot2)
ggplot(gather(latestfifa19), aes(value)) +
  geom_histogram(bins = 8) +
  facet_wrap(~key, scales = 'free_x')
```



ShotPower seems to be left-skewed. All the other predictors look to have reasonable normal distributions. A quadratic transformation may be needed to be done on the ShotPower predictor variable.

Pairwise correlations

```
plot(latestfifa19)
```



Overall rating is mostly correlated with ShortPassing, Dribbling, BallControl, Reactions and Composure.

Model 1

#Fit a first order model with all predictors

```
fit1 = lm(Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +  
Volleys + Dribbling + Curve + FkAccuracy + LongPassing + BallControl + Accele
```

```
ration + SprintSpeed + Agility + Reactions + Balance + ShotPower + Jumping +
Stamina + Strength + LongShots + Aggression + Interceptions + Positioning + V
ision + Penalties + Composure + Marking + StandingTackle + SlidingTackle , da
ta=latestfifa19)
summary (fit1)
```

```
##
```

```
## Call:
```

```
## lm(formula = Overall ~ Crossing + Finishing + HeadingAccuracy +
##     ShortPassing + Volleys + Dribbling + Curve + FKAccuracy +
##     LongPassing + BallControl + Acceleration + SprintSpeed +
##     Agility + Reactions + Balance + ShotPower + Jumping + Stamina +
##     Strength + LongShots + Aggression + Interceptions + Positioning +
##     Vision + Penalties + Composure + Marking + StandingTackle +
##     SlidingTackle, data = latestfifa19)
```

```
##
```

```
## Residuals:
```

```
##      Min       1Q   Median       3Q      Max
## -6.6471 -1.4076 -0.0616  1.3202  7.0897
```

```
##
```

```
## Coefficients:
```

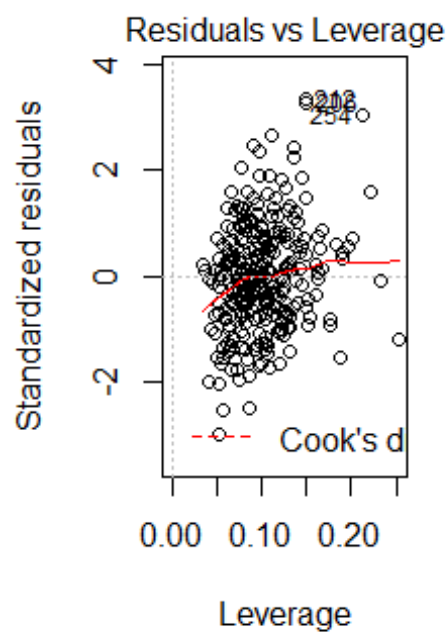
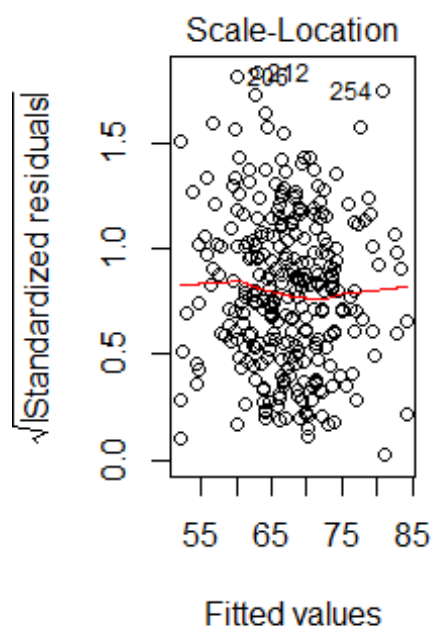
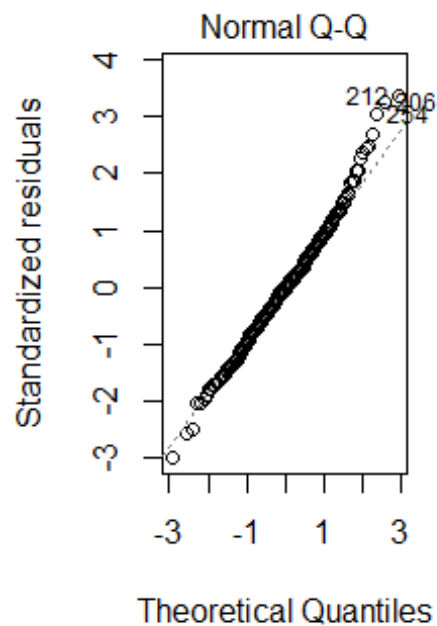
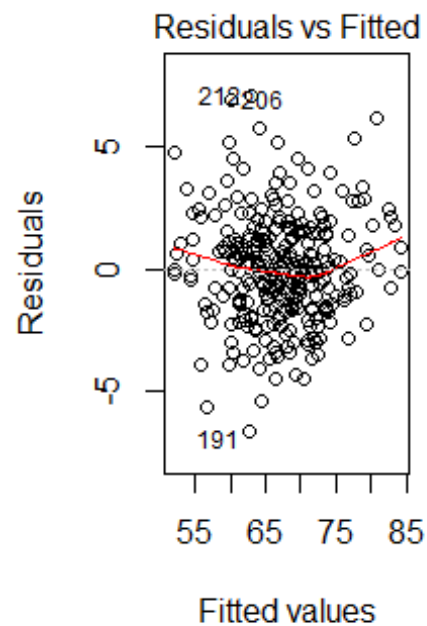
	Estimate	Std. Error	t value	Pr(> t)	
## (Intercept)	11.302515	2.107236	5.364	1.77e-07	***
## Crossing	0.037799	0.018452	2.048	0.041490	*
## Finishing	0.027741	0.024654	1.125	0.261521	
## HeadingAccuracy	0.084340	0.023580	3.577	0.000413	***
## ShortPassing	0.161967	0.041473	3.905	0.000119	***
## Volleys	-0.012976	0.019040	-0.682	0.496141	
## Dribbling	-0.025939	0.033362	-0.777	0.437560	
## Curve	-0.010541	0.017665	-0.597	0.551200	
## FKAccuracy	0.003056	0.017224	0.177	0.859325	
## LongPassing	-0.032950	0.024859	-1.326	0.186137	
## BallControl	0.185717	0.042880	4.331	2.10e-05	***
## Acceleration	0.029345	0.032618	0.900	0.369111	
## SprintSpeed	0.023512	0.030540	0.770	0.442056	
## Agility	0.020966	0.021897	0.957	0.339202	
## Reactions	0.294823	0.030821	9.566	< 2e-16	***
## Balance	-0.027936	0.018722	-1.492	0.136839	
## ShotPower	0.049321	0.022166	2.225	0.026913	*
## Jumping	0.002513	0.014973	0.168	0.866820	
## Stamina	0.009380	0.017466	0.537	0.591685	
## Strength	0.008279	0.018452	0.449	0.654014	
## LongShots	-0.036968	0.022682	-1.630	0.104314	
## Aggression	0.000102	0.014888	0.007	0.994540	
## Interceptions	0.026872	0.020493	1.311	0.190891	
## Positioning	-0.045427	0.022628	-2.008	0.045700	*
## Vision	-0.085416	0.024187	-3.531	0.000487	***
## Penalties	0.036671	0.020717	1.770	0.077854	.
## Composure	0.134032	0.025535	5.249	3.12e-07	***
## Marking	0.048570	0.016382	2.965	0.003302	**

```
## StandingTackle    0.051007    0.032343    1.577 0.115959
## SlidingTackle     -0.071408    0.030783   -2.320 0.021110 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.293 on 267 degrees of freedom
## Multiple R-squared:  0.8932, Adjusted R-squared:  0.8816
## F-statistic: 77.02 on 29 and 267 DF,  p-value: < 2.2e-16
```

Using all the predictor variables, the model explains 88.2% of the variation in the Overall rating which is the Adjusted R^2 because it is a multiple linear regression model. The residual standard error is 2.29 which is relatively small given that the range is between 50 and 80. The most significant predictors are HeadingAccuracy, ShortPassing, BallControl, Reactions, Vision and Composure.

Residual Analysis - First Order Model

```
par (mfrow=c(1,2))
plot(fit1)
```



Residual vs Fitted plot

The horizontal bend is around the 0 line. This suggests that the variances of the error terms are equal.

Normal Q-Q plot:

The normal Q-Q plot is lightly tailed. This suggests that the data is approximately normal. Therefore the residuals are normal.

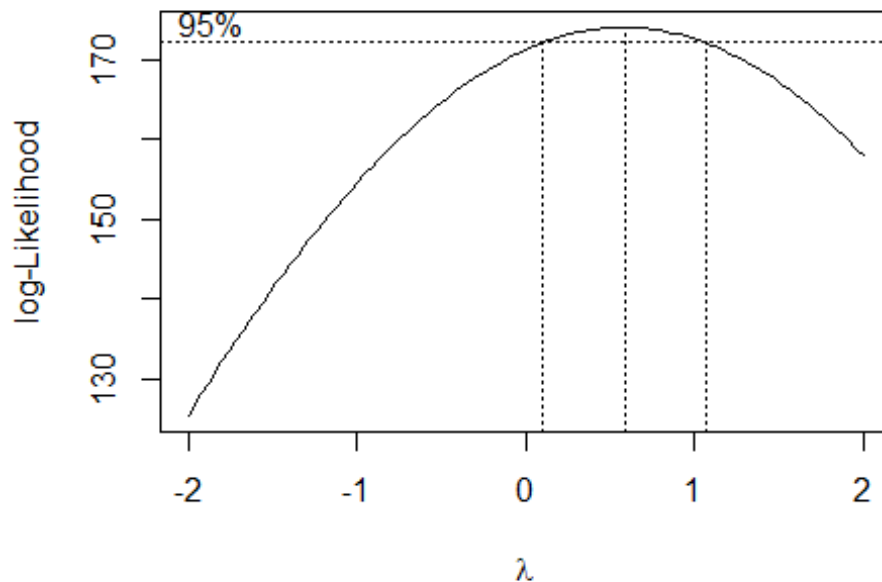
Scale-location:

Residuals are spread equally along the ranges of predictors. This is how you can check the assumption of equal variance (homoscedasticity). It's good if horizontal line with equally spread points, here residuals appear randomly spread.

Residuals vs Leverage:

This plot helps us to find influential cases, if any. Not all outliers are influential in linear regression analysis. In this case, when there is no influential case or cases. You can barely see Cook's distance lines because all cases are well inside of the Cook's distance lines.

```
#Do a Box-Cox analysis to see if the response variable should be transformed  
MASS::boxcox (fit1)
```

In the Box-Cox Plot above, the two vertical dotted lines gives the Upper Limit and Lower Limit for the values for the fit of the log(Overall) vs all predictor variables in the data set for which the Box-Cox plot is plotted. It is clear from the observation that these 2 limits, which make up the 95% Confidence Interval for the given model, do contain '1'. Hence, it implies the statistical tests for which normality approximations are needed can be used over this data. Thus, the presence of $=1$ within the 95% confidence interval in the given plot implies that a transformation of the data is not needed so that the statistical tests conforming to normality approximation can be useful for the inference of the data.

Model 2 - Remove non-significant predictors

For this model, we removed all the non significant predictor variables.

```
#Fit a first order model with Agression variable removed
fit2 = lm (Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
Volleys + Dribbling + Curve + FKAccuracy + LongPassing + BallControl + Accele
ration + SprintSpeed + Agility + Reactions + Balance + ShotPower + Jumping +
Stamina + Strength + LongShots + Interceptions + Positioning + Vision + Penal
ties + Composure + Marking + StandingTackle + SlidingTackle , data=latestfifa
19)
summary (fit2)

##
## Call:
## lm(formula = Overall ~ Crossing + Finishing + HeadingAccuracy +
```

```

##      ShortPassing + Volleys + Dribbling + Curve + FKAaccuracy +
##      LongPassing + BallControl + Acceleration + SprintSpeed +
##      Agility + Reactions + Balance + ShotPower + Jumping + Stamina +
##      Strength + LongShots + Interceptions + Positioning + Vision +
##      Penalties + Composure + Marking + StandingTackle + SlidingTackle,
##      data = latestfifa19)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.6475 -1.4083 -0.0616  1.3204  7.0891
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  11.300986   2.091465   5.403 1.44e-07 ***
## Crossing      0.037799   0.018418   2.052 0.041111 *
## Finishing     0.027707   0.024124   1.149 0.251764
## HeadingAccuracy 0.084362   0.023328   3.616 0.000357 ***
## ShortPassing  0.161992   0.041241   3.928 0.000109 ***
## Volleys      -0.012960   0.018856  -0.687 0.492478
## Dribbling     -0.025938   0.033300  -0.779 0.436714
## Curve        -0.010546   0.017618  -0.599 0.549977
## FKAaccuracy   0.003044   0.017107   0.178 0.858908
## LongPassing  -0.032957   0.024791  -1.329 0.184841
## BallControl   0.185675   0.042369   4.382 1.69e-05 ***
## Acceleration  0.029338   0.032538   0.902 0.368052
## SprintSpeed   0.023502   0.030446   0.772 0.440845
## Agility       0.020974   0.021822   0.961 0.337352
## Reactions     0.294836   0.030700   9.604 < 2e-16 ***
## Balance      -0.027920   0.018537  -1.506 0.133187
## ShotPower     0.049346   0.021845   2.259 0.024692 *
## Jumping       0.002518   0.014932   0.169 0.866231
## Stamina       0.009391   0.017360   0.541 0.588984
## Strength      0.008301   0.018158   0.457 0.647955
## LongShots    -0.036962   0.022625  -1.634 0.103492
## Interceptions 0.026891   0.020264   1.327 0.185633
## Positioning  -0.045401   0.022265  -2.039 0.042421 *
## Vision       -0.085402   0.024052  -3.551 0.000454 ***
## Penalties     0.036666   0.020667   1.774 0.077173 .
## Composure     0.134037   0.025478   5.261 2.94e-07 ***
## Marking       0.048573   0.016347   2.971 0.003235 **
## StandingTackle 0.051022   0.032210   1.584 0.114363
## SlidingTackle -0.071406   0.030725  -2.324 0.020869 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.288 on 268 degrees of freedom
## Multiple R-squared:  0.8932, Adjusted R-squared:  0.8821
## F-statistic: 80.07 on 28 and 268 DF, p-value: < 2.2e-16

```

#Fit a first order model with Jumping variable removed

```
fit3 = lm(Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing + Volleys + Dribbling + Curve + FKAaccuracy + LongPassing + BallControl + Acceleration + SprintSpeed + Agility + Reactions + Balance + ShotPower + Stamina + Strength + LongShots + Interceptions + Positioning + Vision + Penalties + Composure + Marking + StandingTackle + SlidingTackle , data=latestfifa19)
```

```
summary (fit3)
```

```
##
```

```
## Call:
```

```
## lm(formula = Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing + Volleys + Dribbling + Curve + FKAaccuracy + LongPassing + BallControl + Acceleration + SprintSpeed + Agility + Reactions + Balance + ShotPower + Stamina + Strength + LongShots + Interceptions + Positioning + Vision + Penalties + Composure + Marking + StandingTackle + SlidingTackle, data = latestfifa19)
```

```
##
```

```
## Residuals:
```

```
##      Min       1Q   Median       3Q      Max  
## -6.656 -1.420 -0.050  1.332  7.108
```

```
##
```

```
## Coefficients:
```

	Estimate	Std. Error	t value	Pr(> t)	
## (Intercept)	11.302346	2.087670	5.414	1.37e-07	***
## Crossing	0.037949	0.018363	2.067	0.039723	*
## Finishing	0.027294	0.023956	1.139	0.255561	
## HeadingAccuracy	0.085853	0.021549	3.984	8.73e-05	***
## ShortPassing	0.162220	0.041145	3.943	0.000103	***
## Volleys	-0.013074	0.018809	-0.695	0.487612	
## Dribbling	-0.026370	0.033141	-0.796	0.426914	
## Curve	-0.010576	0.017586	-0.601	0.548087	
## FKAaccuracy	0.002857	0.017040	0.168	0.866963	
## LongPassing	-0.032906	0.024744	-1.330	0.184701	
## BallControl	0.185328	0.042242	4.387	1.65e-05	***
## Acceleration	0.029566	0.032451	0.911	0.363048	
## SprintSpeed	0.023485	0.030391	0.773	0.440339	
## Agility	0.021641	0.021422	1.010	0.313307	
## Reactions	0.295214	0.030563	9.659	< 2e-16	***
## Balance	-0.027257	0.018082	-1.507	0.132874	
## ShotPower	0.049400	0.021803	2.266	0.024260	*
## Stamina	0.009524	0.017311	0.550	0.582643	
## Strength	0.008653	0.018005	0.481	0.631220	
## LongShots	-0.036985	0.022583	-1.638	0.102652	
## Interceptions	0.026898	0.020227	1.330	0.184718	
## Positioning	-0.045367	0.022224	-2.041	0.042192	*
## Vision	-0.085369	0.024008	-3.556	0.000445	***
## Penalties	0.036761	0.020622	1.783	0.075773	.
## Composure	0.133688	0.025348	5.274	2.74e-07	***
## Marking	0.048653	0.016311	2.983	0.003118	**

```
## StandingTackle    0.050854    0.032136    1.582 0.114723
## SlidingTackle     -0.071482    0.030666   -2.331 0.020493 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.284 on 269 degrees of freedom
## Multiple R-squared:  0.8932, Adjusted R-squared:  0.8825
## F-statistic: 83.33 on 27 and 269 DF,  p-value: < 2.2e-16

#Fit a first order model with FKAccuracy variable removed
fit4 = lm (Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
Volleys + Dribbling + Curve + LongPassing + BallControl + Acceleration + SprintSpeed + Agility + Reactions + Balance + ShotPower + Stamina + Strength + LongShots + Interceptions + Positioning + Vision + Penalties + Composure + Marking + StandingTackle + SlidingTackle , data=latestfifa19)
summary (fit4)

##
## Call:
## lm(formula = Overall ~ Crossing + Finishing + HeadingAccuracy +
##     ShortPassing + Volleys + Dribbling + Curve + LongPassing +
##     BallControl + Acceleration + SprintSpeed + Agility + Reactions +
##     Balance + ShotPower + Stamina + Strength + LongShots + Interceptions +
##     Positioning + Vision + Penalties + Composure + Marking +
##     StandingTackle + SlidingTackle, data = latestfifa19)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.6436 -1.4019 -0.0469  1.3122  7.1384
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   11.291817   2.082966   5.421 1.31e-07 ***
## Crossing         0.038131   0.018298   2.084 0.038103 *
## Finishing       0.026966   0.023833   1.131 0.258853
## HeadingAccuracy  0.085512   0.021414   3.993 8.41e-05 ***
## ShortPassing    0.162053   0.041058   3.947 0.000101 ***
## Volleys        -0.012418   0.018365  -0.676 0.499508
## Dribbling       -0.026917   0.032920  -0.818 0.414280
## Curve          -0.009558   0.016475  -0.580 0.562298
## LongPassing     -0.032493   0.024577  -1.322 0.187261
## BallControl      0.185507   0.042153   4.401 1.55e-05 ***
## Acceleration     0.029706   0.032381   0.917 0.359765
## SprintSpeed      0.023182   0.030282   0.766 0.444632
## Agility          0.021902   0.021327   1.027 0.305376
## Reactions        0.295239   0.030507   9.678 < 2e-16 ***
## Balance         -0.027354   0.018040  -1.516 0.130615
## ShotPower        0.049503   0.021755   2.276 0.023659 *
## Stamina          0.009291   0.017224   0.539 0.590046
## Strength         0.008581   0.017968   0.478 0.633330
```

```
## LongShots      -0.036770    0.022506   -1.634 0.103475
## Interceptions   0.026995    0.020183    1.338 0.182184
## Positioning     -0.045633    0.022127   -2.062 0.040131 *
## Vision          -0.084517    0.023422   -3.609 0.000367 ***
## Penalties       0.037705    0.019803    1.904 0.057981 .
## Composure       0.133682    0.025302    5.283 2.61e-07 ***
## Marking         0.048621    0.016280    2.987 0.003081 **
## StandingTackle  0.050932    0.032075    1.588 0.113484
## SlidingTackle   -0.071298    0.030591   -2.331 0.020507 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.28 on 270 degrees of freedom
## Multiple R-squared:  0.8932, Adjusted R-squared:  0.8829
## F-statistic: 86.85 on 26 and 270 DF,  p-value: < 2.2e-16
```

#Fit a first order model with Strength variable removed

```
fit5 = lm(Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
Volleys + Dribbling + Curve + LongPassing + BallControl + Acceleration + Sprin
tSpeed + Agility + Reactions + Balance + ShotPower + Stamina + LongShots + I
nterceptions + Positioning + Vision + Penalties + Composure + Marking + Stand
ingTackle + SlidingTackle , data=latestfifa19)
summary(fit5)
```

```
##
## Call:
## lm(formula = Overall ~ Crossing + Finishing + HeadingAccuracy +
##      ShortPassing + Volleys + Dribbling + Curve + LongPassing +
##      BallControl + Acceleration + SprintSpeed + Agility + Reactions +
##      Balance + ShotPower + Stamina + LongShots + Interceptions +
##      Positioning + Vision + Penalties + Composure + Marking +
##      StandingTackle + SlidingTackle, data = latestfifa19)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.5935 -1.3702 -0.0187  1.3676  7.1348
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   11.72161    1.87586   6.249 1.60e-09 ***
## Crossing       0.03825    0.01827   2.094 0.037230 *
## Finishing      0.02628    0.02376   1.106 0.269600
## HeadingAccuracy 0.08944    0.01974   4.530 8.86e-06 ***
## ShortPassing   0.16193    0.04100   3.950 9.99e-05 ***
## Volleys       -0.01258    0.01834  -0.686 0.493150
## Dribbling      -0.02575    0.03278  -0.786 0.432801
## Curve         -0.01009    0.01641  -0.615 0.539066
## LongPassing    -0.03205    0.02452  -1.307 0.192383
## BallControl     0.18351    0.04188   4.381 1.69e-05 ***
## Acceleration   0.02811    0.03216   0.874 0.382912
```

```
## SprintSpeed      0.02386      0.03021      0.790 0.430247
## Agility          0.02148      0.02128      1.009 0.313654
## Reactions        0.29502      0.03046      9.685 < 2e-16 ***
## Balance         -0.02987      0.01723     -1.734 0.084095 .
## ShotPower        0.05046      0.02163      2.333 0.020399 *
## Stamina          0.01113      0.01676      0.664 0.507120
## LongShots       -0.03603      0.02242     -1.607 0.109239
## Interceptions    0.02715      0.02015      1.347 0.178994
## Positioning     -0.04449      0.02197     -2.025 0.043801 *
## Vision          -0.08600      0.02318     -3.710 0.000252 ***
## Penalties        0.03777      0.01977      1.910 0.057193 .
## Composure        0.13462      0.02519      5.344 1.93e-07 ***
## Marking          0.04862      0.01626      2.991 0.003039 **
## StandingTackle   0.05232      0.03190      1.640 0.102077
## SlidingTackle   -0.07235      0.03047     -2.375 0.018267 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.277 on 271 degrees of freedom
## Multiple R-squared:  0.8931, Adjusted R-squared:  0.8832
## F-statistic: 90.57 on 25 and 271 DF, p-value: < 2.2e-16
```

#Fit a first order model with Curve variable removed

```
fit6 = lm(Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
Volleys + Dribbling + LongPassing + BallControl + Acceleration + SprintSpeed
+ Agility + Reactions + Balance + ShotPower + Stamina + LongShots + Intercept
ions + Positioning + Vision + Penalties + Composure + Marking + StandingTackl
e + SlidingTackle , data=latestfifa19)
summary(fit6)
```

```
##
## Call:
## lm(formula = Overall ~ Crossing + Finishing + HeadingAccuracy +
##     ShortPassing + Volleys + Dribbling + LongPassing + BallControl +
##     Acceleration + SprintSpeed + Agility + Reactions + Balance +
##     ShotPower + Stamina + LongShots + Interceptions + Positioning +
##     Vision + Penalties + Composure + Marking + StandingTackle +
##     SlidingTackle, data = latestfifa19)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.5558 -1.3665 -0.0344  1.3532  6.8837
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   11.80732    1.86853   6.319 1.07e-09 ***
## Crossing        0.03376    0.01673   2.018 0.044567 *
## Finishing       0.02734    0.02367   1.155 0.249013
## HeadingAccuracy  0.09027    0.01968   4.588 6.84e-06 ***
## ShortPassing    0.16270    0.04093   3.975 9.03e-05 ***
```

```
## Volleys          -0.01450    0.01805   -0.803  0.422438
## Dribbling        -0.02646    0.03273   -0.809  0.419470
## LongPassing      -0.03237    0.02449   -1.322  0.187346
## BallControl       0.18414    0.04182    4.403  1.54e-05 ***
## Acceleration      0.03003    0.03197    0.939  0.348411
## SprintSpeed       0.02309    0.03015    0.766  0.444342
## Agility           0.01985    0.02109    0.941  0.347496
## Reactions         0.29579    0.03040    9.730  < 2e-16 ***
## Balance          -0.03005    0.01721   -1.746  0.081906 .
## ShotPower         0.04980    0.02158    2.308  0.021762 *
## Stamina           0.01046    0.01671    0.626  0.531869
## LongShots        -0.03649    0.02238   -1.630  0.104220
## Interceptions     0.02705    0.02013    1.344  0.180061
## Positioning      -0.04499    0.02193   -2.052  0.041119 *
## Vision            -0.08737    0.02305   -3.791  0.000185 ***
## Penalties         0.03522    0.01931    1.824  0.069318 .
## Composure         0.13406    0.02514    5.332  2.05e-07 ***
## Marking           0.04892    0.01623    3.014  0.002819 **
## StandingTackle    0.05197    0.03186    1.632  0.103932
## SlidingTackle     -0.07259    0.03043   -2.385  0.017752 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.274 on 272 degrees of freedom
## Multiple R-squared:  0.893, Adjusted R-squared:  0.8835
## F-statistic: 94.55 on 24 and 272 DF, p-value: < 2.2e-16
```

#Fit a first order model with Stamina variable removed

```
fit7 = lm(Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
Volleys + Dribbling + LongPassing + BallControl + Acceleration + SprintSpeed
+ Agility + Reactions + Balance + ShotPower + LongShots + Interceptions + Pos
itioning + Vision + Penalties + Composure + Marking + StandingTackle + Slidin
gTackle , data=latestfifa19)
summary(fit7)
```

```
##
## Call:
## lm(formula = Overall ~ Crossing + Finishing + HeadingAccuracy +
##     ShortPassing + Volleys + Dribbling + LongPassing + BallControl +
##     Acceleration + SprintSpeed + Agility + Reactions + Balance +
##     ShotPower + LongShots + Interceptions + Positioning + Vision +
##     Penalties + Composure + Marking + StandingTackle + SlidingTackle,
##     data = latestfifa19)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.5853 -1.4173 -0.0167  1.3482  6.9459
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
```



```

## (Intercept)      11.96637      1.84912      6.471 4.48e-10 ***
## Crossing          0.03339      0.01670      1.999 0.046564 *
## Finishing         0.02712      0.02364      1.147 0.252301
## HeadingAccuracy   0.09104      0.01961      4.641 5.38e-06 ***
## ShortPassing      0.16121      0.04082      3.949 9.98e-05 ***
## Volleys          -0.01535      0.01798     -0.854 0.394091
## Dribbling         -0.03021      0.03214     -0.940 0.347989
## LongPassing       -0.03162      0.02443     -1.294 0.196778
## BallControl       0.18504      0.04175      4.432 1.35e-05 ***
## Acceleration      0.03135      0.03187      0.984 0.326084
## SprintSpeed       0.02491      0.02997      0.831 0.406654
## Agility           0.02107      0.02097      1.005 0.315978
## Reactions         0.29756      0.03023      9.842 < 2e-16 ***
## Balance          -0.02999      0.01719     -1.745 0.082157 .
## ShotPower         0.05109      0.02146      2.381 0.017964 *
## LongShots         -0.03565      0.02232     -1.598 0.111298
## Interceptions     0.02827      0.02001      1.413 0.158860
## Positioning       -0.04227      0.02146     -1.969 0.049947 *
## Vision            -0.08653      0.02298     -3.765 0.000204 ***
## Penalties         0.03419      0.01922      1.779 0.076382 .
## Composure         0.13404      0.02512      5.337 1.99e-07 ***
## Marking           0.05054      0.01601      3.157 0.001770 **
## StandingTackle    0.05219      0.03182      1.640 0.102080
## SlidingTackle     -0.07318      0.03038     -2.409 0.016672 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.272 on 273 degrees of freedom
## Multiple R-squared:  0.8928, Adjusted R-squared:  0.8838
## F-statistic: 98.86 on 23 and 273 DF,  p-value: < 2.2e-16

#Fit a first order model with SprintSpeed variable removed
fit8 = lm(Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
Volleys + Dribbling + LongPassing + BallControl + Acceleration + Agility + Re
actions + Balance + ShotPower + LongShots + Interceptions + Positioning + Vis
ion + Penalties + Composure + Marking + StandingTackle + SlidingTackle , data
=latestfifa19)
summary(fit8)

##
## Call:
## lm(formula = Overall ~ Crossing + Finishing + HeadingAccuracy +
##     ShortPassing + Volleys + Dribbling + LongPassing + BallControl +
##     Acceleration + Agility + Reactions + Balance + ShotPower +
##     LongShots + Interceptions + Positioning + Vision + Penalties +
##     Composure + Marking + StandingTackle + SlidingTackle, data = latestfif
a19)
##
## Residuals:
##      Min       1Q   Median       3Q      Max

```

```
## -6.4872 -1.4550 -0.0055 1.3298 7.0098
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  12.15262    1.83445   6.625 1.84e-10 ***
## Crossing      0.03418    0.01666   2.051 0.041195 *
## Finishing     0.02928    0.02348   1.247 0.213511
## HeadingAccuracy 0.09213    0.01956   4.710 3.95e-06 ***
## ShortPassing  0.16244    0.04077   3.985 8.67e-05 ***
## Volleys      -0.01660    0.01790  -0.927 0.354611
## Dribbling     -0.03047    0.03212  -0.949 0.343664
## LongPassing   -0.03353    0.02431  -1.379 0.168900
## BallControl    0.18436    0.04172   4.419 1.43e-05 ***
## Acceleration   0.05201    0.01993   2.610 0.009543 **
## Agility        0.02285    0.02085   1.096 0.274195
## Reactions      0.29651    0.03019   9.822 < 2e-16 ***
## Balance       -0.03220    0.01697  -1.898 0.058781 .
## ShotPower      0.05395    0.02117   2.548 0.011373 *
## LongShots     -0.03723    0.02222  -1.675 0.095033 .
## Interceptions  0.02758    0.01998   1.380 0.168636
## Positioning   -0.04195    0.02145  -1.956 0.051490 .
## Vision        -0.08579    0.02295  -3.738 0.000226 ***
## Penalties     0.03269    0.01913   1.709 0.088516 .
## Composure     0.13486    0.02508   5.377 1.63e-07 ***
## Marking       0.05103    0.01599   3.192 0.001578 **
## StandingTackle 0.05298    0.03179   1.667 0.096713 .
## SlidingTackle -0.07344    0.03036  -2.419 0.016222 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.27 on 274 degrees of freedom
## Multiple R-squared:  0.8925, Adjusted R-squared:  0.8839
## F-statistic: 103.4 on 22 and 274 DF, p-value: < 2.2e-16

#Fit a first order model with Volleys variable removed
fit9 = lm(Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
Dribbling + LongPassing + BallControl + Acceleration + Agility + Reactions +
Balance + ShotPower + LongShots + Interceptions + Positioning + Vision + Penalties + Composure + Marking + StandingTackle + SlidingTackle , data=latestfifa19)
summary(fit9)

##
## Call:
## lm(formula = Overall ~ Crossing + Finishing + HeadingAccuracy +
##     ShortPassing + Dribbling + LongPassing + BallControl + Acceleration +
##     Agility + Reactions + Balance + ShotPower + LongShots + Interceptions
## +
##     Positioning + Vision + Penalties + Composure + Marking +
##     StandingTackle + SlidingTackle, data = latestfifa19)
```

```
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.5424 -1.4120 -0.0076  1.3182  6.9869
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  12.24688    1.83116   6.688 1.26e-10 ***
## Crossing      0.03233    0.01654   1.955 0.051623 .
## Finishing     0.02673    0.02331   1.147 0.252555
## HeadingAccuracy 0.08985    0.01940   4.631 5.61e-06 ***
## ShortPassing  0.16152    0.04075   3.964 9.40e-05 ***
## Dribbling    -0.03173    0.03208  -0.989 0.323475
## LongPassing  -0.03433    0.02429  -1.413 0.158670
## BallControl   0.18820    0.04150   4.534 8.63e-06 ***
## Acceleration  0.05206    0.01992   2.613 0.009464 **
## Agility       0.02284    0.02085   1.096 0.274210
## Reactions     0.29658    0.03018   9.827 < 2e-16 ***
## Balance      -0.03253    0.01696  -1.918 0.056123 .
## ShotPower     0.05156    0.02101   2.454 0.014738 *
## LongShots    -0.04256    0.02146  -1.983 0.048342 *
## Interceptions 0.02890    0.01993   1.450 0.148078
## Positioning  -0.04194    0.02144  -1.956 0.051491 .
## Vision       -0.08582    0.02295  -3.740 0.000224 ***
## Penalties     0.02993    0.01889   1.585 0.114195
## Composure     0.13251    0.02495   5.312 2.25e-07 ***
## Marking       0.05089    0.01598   3.184 0.001618 **
## StandingTackle 0.05186    0.03175   1.633 0.103592
## SlidingTackle -0.07062    0.03020  -2.338 0.020088 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.27 on 275 degrees of freedom
## Multiple R-squared:  0.8922, Adjusted R-squared:  0.884
## F-statistic: 108.4 on 21 and 275 DF, p-value: < 2.2e-16

#Fit a first order model with Dribbling variable removed
fit10 = lm(Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
LongPassing + BallControl + Acceleration + Agility + Reactions + Balance + Sh
otPower + LongShots + Interceptions + Positioning + Vision + Penalties + Comp
osure + Marking + StandingTackle + SlidingTackle , data=latestfifa19)
summary(fit10)

##
## Call:
## lm(formula = Overall ~ Crossing + Finishing + HeadingAccuracy +
##      ShortPassing + LongPassing + BallControl + Acceleration +
##      Agility + Reactions + Balance + ShotPower + LongShots + Interceptions
##      +
##      Positioning + Vision + Penalties + Composure + Marking +
```

```

##      StandingTackle + SlidingTackle, data = latestfifa19)
##
## Residuals:
##      Min        1Q    Median        3Q        Max
## -6.5438 -1.4085 -0.0006   1.4364   7.0601
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   12.54952    1.80535   6.951 2.61e-11 ***
## Crossing       0.02963    0.01631   1.817 0.070368 .
## Finishing      0.02420    0.02317   1.044 0.297262
## HeadingAccuracy 0.09183    0.01930   4.759 3.15e-06 ***
## ShortPassing   0.15890    0.04066   3.908 0.000117 ***
## LongPassing   -0.03467    0.02429  -1.428 0.154530
## BallControl    0.16898    0.03667   4.608 6.22e-06 ***
## Acceleration   0.04615    0.01901   2.428 0.015801 *
## Agility        0.02296    0.02085   1.101 0.271650
## Reactions      0.29930    0.03005   9.959 < 2e-16 ***
## Balance       -0.03337    0.01694  -1.970 0.049841 *
## ShotPower      0.05242    0.02099   2.498 0.013081 *
## LongShots     -0.04187    0.02145  -1.952 0.051935 .
## Interceptions  0.02985    0.01990   1.500 0.134784
## Positioning   -0.04437    0.02130  -2.083 0.038194 *
## Vision        -0.08779    0.02286  -3.840 0.000153 ***
## Penalties     0.02726    0.01869   1.458 0.145893
## Composure     0.13029    0.02485   5.244 3.13e-07 ***
## Marking       0.05172    0.01596   3.241 0.001339 **
## StandingTackle 0.05230    0.03175   1.647 0.100641
## SlidingTackle -0.07221    0.03016  -2.394 0.017322 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.27 on 276 degrees of freedom
## Multiple R-squared:  0.8918, Adjusted R-squared:  0.884
## F-statistic: 113.8 on 20 and 276 DF, p-value: < 2.2e-16

#Fit a first order model with Finishing variable removed
fit11 = lm(Overall ~ Crossing + HeadingAccuracy + ShortPassing + LongPassing
+ BallControl + Acceleration + Agility + Reactions + Balance + ShotPower + Lo
ngShots + Interceptions + Positioning + Vision + Penalties + Composure + Mark
ing + StandingTackle + SlidingTackle , data=latestfifa19)
summary (fit11)

##
## Call:
## lm(formula = Overall ~ Crossing + HeadingAccuracy + ShortPassing +
##      LongPassing + BallControl + Acceleration + Agility + Reactions +
##      Balance + ShotPower + LongShots + Interceptions + Positioning +
##      Vision + Penalties + Composure + Marking + StandingTackle +
##      SlidingTackle, data = latestfifa19)

```

```
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.540 -1.453  0.023  1.345  7.009
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  12.55821    1.80562   6.955 2.54e-11 ***
## Crossing      0.02801    0.01624   1.725 0.085664 .
## HeadingAccuracy 0.09346    0.01924   4.858 1.99e-06 ***
## ShortPassing  0.15737    0.04064   3.872 0.000135 ***
## LongPassing  -0.03340    0.02426  -1.377 0.169647
## BallControl   0.17451    0.03629   4.808 2.50e-06 ***
## Acceleration  0.04802    0.01892   2.537 0.011717 *
## Agility       0.02166    0.02081   1.041 0.299003
## Reactions     0.29961    0.03006   9.968 < 2e-16 ***
## Balance      -0.03363    0.01694  -1.985 0.048141 *
## ShotPower     0.05607    0.02070   2.709 0.007168 **
## LongShots    -0.03392    0.02005  -1.691 0.091924 .
## Interceptions 0.02902    0.01989   1.459 0.145701
## Positioning  -0.03640    0.01989  -1.830 0.068351 .
## Vision       -0.08709    0.02285  -3.811 0.000171 ***
## Penalties     0.03040    0.01845   1.647 0.100619
## Composure     0.12720    0.02467   5.156 4.82e-07 ***
## Marking       0.05109    0.01595   3.203 0.001519 **
## StandingTackle 0.05084    0.03172   1.603 0.110156
## SlidingTackle -0.07417    0.03011  -2.463 0.014368 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.27 on 277 degrees of freedom
## Multiple R-squared:  0.8914, Adjusted R-squared:  0.8839
## F-statistic: 119.6 on 19 and 277 DF, p-value: < 2.2e-16

#Fit a first order model with Agility variable removed
fit12 = lm(Overall ~ Crossing + HeadingAccuracy + ShortPassing + LongPassing
+ BallControl + Acceleration + Reactions + Balance + ShotPower + LongShots +
Interceptions + Positioning + Vision + Penalties + Composure + Marking + Stan
dingTackle + SlidingTackle , data=latestfifa19)
summary(fit12)

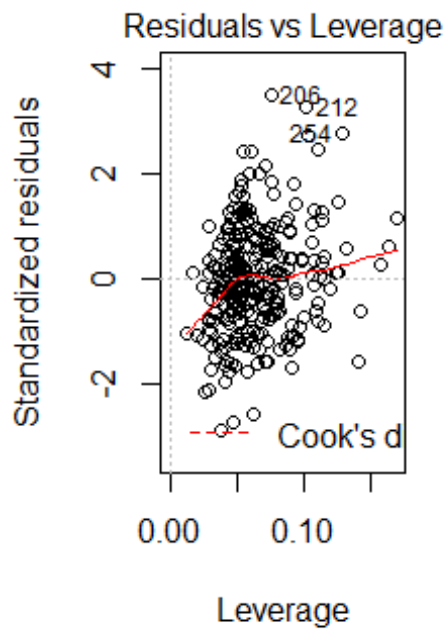
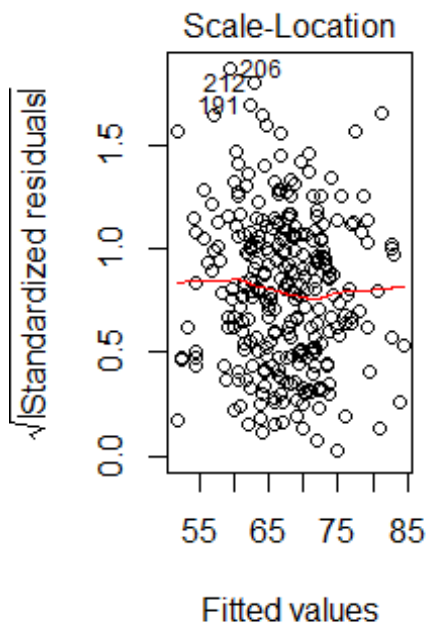
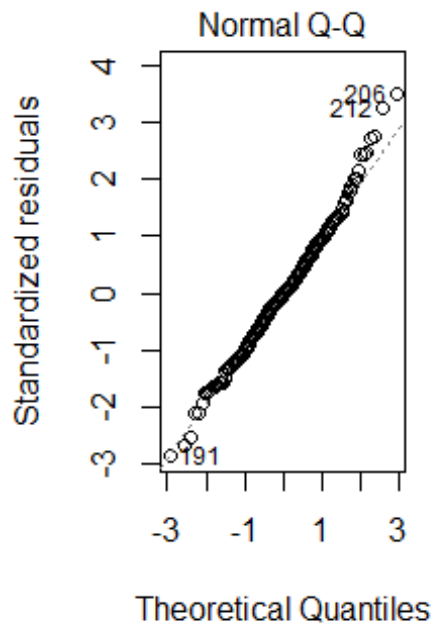
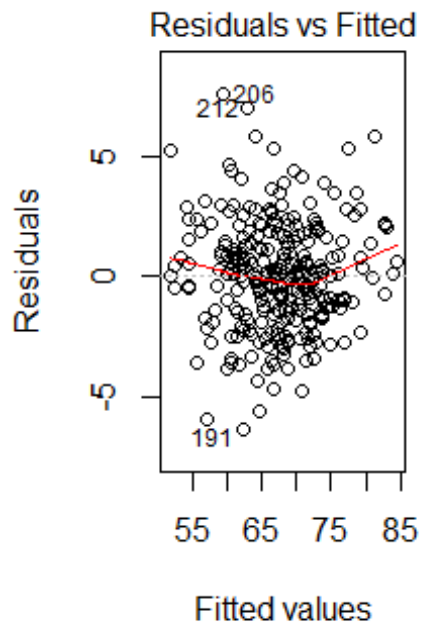
##
## Call:
## lm(formula = Overall ~ Crossing + HeadingAccuracy + ShortPassing +
##      LongPassing + BallControl + Acceleration + Reactions + Balance +
##      ShotPower + LongShots + Interceptions + Positioning + Vision +
##      Penalties + Composure + Marking + StandingTackle + SlidingTackle,
##      data = latestfifa19)
##
## Residuals:
```

```
##      Min      1Q  Median      3Q      Max
## -6.3501 -1.4550 -0.0119  1.3973  7.6074
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    12.71956     1.79922   7.069 1.26e-11 ***
## Crossing         0.02950     0.01618   1.823 0.069316 .
## HeadingAccuracy  0.09067     0.01905   4.759 3.13e-06 ***
## ShortPassing     0.15023     0.04006   3.750 0.000215 ***
## LongPassing     -0.02973     0.02400  -1.238 0.216595
## BallControl      0.18163     0.03565   5.095 6.45e-07 ***
## Acceleration     0.05865     0.01593   3.681 0.000279 ***
## Reactions        0.30289     0.02990  10.131 < 2e-16 ***
## Balance         -0.02790     0.01603  -1.741 0.082762 .
## ShotPower        0.05698     0.02068   2.755 0.006259 **
## LongShots       -0.03359     0.02005  -1.675 0.095058 .
## Interceptions    0.03085     0.01982   1.557 0.120690
## Positioning     -0.03779     0.01985  -1.904 0.057948 .
## Vision          -0.08710     0.02286  -3.810 0.000171 ***
## Penalties        0.02990     0.01845   1.621 0.106184
## Composure        0.12647     0.02467   5.127 5.52e-07 ***
## Marking          0.05060     0.01595   3.173 0.001676 **
## StandingTackle   0.04805     0.03162   1.520 0.129685
## SlidingTackle   -0.07435     0.03011  -2.469 0.014145 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.27 on 278 degrees of freedom
## Multiple R-squared:  0.891, Adjusted R-squared:  0.8839
## F-statistic: 126.2 on 18 and 278 DF, p-value: < 2.2e-16
```

After using the manual backward elimination method, most of our predictors were significant at $p < 0.05$. Although, some of the predictors did have a p-value greater than 0.05. Since, the Adjusted R^2 value started decreasing after removing the Agility variable, the predictor variables left were the ones to be used in the model. Those predictor variables were LongPassing, Interceptions, Penalties, LongShots, Crossing, Positioning, Balance, StandingTackle, SlidingTackle, ShotPower, HeadingAccuracy, ShortPassing, BallControl, Acceleration, Reactions, Vision, Composure, Marking. A residual analysis would be appropriate for the model before interpreting the parameters.

Model 3 Residual Analysis

```
par (mfrow=c(1,2))
plot(fit12)
```



Interpretations for these graphs

The residuals vs fitted residuals:

The horizontal bend is around the 0 line. This suggests that the variances of the error terms are equal.

Normal Q-Q plot:

The normal Q-Q plot is lightly tailed or it follows a straight line. This suggests that the data is approximately normal. Therefore the residuals are normal.

Scale-location graph:

Residuals are spread equally along the ranges of predictors. This is how you can check the assumption of equal variance (homoscedasticity). It's good if horizontal line with equally spread points, here residuals appear randomly spread.

Residuals vs Leverage:

This plot helps us to find influential cases, if any. Not all outliers are influential in linear regression analysis. In this case, there is no influential case or cases. You can barely see Cook's distance lines because all cases are well inside of the Cook's distance lines.

Earlier it was noted that ShotPower was left-skewed, it is important that a quadratic transformation be done and then refit the model.

```
#Refit the model with a quadratic of ShotPower
latestfifa19$ShotPower.c = latestfifa19$ShotPower - mean (latestfifa19$ShotPower)
latestfifa19$ShotPowersq = latestfifa19$ShotPower.c^2
fit13 = lm (Overall ~ Crossing + HeadingAccuracy + ShortPassing + LongPassing +
+ BallControl + Acceleration + Reactions + Balance + ShotPowersq + LongShots +
+ Interceptions + Positioning + Vision + Penalties + Composure + Marking + StandingTackle + SlidingTackle , data=latestfifa19)
summary (fit13)

##
## Call:
## lm(formula = Overall ~ Crossing + HeadingAccuracy + ShortPassing +
##     LongPassing + BallControl + Acceleration + Reactions + Balance +
##     ShotPowersq + LongShots + Interceptions + Positioning + Vision +
##     Penalties + Composure + Marking + StandingTackle + SlidingTackle,
##     data = latestfifa19)
##
```

```
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.1988 -1.4600 -0.0484  1.3718  7.9846
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  12.9860791  1.8213984   7.130 8.70e-12 ***
## Crossing      0.0222296  0.0162757   1.366 0.173101
## HeadingAccuracy 0.0881069  0.0193057   4.564 7.55e-06 ***
## ShortPassing  0.1681172  0.0400924   4.193 3.70e-05 ***
## LongPassing  -0.0341934  0.0242516  -1.410 0.159675
## BallControl   0.1809475  0.0361200   5.010 9.71e-07 ***
## Acceleration  0.0610918  0.0161820   3.775 0.000195 ***
## Reactions     0.3087819  0.0302315  10.214 < 2e-16 ***
## Balance      -0.0339042  0.0162786  -2.083 0.038189 *
## ShotPowersq   0.0004524  0.0005955   0.760 0.448040
## LongShots     -0.0041727  0.0181147  -0.230 0.817989
## Interceptions 0.0268912  0.0200652   1.340 0.181277
## Positioning  -0.0323092  0.0199883  -1.616 0.107141
## Vision        -0.0853956  0.0233169  -3.662 0.000299 ***
## Penalties     0.0350568  0.0185976   1.885 0.060471 .
## Composure     0.1349643  0.0248015   5.442 1.16e-07 ***
## Marking       0.0519695  0.0161622   3.216 0.001456 **
## StandingTackle 0.0435366  0.0322478   1.350 0.178093
## SlidingTackle -0.0679598  0.0308424  -2.203 0.028383 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.299 on 278 degrees of freedom
## Multiple R-squared:  0.8882, Adjusted R-squared:  0.881
## F-statistic: 122.7 on 18 and 278 DF,  p-value: < 2.2e-16
```

The quadratic transformation of ShotPower made Crossing, ShotPower, LongShort, Positioning less significant in the model. However, it did make the Penalties and Balance variables significant. So the best model was the original fit12 without the quadratic transformation of any predictor variable which is presented below. The new model will now be called fit14.

```
#Final model
fit14 = lm(Overall ~ Crossing + HeadingAccuracy + ShortPassing + LongPassing
+ BallControl + Acceleration + Reactions + Balance + ShotPower + LongShots +
Interceptions + Positioning + Vision + Penalties + Composure + Marking + Stan
dingTackle + SlidingTackle , data=latestfifa19)
summary(fit14)

##
## Call:
## lm(formula = Overall ~ Crossing + HeadingAccuracy + ShortPassing +
##      LongPassing + BallControl + Acceleration + Reactions + Balance +
##      ShotPower + LongShots + Interceptions + Positioning + Vision +
```

```
##      Penalties + Composure + Marking + StandingTackle + SlidingTackle,
##      data = latestfifa19)
##
## Residuals:
##      Min        1Q    Median        3Q        Max
## -6.3501 -1.4550 -0.0119  1.3973  7.6074
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  12.71956    1.79922   7.069 1.26e-11 ***
## Crossing      0.02950    0.01618   1.823 0.069316 .
## HeadingAccuracy 0.09067    0.01905   4.759 3.13e-06 ***
## ShortPassing  0.15023    0.04006   3.750 0.000215 ***
## LongPassing  -0.02973    0.02400  -1.238 0.216595
## BallControl   0.18163    0.03565   5.095 6.45e-07 ***
## Acceleration  0.05865    0.01593   3.681 0.000279 ***
## Reactions     0.30289    0.02990  10.131 < 2e-16 ***
## Balance      -0.02790    0.01603  -1.741 0.082762 .
## ShotPower     0.05698    0.02068   2.755 0.006259 **
## LongShots     -0.03359    0.02005  -1.675 0.095058 .
## Interceptions 0.03085    0.01982   1.557 0.120690
## Positioning  -0.03779    0.01985  -1.904 0.057948 .
## Vision        -0.08710    0.02286  -3.810 0.000171 ***
## Penalties     0.02990    0.01845   1.621 0.106184
## Composure     0.12647    0.02467   5.127 5.52e-07 ***
## Marking       0.05060    0.01595   3.173 0.001676 **
## StandingTackle 0.04805    0.03162   1.520 0.129685
## SlidingTackle -0.07435    0.03011  -2.469 0.014145 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.27 on 278 degrees of freedom
## Multiple R-squared:  0.891, Adjusted R-squared:  0.8839
## F-statistic: 126.2 on 18 and 278 DF, p-value: < 2.2e-16
```

```
confint(fit14)
```

```
##              2.5 %      97.5 %
## (Intercept)  9.177730380 16.261382957
## Crossing     -0.002348058 0.061348614
## HeadingAccuracy 0.053166267 0.128181452
## ShortPassing  0.071366680 0.229090396
## LongPassing  -0.076983337 0.017525681
## BallControl   0.111453292 0.251804866
## Acceleration  0.027282009 0.090012266
## Reactions     0.244031050 0.361740407
## Balance      -0.059448735 0.003643756
## ShotPower     0.016263541 0.097694456
## LongShots     -0.073070249 0.005886671
## Interceptions -0.008161388 0.069852126
```

## Positioning	-0.076867918	0.001281774
## Vision	-0.132094058	-0.042101976
## Penalties	-0.006414477	0.066221059
## Composure	0.077913011	0.175026192
## Marking	0.019213086	0.081995203
## StandingTackle	-0.014185604	0.110288694
## SlidingTackle	-0.133618172	-0.015073578

Intepretations of Confidence Intervals

Average Overall increases 0.0300 per crossing, or between -0.00234 and 0.0613 per crossing with 95% confidence, holding other predictors held constant.

Average Overall increases 0.0907 per Heading Accuracy, or between 0.0532 and 0.128 per HeadingAccuracy with 95% confidence, holding other predictors held constant.

Average Overall increases 0.150 per ShortPassing , or between 0.0714 and 0.229 per ShortPassing with 95% confidence, holding other predictors held constant.

Average Overall increases 0.182 per BallControl, or between 0.111 and 0.252 per BallControl with 95% confidence, holding other predictors held constant.

Average Overall increases 0.0587 per Acceleration, or between 0.0273 and 0.0900 per Acceleration with 95% confidence, holding other predictors held constant.

Average Overall increases 0.303 per Reactions, or between 0.244 and 0.362 per Reactions with 95% confidence, holding other predictors held constant.

Average Overall increases 0.0570 per ShotPower, or between 0.163 and 0.0977 per ShotPower with 95% confidence, holding other predictors held constant.

Average Overall decreases -0.0871 per Vision, or between -0.132 and -0.421 per Vision with 95% confidence, holding other predictors held constant.

Average Overall increases 0.126 per Composure, or between 0.0779 and 0.175 per Composure with 95% confidence, holding other predictors held constant.

Average Overall increases 0.0506 per Marking, or between 0.0192 and 0.0820 per Marking with 95% confidence, holding other predictors held constant.

Average Overall decreases -0.0744 per SlidingTackle, or between -0.134 and -0.0151 per SlidingTackle with 95% confidence, holding other predictors held constant.

Stepwise Regression

We then apply stepwise regression to the full model (fit1) with all predictors with the AIC criterion.

```
fit1a1c = step(fit1, direction="both")
```

```
## Start: AIC=521.21
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##     Volleys + Dribbling + Curve + FKAccuracy + LongPassing +
##     BallControl + Acceleration + SprintSpeed + Agility + Reactions +
##     Balance + ShotPower + Jumping + Stamina + Strength + LongShots +
##     Aggression + Interceptions + Positioning + Vision + Penalties +
##     Composure + Marking + StandingTackle + SlidingTackle
##
```

	Df	Sum of Sq	RSS	AIC
## - Aggression	1	0.00	1403.3	519.21
## - Jumping	1	0.15	1403.5	519.24
## - FKAccuracy	1	0.17	1403.5	519.24
## - Strength	1	1.06	1404.4	519.43
## - Stamina	1	1.52	1404.9	519.53
## - Curve	1	1.87	1405.2	519.60
## - Volleys	1	2.44	1405.8	519.72
## - SprintSpeed	1	3.12	1406.5	519.86
## - Dribbling	1	3.18	1406.5	519.88
## - Acceleration	1	4.25	1407.6	520.10
## - Agility	1	4.82	1408.2	520.22
## - Finishing	1	6.65	1410.0	520.61
## - Interceptions	1	9.04	1412.4	521.11
## - LongPassing	1	9.23	1412.6	521.15
## <none>			1403.3	521.21
## - Balance	1	11.70	1415.0	521.67
## - StandingTackle	1	13.07	1416.4	521.96
## - LongShots	1	13.96	1417.3	522.15
## - Penalties	1	16.47	1419.8	522.67
## - Positioning	1	21.18	1424.5	523.66
## - Crossing	1	22.06	1425.4	523.84
## - ShotPower	1	26.02	1429.4	524.66
## - SlidingTackle	1	28.28	1431.6	525.13
## - Marking	1	46.20	1449.5	528.83
## - Vision	1	65.55	1468.9	532.76
## - HeadingAccuracy	1	67.24	1470.6	533.11
## - ShortPassing	1	80.16	1483.5	535.70
## - BallControl	1	98.60	1501.9	539.37
## - Composure	1	144.81	1548.2	548.37
## - Reactions	1	480.94	1884.3	606.73

```
##
## Step: AIC=519.21
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##     Volleys + Dribbling + Curve + FKAccuracy + LongPassing +
##     BallControl + Acceleration + SprintSpeed + Agility + Reactions +
##     Balance + ShotPower + Jumping + Stamina + Strength + LongShots +
##     Interceptions + Positioning + Vision + Penalties + Composure +
##     Marking + StandingTackle + SlidingTackle
##
```

	Df	Sum of Sq	RSS	AIC
## - Jumping	1	0.15	1403.5	517.24

```

## - FKAccuracy      1      0.17 1403.5 517.24
## - Strength        1      1.09 1404.4 517.44
## - Stamina         1      1.53 1404.9 517.53
## - Curve           1      1.88 1405.2 517.60
## - Volleys         1      2.47 1405.8 517.73
## - SprintSpeed     1      3.12 1406.5 517.87
## - Dribbling       1      3.18 1406.5 517.88
## - Acceleration    1      4.26 1407.6 518.11
## - Agility         1      4.84 1408.2 518.23
## - Finishing       1      6.91 1410.2 518.66
## - Interceptions   1      9.22 1412.6 519.15
## - LongPassing     1      9.25 1412.6 519.16
## <none>            1403.3 519.21
## - Balance         1     11.88 1415.2 519.71
## - StandingTackle  1     13.14 1416.5 519.97
## - LongShots       1     13.98 1417.3 520.15
## - Penalties       1     16.48 1419.8 520.67
## + Aggression      1      0.00 1403.3 521.21
## - Positioning     1     21.77 1425.1 521.78
## - Crossing        1     22.06 1425.4 521.84
## - ShotPower       1     26.72 1430.1 522.81
## - SlidingTackle   1     28.28 1431.6 523.13
## - Marking         1     46.23 1449.6 526.83
## - Vision          1     66.02 1469.4 530.86
## - HeadingAccuracy 1     68.48 1471.8 531.36
## - ShortPassing    1     80.79 1484.1 533.83
## - BallControl     1    100.57 1503.9 537.76
## - Composure       1    144.93 1548.3 546.40
## - Reactions       1    482.97 1886.3 605.05
##
## Step:  AIC=517.24
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##           Volleys + Dribbling + Curve + FKAccuracy + LongPassing +
##           BallControl + Acceleration + SprintSpeed + Agility + Reactions +
##           Balance + ShotPower + Stamina + Strength + LongShots + Interceptions +
##           Positioning + Vision + Penalties + Composure + Marking +
##           StandingTackle + SlidingTackle
##
##           Df Sum of Sq    RSS    AIC
## - FKAccuracy      1      0.15 1403.6 515.27
## - Strength        1      1.20 1404.7 515.49
## - Stamina         1      1.58 1405.1 515.57
## - Curve           1      1.89 1405.4 515.64
## - Volleys         1      2.52 1406.0 515.77
## - SprintSpeed     1      3.12 1406.6 515.90
## - Dribbling       1      3.30 1406.8 515.94
## - Acceleration    1      4.33 1407.8 516.15
## - Agility         1      5.32 1408.8 516.36
## - Finishing       1      6.77 1410.3 516.67
## - Interceptions   1      9.23 1412.7 517.18

```

```

## - LongPassing      1      9.23 1412.7 517.18
## <none>              1403.5 517.24
## - Balance          1     11.86 1415.3 517.74
## - StandingTackle   1     13.07 1416.6 517.99
## - LongShots         1     13.99 1417.5 518.18
## - Penalties         1     16.58 1420.1 518.73
## + Jumping           1      0.15 1403.3 519.21
## + Aggression        1      0.00 1403.5 519.24
## - Positioning       1     21.74 1425.2 519.80
## - Crossing          1     22.28 1425.8 519.92
## - ShotPower         1     26.79 1430.3 520.85
## - SlidingTackle     1     28.35 1431.8 521.18
## - Marking           1     46.42 1449.9 524.90
## - Vision            1     65.97 1469.5 528.88
## - ShortPassing      1     81.10 1484.6 531.92
## - HeadingAccuracy   1     82.81 1486.3 532.26
## - BallControl       1    100.43 1503.9 535.76
## - Composure         1    145.13 1548.6 544.46
## - Reactions         1    486.80 1890.3 603.67
##
## Step:  AIC=515.27
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##           Volleys + Dribbling + Curve + LongPassing + BallControl +
##           Acceleration + SprintSpeed + Agility + Reactions + Balance +
##           ShotPower + Stamina + Strength + LongShots + Interceptions +
##           Positioning + Vision + Penalties + Composure + Marking +
##           StandingTackle + SlidingTackle
##
##           Df Sum of Sq    RSS    AIC
## - Strength      1      1.19 1404.8 513.52
## - Stamina        1      1.51 1405.2 513.59
## - Curve          1      1.75 1405.4 513.64
## - Volleys        1      2.38 1406.0 513.77
## - SprintSpeed    1      3.05 1406.7 513.91
## - Dribbling      1      3.48 1407.1 514.00
## - Acceleration   1      4.38 1408.0 514.19
## - Agility        1      5.48 1409.1 514.43
## - Finishing      1      6.66 1410.3 514.67
## - LongPassing    1      9.09 1412.7 515.19
## - Interceptions  1      9.30 1412.9 515.23
## <none>           1403.6 515.27
## - Balance        1     11.95 1415.6 515.79
## - StandingTackle 1     13.11 1416.8 516.03
## - LongShots      1     13.88 1417.5 516.19
## - Penalties      1     18.85 1422.5 517.23
## + FKAccuracy     1      0.15 1403.5 517.24
## + Jumping        1      0.13 1403.5 517.24
## + Aggression     1      0.00 1403.6 517.27
## - Positioning    1     22.11 1425.8 517.91
## - Crossing       1     22.58 1426.2 518.01

```



```

## - ShotPower      1      26.92 1430.6 518.91
## - SlidingTackle  1      28.24 1431.9 519.18
## - Marking        1      46.37 1450.0 522.92
## - Vision         1      67.69 1471.3 527.26
## - ShortPassing   1      80.98 1484.6 529.93
## - HeadingAccuracy 1      82.90 1486.5 530.31
## - BallControl    1     100.68 1504.3 533.84
## - Composure      1     145.12 1548.8 542.49
## - Reactions      1     486.90 1890.5 601.71
##
## Step:  AIC=513.52
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##      Volleys + Dribbling + Curve + LongPassing + BallControl +
##      Acceleration + SprintSpeed + Agility + Reactions + Balance +
##      ShotPower + Stamina + LongShots + Interceptions + Positioning +
##      Vision + Penalties + Composure + Marking + StandingTackle +
##      SlidingTackle
##
##              Df Sum of Sq    RSS    AIC
## - Curve      1      1.96 1406.8 511.93
## - Stamina    1      2.29 1407.1 512.00
## - Volleys    1      2.44 1407.3 512.03
## - Dribbling  1      3.20 1408.0 512.19
## - SprintSpeed 1      3.23 1408.1 512.20
## - Acceleration 1      3.96 1408.8 512.36
## - Agility    1      5.28 1410.1 512.63
## - Finishing  1      6.34 1411.2 512.86
## - LongPassing 1      8.85 1413.7 513.39
## - Interceptions 1      9.41 1414.2 513.50
## <none>              1404.8 513.52
## - LongShots   1     13.39 1418.2 514.34
## - StandingTackle 1     13.95 1418.8 514.45
## - Balance     1     15.58 1420.4 514.80
## + Strength    1      1.19 1403.6 515.27
## + Jumping     1      0.23 1404.6 515.47
## - Penalties   1     18.91 1423.7 515.49
## + FKAccuracy  1      0.13 1404.7 515.49
## + Aggression  1      0.03 1404.8 515.51
## - Positioning 1     21.27 1426.1 515.98
## - Crossing    1     22.72 1427.5 516.28
## - ShotPower   1     28.21 1433.0 517.42
## - SlidingTackle 1     29.23 1434.1 517.64
## - Marking     1     46.37 1451.2 521.16
## - Vision      1     71.34 1476.2 526.23
## - ShortPassing 1     80.86 1485.7 528.14
## - BallControl  1     99.51 1504.3 531.85
## - HeadingAccuracy 1    106.37 1511.2 533.20
## - Composure   1    148.06 1552.9 541.28
## - Reactions   1    486.27 1891.1 599.80
##

```

```
## Step: AIC=511.93
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##     Volleys + Dribbling + LongPassing + BallControl + Acceleration +
##     SprintSpeed + Agility + Reactions + Balance + ShotPower +
##     Stamina + LongShots + Interceptions + Positioning + Vision +
##     Penalties + Composure + Marking + StandingTackle + SlidingTackle
##
```

	Df	Sum of Sq	RSS	AIC
## - Stamina	1	2.03	1408.8	510.36
## - SprintSpeed	1	3.03	1409.8	510.57
## - Volleys	1	3.34	1410.1	510.64
## - Dribbling	1	3.38	1410.2	510.65
## - Acceleration	1	4.56	1411.3	510.90
## - Agility	1	4.58	1411.4	510.90
## - Finishing	1	6.90	1413.7	511.39
## - LongPassing	1	9.04	1415.8	511.84
## - Interceptions	1	9.34	1416.1	511.90
## <none>			1406.8	511.93
## - LongShots	1	13.74	1420.5	512.82
## - StandingTackle	1	13.77	1420.6	512.83
## - Balance	1	15.77	1422.6	513.24
## + Curve	1	1.96	1404.8	513.52
## - Penalties	1	17.20	1424.0	513.54
## + Strength	1	1.40	1405.4	513.64
## + Jumping	1	0.30	1406.5	513.87
## + Aggression	1	0.09	1406.7	513.91
## + FKAccuracy	1	0.02	1406.8	513.93
## - Crossing	1	21.06	1427.8	514.35
## - Positioning	1	21.78	1428.6	514.50
## - ShotPower	1	27.55	1434.3	515.69
## - SlidingTackle	1	29.43	1436.2	516.08
## - Marking	1	46.99	1453.8	519.69
## - Vision	1	74.32	1481.1	525.22
## - ShortPassing	1	81.71	1488.5	526.70
## - BallControl	1	100.25	1507.0	530.38
## - HeadingAccuracy	1	108.87	1515.7	532.07
## - Composure	1	147.02	1553.8	539.45
## - Reactions	1	489.66	1896.5	598.64

```
## Step: AIC=510.36
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##     Volleys + Dribbling + LongPassing + BallControl + Acceleration +
##     SprintSpeed + Agility + Reactions + Balance + ShotPower +
##     LongShots + Interceptions + Positioning + Vision + Penalties +
##     Composure + Marking + StandingTackle + SlidingTackle
##
```

	Df	Sum of Sq	RSS	AIC
## - SprintSpeed	1	3.56	1412.4	509.11
## - Volleys	1	3.76	1412.6	509.15
## - Dribbling	1	4.56	1413.4	509.32

```

## - Acceleration      1      4.99 1413.8 509.41
## - Agility            1      5.21 1414.0 509.46
## - Finishing          1      6.79 1415.6 509.79
## - LongPassing        1      8.64 1417.5 510.18
## <none>                1408.8 510.36
## - Interceptions      1     10.30 1419.1 510.52
## - LongShots          1     13.17 1422.0 511.12
## - StandingTackle     1     13.89 1422.7 511.27
## - Balance            1     15.71 1424.5 511.65
## - Penalties          1     16.33 1425.1 511.78
## + Strength           1      2.15 1406.7 511.91
## + Stamina            1      2.03 1406.8 511.93
## + Curve              1      1.70 1407.1 512.00
## + Jumping            1      0.42 1408.4 512.27
## + Aggression          1      0.25 1408.6 512.31
## + FKAccuracy          1      0.06 1408.8 512.35
## - Positioning        1     20.01 1428.8 512.55
## - Crossing           1     20.63 1429.4 512.68
## - ShotPower          1     29.25 1438.1 514.46
## - SlidingTackle      1     29.94 1438.8 514.61
## - Marking            1     51.45 1460.3 519.01
## - Vision             1     73.14 1482.0 523.39
## - ShortPassing       1     80.50 1489.3 524.86
## - BallControl        1    101.36 1510.2 529.00
## - HeadingAccuracy    1    111.17 1520.0 530.92
## - Composure          1    146.97 1555.8 537.83
## - Reactions          1    499.90 1908.7 598.55
##
## Step:  AIC=509.11
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##           Volleys + Dribbling + LongPassing + BallControl + Acceleration +
##           Agility + Reactions + Balance + ShotPower + LongShots + Interceptions
##           +
##           Positioning + Vision + Penalties + Composure + Marking +
##           StandingTackle + SlidingTackle
##
##           Df Sum of Sq    RSS    AIC
## - Volleys      1      4.43 1416.8 508.04
## - Dribbling     1      4.64 1417.0 508.09
## - Agility       1      6.19 1418.6 508.41
## - Finishing     1      8.01 1420.4 508.79
## <none>          1412.4 509.11
## - LongPassing   1      9.81 1422.2 509.17
## - Interceptions 1      9.82 1422.2 509.17
## - StandingTackle 1     14.32 1426.7 510.11
## - LongShots     1     14.47 1426.8 510.14
## - Penalties     1     15.06 1427.4 510.26
## + SprintSpeed   1      3.56 1408.8 510.36
## + Stamina       1      2.56 1409.8 510.57
## + Strength      1      2.51 1409.9 510.58

```

```

## + Curve          1      1.47 1410.9 510.80
## - Balance        1     18.56 1430.9 510.99
## + Jumping        1      0.45 1411.9 511.02
## + Aggression     1      0.20 1412.2 511.07
## + FKAccuracy     1      0.11 1412.3 511.09
## - Positioning    1     19.72 1432.1 511.23
## - Crossing       1     21.69 1434.1 511.64
## - SlidingTackle  1     30.16 1442.5 513.39
## - ShotPower      1     33.47 1445.8 514.07
## - Acceleration   1     35.12 1447.5 514.41
## - Marking        1     52.52 1464.9 517.95
## - Vision         1     72.01 1484.4 521.88
## - ShortPassing   1     81.84 1494.2 523.84
## - BallControl    1    100.65 1513.0 527.56
## - HeadingAccuracy 1    114.34 1526.7 530.23
## - Composure      1    149.02 1561.4 536.90
## - Reactions      1    497.24 1909.6 596.69
##
## Step:  AIC=508.04
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##      Dribbling + LongPassing + BallControl + Acceleration + Agility +
##      Reactions + Balance + ShotPower + LongShots + Interceptions +
##      Positioning + Vision + Penalties + Composure + Marking +
##      StandingTackle + SlidingTackle
##
##              Df Sum of Sq    RSS    AIC
## - Dribbling    1      5.04 1421.8 507.10
## - Agility      1      6.18 1423.0 507.34
## - Finishing    1      6.77 1423.6 507.46
## <none>                1416.8 508.04
## - LongPassing  1     10.29 1427.1 508.19
## - Interceptions 1     10.84 1427.7 508.31
## - Penalties    1     12.94 1429.8 508.74
## - StandingTackle 1     13.74 1430.5 508.91
## + Volleys      1      4.43 1412.4 509.11
## + SprintSpeed  1      4.24 1412.6 509.15
## + Stamina      1      3.12 1413.7 509.39
## + Strength     1      2.86 1414.0 509.44
## + Curve        1      2.36 1414.5 509.55
## + FKAccuracy   1      0.75 1416.1 509.88
## + Jumping      1      0.66 1416.2 509.90
## - Balance      1     18.96 1435.8 509.99
## + Aggression   1      0.08 1416.7 510.02
## - Crossing     1     19.69 1436.5 510.14
## - Positioning  1     19.71 1436.5 510.15
## - LongShots    1     20.26 1437.1 510.26
## - SlidingTackle 1     28.17 1445.0 511.89
## - ShotPower    1     31.03 1447.8 512.48
## - Acceleration 1     35.18 1452.0 513.33
## - Marking      1     52.24 1469.0 516.80

```

```

## - Vision          1      72.05 1488.9 520.77
## - ShortPassing    1      80.96 1497.8 522.55
## - BallControl     1     105.93 1522.7 527.46
## - HeadingAccuracy 1     110.50 1527.3 528.35
## - Composure       1     145.36 1562.2 535.05
## - Reactions       1     497.49 1914.3 595.42
##
## Step: AIC=507.1
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##      LongPassing + BallControl + Acceleration + Agility + Reactions +
##      Balance + ShotPower + LongShots + Interceptions + Positioning +
##      Vision + Penalties + Composure + Marking + StandingTackle +
##      SlidingTackle
##
##              Df Sum of Sq    RSS    AIC
## - Finishing    1      5.62 1427.5 506.27
## - Agility      1      6.25 1428.1 506.40
## <none>                1421.8 507.10
## - LongPassing  1     10.50 1432.3 507.28
## - Penalties    1     10.96 1432.8 507.38
## - Interceptions 1     11.59 1433.4 507.51
## - StandingTackle 1     13.98 1435.8 508.00
## + Dribbling    1      5.04 1416.8 508.04
## + Volleys      1      4.83 1417.0 508.09
## + Stamina      1      4.64 1417.2 508.13
## + SprintSpeed  1      4.36 1417.5 508.19
## + Strength     1      2.66 1419.2 508.54
## + Curve        1      2.57 1419.3 508.56
## - Crossing     1     17.00 1438.8 508.63
## + Jumping      1      0.98 1420.9 508.89
## + FKAccuracy   1      0.54 1421.3 508.98
## + Aggression   1      0.08 1421.8 509.08
## - LongShots    1     19.63 1441.5 509.17
## - Balance      1     19.99 1441.8 509.24
## - Positioning  1     22.35 1444.2 509.73
## - SlidingTackle 1     29.53 1451.4 511.20
## - Acceleration 1     30.38 1452.2 511.38
## - ShotPower    1     32.14 1454.0 511.74
## - Marking      1     54.10 1476.0 516.19
## - Vision       1     75.97 1497.8 520.56
## - ShortPassing 1     78.69 1500.5 521.09
## - BallControl  1    109.38 1531.2 527.11
## - HeadingAccuracy 1   116.66 1538.5 528.52
## - Composure    1    141.67 1563.5 533.31
## - Reactions    1    510.90 1932.8 596.27
##
## Step: AIC=506.27
## Overall ~ Crossing + HeadingAccuracy + ShortPassing + LongPassing +
##      BallControl + Acceleration + Agility + Reactions + Balance +
##      ShotPower + LongShots + Interceptions + Positioning + Vision +

```

Penalties + Composure + Marking + StandingTackle + SlidingTackle

##

##		Df	Sum of Sq	RSS	AIC
## - Agility	1	5.58	1433.0	505.43	
## <none>			1427.5	506.27	
## - LongPassing	1	9.77	1437.2	506.29	
## - Interceptions	1	10.97	1438.4	506.54	
## - StandingTackle	1	13.24	1440.7	507.01	
## + Finishing	1	5.62	1421.8	507.10	
## + SprintSpeed	1	5.35	1422.1	507.15	
## - Penalties	1	13.98	1441.5	507.16	
## - LongShots	1	14.74	1442.2	507.32	
## + Stamina	1	4.29	1423.2	507.37	
## - Crossing	1	15.33	1442.8	507.44	
## + Dribbling	1	3.89	1423.6	507.46	
## + Volleys	1	3.58	1423.9	507.52	
## + Curve	1	2.92	1424.5	507.66	
## + Strength	1	2.25	1425.2	507.80	
## - Positioning	1	17.25	1444.7	507.84	
## + FkAccuracy	1	0.85	1426.6	508.09	
## + Jumping	1	0.50	1427.0	508.16	
## + Aggression	1	0.03	1427.4	508.26	
## - Balance	1	20.30	1447.8	508.46	
## - SlidingTackle	1	31.27	1458.7	510.70	
## - Acceleration	1	33.18	1460.7	511.09	
## - ShotPower	1	37.82	1465.3	512.03	
## - Marking	1	52.87	1480.3	515.07	
## - Vision	1	74.83	1502.3	519.44	
## - ShortPassing	1	77.28	1504.7	519.93	
## - BallControl	1	119.13	1546.6	528.07	
## - HeadingAccuracy	1	121.62	1549.1	528.55	
## - Composure	1	136.97	1564.4	531.48	
## - Reactions	1	512.01	1939.5	595.30	

##

Step: AIC=505.43

Overall ~ Crossing + HeadingAccuracy + ShortPassing + LongPassing +

BallControl + Acceleration + Reactions + Balance + ShotPower +

LongShots + Interceptions + Positioning + Vision + Penalties +

Composure + Marking + StandingTackle + SlidingTackle

##

##		Df	Sum of Sq	RSS	AIC
## - LongPassing	1	7.91	1441.0	505.06	
## <none>			1433.0	505.43	
## - StandingTackle	1	11.91	1445.0	505.88	
## - Interceptions	1	12.49	1445.5	506.00	
## + SprintSpeed	1	6.39	1426.7	506.10	
## - Penalties	1	13.54	1446.6	506.22	
## + Agility	1	5.58	1427.5	506.27	
## + Stamina	1	5.31	1427.7	506.32	
## + Finishing	1	4.95	1428.1	506.40	

```

## - LongShots      1      14.46 1447.5 506.41
## + Dribbling      1       4.00 1429.0 506.60
## - Balance        1      15.63 1448.7 506.65
## + Volleys        1       3.65 1429.4 506.67
## - Crossing       1      17.14 1450.2 506.96
## + Strength       1       2.11 1430.9 506.99
## + Curve          1       1.88 1431.2 507.04
## + Jumping        1       1.26 1431.8 507.17
## - Positioning    1      18.69 1451.7 507.27
## + FkAccuracy     1       0.45 1432.6 507.33
## + Aggression     1       0.00 1433.0 507.43
## - SlidingTackle  1      31.43 1464.5 509.87
## - ShotPower      1      39.12 1472.2 511.43
## - Marking        1      51.91 1485.0 513.99
## - Acceleration   1      69.84 1502.9 517.56
## - ShortPassing   1      72.49 1505.5 518.08
## - Vision         1      74.85 1507.9 518.55
## - HeadingAccuracy 1     116.74 1549.8 526.69
## - BallControl    1     133.81 1566.9 529.94
## - Composure      1     135.51 1568.6 530.26
## - Reactions      1     529.05 1962.1 596.75
##
## Step:  AIC=505.06
## Overall ~ Crossing + HeadingAccuracy + ShortPassing + BallControl +
##      Acceleration + Reactions + Balance + ShotPower + LongShots +
##      Interceptions + Positioning + Vision + Penalties + Composure +
##      Marking + StandingTackle + SlidingTackle
##
##              Df Sum of Sq    RSS    AIC
## <none>              1441.0 505.06
## - Interceptions    1      10.81 1451.8 505.28
## + LongPassing      1       7.91 1433.0 505.43
## - StandingTackle   1      11.92 1452.9 505.51
## + SprintSpeed      1       7.52 1433.4 505.51
## - Penalties        1      12.22 1453.2 505.57
## - Crossing         1      13.64 1454.6 505.86
## + Stamina          1       4.70 1436.2 506.09
## + Finishing        1       4.43 1436.5 506.15
## + Dribbling        1       4.21 1436.8 506.19
## + Volleys          1       4.10 1436.9 506.22
## + Agility          1       3.72 1437.2 506.29
## - LongShots        1      16.85 1457.8 506.51
## - Balance          1      17.26 1458.2 506.60
## + Curve            1       2.23 1438.7 506.60
## - Positioning      1      17.38 1458.3 506.62
## + Strength         1       1.84 1439.1 506.68
## + Jumping          1       1.08 1439.9 506.84
## + FkAccuracy       1       0.99 1440.0 506.86
## + Aggression       1       0.00 1441.0 507.06
## - SlidingTackle    1      35.69 1476.6 510.33

```



```
## - ShotPower      1      41.68 1482.6 511.53
## - Marking        1      54.06 1495.0 514.00
## - ShortPassing   1      68.64 1509.6 516.88
## - Acceleration   1      75.32 1516.3 518.19
## - Vision         1      78.29 1519.2 518.77
## - HeadingAccuracy 1     127.91 1568.9 528.32
## - Composure      1     132.26 1573.2 529.14
## - BallControl    1     132.57 1573.5 529.20
## - Reactions      1     555.87 1996.8 599.96
```

Long Passing, Sprint Speed, Stamina, Finishing, Dribbling, Volleys, Agility, Curve, Strength, Jumping, FreeKick Accuracy and Aggression were the predictors variables removed from the model using the AIC method. Following this, we applied another method of stepwise regression using the SBC criterion.

```
# Get the sample size from the dim function
n = dim(latestfifa19)[1]
fit1sbc = step (fit1, direction = "both", k=log(n))

## Start: AIC=632.02
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
## Volleys + Dribbling + Curve + FKAccuracy + LongPassing +
## BallControl + Acceleration + SprintSpeed + Agility + Reactions +
## Balance + ShotPower + Jumping + Stamina + Strength + LongShots +
## Aggression + Interceptions + Positioning + Vision + Penalties +
## Composure + Marking + StandingTackle + SlidingTackle
##
##           Df Sum of Sq    RSS    AIC
## - Aggression      1      0.00 1403.3 626.32
## - Jumping          1      0.15 1403.5 626.36
## - FKAccuracy       1      0.17 1403.5 626.36
## - Strength         1      1.06 1404.4 626.55
## - Stamina          1      1.52 1404.9 626.64
## - Curve            1      1.87 1405.2 626.72
## - Volleys          1      2.44 1405.8 626.84
## - SprintSpeed      1      3.12 1406.5 626.98
## - Dribbling        1      3.18 1406.5 627.00
## - Acceleration     1      4.25 1407.6 627.22
## - Agility          1      4.82 1408.2 627.34
## - Finishing        1      6.65 1410.0 627.73
## - Interceptions    1      9.04 1412.4 628.23
## - LongPassing      1      9.23 1412.6 628.27
## - Balance          1     11.70 1415.0 628.79
## - StandingTackle   1     13.07 1416.4 629.08
## - LongShots        1     13.96 1417.3 629.26
## - Penalties        1     16.47 1419.8 629.79
## - Positioning      1     21.18 1424.5 630.77
## - Crossing         1     22.06 1425.4 630.96
## - ShotPower        1     26.02 1429.4 631.78
## <none>              1403.3 632.02
```

```

## - SlidingTackle      1      28.28 1431.6 632.25
## - Marking            1      46.20 1449.5 635.94
## - Vision             1      65.55 1468.9 639.88
## - HeadingAccuracy    1      67.24 1470.6 640.22
## - ShortPassing       1      80.16 1483.5 642.82
## - BallControl        1      98.60 1501.9 646.49
## - Composure          1     144.81 1548.2 655.49
## - Reactions          1     480.94 1884.3 713.85
##
## Step:  AIC=626.32
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##         Volleys + Dribbling + Curve + FKAccuracy + LongPassing +
##         BallControl + Acceleration + SprintSpeed + Agility + Reactions +
##         Balance + ShotPower + Jumping + Stamina + Strength + LongShots +
##         Interceptions + Positioning + Vision + Penalties + Composure +
##         Marking + StandingTackle + SlidingTackle
##
##              Df Sum of Sq    RSS    AIC
## - Jumping      1      0.15 1403.5 620.66
## - FKAccuracy    1      0.17 1403.5 620.67
## - Strength      1      1.09 1404.4 620.86
## - Stamina       1      1.53 1404.9 620.95
## - Curve         1      1.88 1405.2 621.03
## - Volleys       1      2.47 1405.8 621.15
## - SprintSpeed   1      3.12 1406.5 621.29
## - Dribbling     1      3.18 1406.5 621.30
## - Acceleration  1      4.26 1407.6 621.53
## - Agility       1      4.84 1408.2 621.65
## - Finishing     1      6.91 1410.2 622.09
## - Interceptions 1      9.22 1412.6 622.58
## - LongPassing   1      9.25 1412.6 622.58
## - Balance       1     11.88 1415.2 623.13
## - StandingTackle 1     13.14 1416.5 623.40
## - LongShots     1     13.98 1417.3 623.57
## - Penalties     1     16.48 1419.8 624.10
## - Positioning   1     21.77 1425.1 625.20
## - Crossing      1     22.06 1425.4 625.26
## - ShotPower     1     26.72 1430.1 626.23
## <none>              1403.3 626.32
## - SlidingTackle 1     28.28 1431.6 626.56
## - Marking       1     46.23 1449.6 630.26
## + Aggression    1      0.00 1403.3 632.02
## - Vision        1     66.02 1469.4 634.28
## - HeadingAccuracy 1     68.48 1471.8 634.78
## - ShortPassing   1     80.79 1484.1 637.25
## - BallControl    1    100.57 1503.9 641.19
## - Composure      1    144.93 1548.3 649.82
## - Reactions      1    482.97 1886.3 708.47
##
## Step:  AIC=620.66

```

```
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##     Volleys + Dribbling + Curve + FKAccuracy + LongPassing +
##     BallControl + Acceleration + SprintSpeed + Agility + Reactions +
##     Balance + ShotPower + Stamina + Strength + LongShots + Interceptions +
##     Positioning + Vision + Penalties + Composure + Marking +
##     StandingTackle + SlidingTackle
##
```

	Df	Sum of Sq	RSS	AIC
## - FKAccuracy	1	0.15	1403.6	615.00
## - Strength	1	1.20	1404.7	615.22
## - Stamina	1	1.58	1405.1	615.30
## - Curve	1	1.89	1405.4	615.37
## - Volleys	1	2.52	1406.0	615.50
## - SprintSpeed	1	3.12	1406.6	615.63
## - Dribbling	1	3.30	1406.8	615.67
## - Acceleration	1	4.33	1407.8	615.88
## - Agility	1	5.32	1408.8	616.09
## - Finishing	1	6.77	1410.3	616.40
## - Interceptions	1	9.23	1412.7	616.91
## - LongPassing	1	9.23	1412.7	616.91
## - Balance	1	11.86	1415.3	617.47
## - StandingTackle	1	13.07	1416.6	617.72
## - LongShots	1	13.99	1417.5	617.91
## - Penalties	1	16.58	1420.1	618.46
## - Positioning	1	21.74	1425.2	619.53
## - Crossing	1	22.28	1425.8	619.65
## - ShotPower	1	26.79	1430.3	620.58
## <none>			1403.5	620.66
## - SlidingTackle	1	28.35	1431.8	620.91
## - Marking	1	46.42	1449.9	624.63
## + Jumping	1	0.15	1403.3	626.32
## + Aggression	1	0.00	1403.5	626.36
## - Vision	1	65.97	1469.5	628.61
## - ShortPassing	1	81.10	1484.6	631.65
## - HeadingAccuracy	1	82.81	1486.3	632.00
## - BallControl	1	100.43	1503.9	635.49
## - Composure	1	145.13	1548.6	644.19
## - Reactions	1	486.80	1890.3	703.41

```
## Step: AIC=615
```

```
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##     Volleys + Dribbling + Curve + LongPassing + BallControl +
##     Acceleration + SprintSpeed + Agility + Reactions + Balance +
##     ShotPower + Stamina + Strength + LongShots + Interceptions +
##     Positioning + Vision + Penalties + Composure + Marking +
##     StandingTackle + SlidingTackle
##
```

	Df	Sum of Sq	RSS	AIC
## - Strength	1	1.19	1404.8	609.56
## - Stamina	1	1.51	1405.2	609.63

```

## - Curve          1          1.75 1405.4 609.68
## - Volleys        1          2.38 1406.0 609.81
## - SprintSpeed    1          3.05 1406.7 609.95
## - Dribbling      1          3.48 1407.1 610.04
## - Acceleration   1          4.38 1408.0 610.23
## - Agility        1          5.48 1409.1 610.46
## - Finishing      1          6.66 1410.3 610.71
## - LongPassing    1          9.09 1412.7 611.22
## - Interceptions  1          9.30 1412.9 611.27
## - Balance        1         11.95 1415.6 611.82
## - StandingTackle 1         13.11 1416.8 612.07
## - LongShots      1         13.88 1417.5 612.23
## - Penalties      1         18.85 1422.5 613.27
## - Positioning    1         22.11 1425.8 613.95
## - Crossing       1         22.58 1426.2 614.04
## - ShotPower      1         26.92 1430.6 614.95
## <none>           1403.6 615.00
## - SlidingTackle  1         28.24 1431.9 615.22
## - Marking        1         46.37 1450.0 618.96
## + FKAccuracy     1          0.15 1403.5 620.66
## + Jumping        1          0.13 1403.5 620.67
## + Aggression     1          0.00 1403.6 620.69
## - Vision         1         67.69 1471.3 623.29
## - ShortPassing   1         80.98 1484.6 625.97
## - HeadingAccuracy 1         82.90 1486.5 626.35
## - BallControl    1        100.68 1504.3 629.88
## - Composure      1        145.12 1548.8 638.53
## - Reactions      1        486.90 1890.5 697.75
##
## Step:  AIC=609.56
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##           Volleys + Dribbling + Curve + LongPassing + BallControl +
##           Acceleration + SprintSpeed + Agility + Reactions + Balance +
##           ShotPower + Stamina + LongShots + Interceptions + Positioning +
##           Vision + Penalties + Composure + Marking + StandingTackle +
##           SlidingTackle
##
##           Df Sum of Sq    RSS    AIC
## - Curve          1          1.96 1406.8 604.28
## - Stamina        1          2.29 1407.1 604.35
## - Volleys        1          2.44 1407.3 604.38
## - Dribbling      1          3.20 1408.0 604.54
## - SprintSpeed    1          3.23 1408.1 604.55
## - Acceleration   1          3.96 1408.8 604.70
## - Agility        1          5.28 1410.1 604.98
## - Finishing      1          6.34 1411.2 605.20
## - LongPassing    1          8.85 1413.7 605.73
## - Interceptions  1          9.41 1414.2 605.85
## - LongShots      1         13.39 1418.2 606.68
## - StandingTackle 1         13.95 1418.8 606.80

```

```

## - Balance          1      15.58 1420.4 607.14
## - Penalties        1      18.91 1423.7 607.83
## - Positioning      1      21.27 1426.1 608.32
## - Crossing         1      22.72 1427.5 608.63
## <none>              1404.8 609.56
## - ShotPower        1      28.21 1433.0 609.77
## - SlidingTackle    1      29.23 1434.1 609.98
## - Marking          1      46.37 1451.2 613.51
## + Strength         1       1.19 1403.6 615.00
## + Jumping          1       0.23 1404.6 615.20
## + FKAccuracy       1       0.13 1404.7 615.22
## + Aggression       1       0.03 1404.8 615.24
## - Vision           1      71.34 1476.2 618.57
## - ShortPassing     1      80.86 1485.7 620.48
## - BallControl      1      99.51 1504.3 624.19
## - HeadingAccuracy  1     106.37 1511.2 625.54
## - Composure        1     148.06 1552.9 633.62
## - Reactions        1     486.27 1891.1 692.14
##
## Step:  AIC=604.28
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##           Volleys + Dribbling + LongPassing + BallControl + Acceleration +
##           SprintSpeed + Agility + Reactions + Balance + ShotPower +
##           Stamina + LongShots + Interceptions + Positioning + Vision +
##           Penalties + Composure + Marking + StandingTackle + SlidingTackle
##
##           Df Sum of Sq    RSS    AIC
## - Stamina          1      2.03 1408.8 599.01
## - SprintSpeed       1      3.03 1409.8 599.22
## - Volleys           1      3.34 1410.1 599.29
## - Dribbling         1      3.38 1410.2 599.30
## - Acceleration      1      4.56 1411.3 599.54
## - Agility           1      4.58 1411.4 599.55
## - Finishing         1      6.90 1413.7 600.04
## - LongPassing       1      9.04 1415.8 600.48
## - Interceptions     1      9.34 1416.1 600.55
## - LongShots         1     13.74 1420.5 601.47
## - StandingTackle    1     13.77 1420.6 601.48
## - Balance           1     15.77 1422.6 601.89
## - Penalties         1     17.20 1424.0 602.19
## - Crossing          1     21.06 1427.8 603.00
## - Positioning       1     21.78 1428.6 603.15
## <none>              1406.8 604.28
## - ShotPower        1     27.55 1434.3 604.34
## - SlidingTackle     1     29.43 1436.2 604.73
## - Marking           1     46.99 1453.8 608.34
## + Curve             1      1.96 1404.8 609.56
## + Strength          1      1.40 1405.4 609.68
## + Jumping           1      0.30 1406.5 609.91
## + Aggression        1      0.09 1406.7 609.95

```

```

## + FKAaccuracy      1      0.02 1406.8 609.97
## - Vision           1      74.32 1481.1 613.87
## - ShortPassing     1      81.71 1488.5 615.35
## - BallControl      1     100.25 1507.0 619.03
## - HeadingAccuracy  1     108.87 1515.7 620.72
## - Composure        1     147.02 1553.8 628.10
## - Reactions        1     489.66 1896.5 687.29
##
## Step:  AIC=599.01
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##           Volleys + Dribbling + LongPassing + BallControl + Acceleration +
##           SprintSpeed + Agility + Reactions + Balance + ShotPower +
##           LongShots + Interceptions + Positioning + Vision + Penalties +
##           Composure + Marking + StandingTackle + SlidingTackle
##
##           Df Sum of Sq    RSS    AIC
## - SprintSpeed      1      3.56 1412.4 594.07
## - Volleys           1      3.76 1412.6 594.11
## - Dribbling         1      4.56 1413.4 594.28
## - Acceleration      1      4.99 1413.8 594.37
## - Agility           1      5.21 1414.0 594.41
## - Finishing         1      6.79 1415.6 594.75
## - LongPassing       1      8.64 1417.5 595.13
## - Interceptions     1     10.30 1419.1 595.48
## - LongShots         1     13.17 1422.0 596.08
## - StandingTackle   1     13.89 1422.7 596.23
## - Balance           1     15.71 1424.5 596.61
## - Penalties         1     16.33 1425.1 596.74
## - Positioning       1     20.01 1428.8 597.51
## - Crossing          1     20.63 1429.4 597.63
## <none>              1408.8 599.01
## - ShotPower         1     29.25 1438.1 599.42
## - SlidingTackle     1     29.94 1438.8 599.56
## - Marking           1     51.45 1460.3 603.97
## + Strength          1      2.15 1406.7 604.25
## + Stamina           1      2.03 1406.8 604.28
## + Curve             1      1.70 1407.1 604.35
## + Jumping           1      0.42 1408.4 604.62
## + Aggression        1      0.25 1408.6 604.65
## + FKAaccuracy       1      0.06 1408.8 604.69
## - Vision            1     73.14 1482.0 608.35
## - ShortPassing      1     80.50 1489.3 609.82
## - BallControl       1    101.36 1510.2 613.95
## - HeadingAccuracy   1    111.17 1520.0 615.88
## - Composure         1    146.97 1555.8 622.79
## - Reactions         1    499.90 1908.7 683.51
##
## Step:  AIC=594.07
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##           Volleys + Dribbling + LongPassing + BallControl + Acceleration +

```

```

##      Agility + Reactions + Balance + ShotPower + LongShots + Interceptions
+
##      Positioning + Vision + Penalties + Composure + Marking +
##      StandingTackle + SlidingTackle
##
##              Df Sum of Sq      RSS      AIC
## - Volleys      1      4.43 1416.8 589.30
## - Dribbling     1      4.64 1417.0 589.35
## - Agility       1      6.19 1418.6 589.67
## - Finishing     1      8.01 1420.4 590.05
## - LongPassing   1      9.81 1422.2 590.43
## - Interceptions 1      9.82 1422.2 590.43
## - StandingTackle 1     14.32 1426.7 591.37
## - LongShots     1     14.47 1426.8 591.40
## - Penalties     1     15.06 1427.4 591.52
## - Balance       1     18.56 1430.9 592.25
## - Positioning   1     19.72 1432.1 592.49
## - Crossing      1     21.69 1434.1 592.90
## <none>                                1412.4 594.07
## - SlidingTackle 1     30.16 1442.5 594.65
## - ShotPower     1     33.47 1445.8 595.33
## - Acceleration  1     35.12 1447.5 595.67
## + SprintSpeed   1      3.56 1408.8 599.01
## - Marking       1     52.52 1464.9 599.22
## + Stamina       1      2.56 1409.8 599.22
## + Strength      1      2.51 1409.9 599.23
## + Curve         1      1.47 1410.9 599.45
## + Jumping       1      0.45 1411.9 599.67
## + Aggression    1      0.20 1412.2 599.72
## + FKAccuracy    1      0.11 1412.3 599.74
## - Vision        1     72.01 1484.4 603.14
## - ShortPassing  1     81.84 1494.2 605.10
## - BallControl   1    100.65 1513.0 608.82
## - HeadingAccuracy 1    114.34 1526.7 611.49
## - Composure     1    149.02 1561.4 618.16
## - Reactions     1    497.24 1909.6 677.96
##
## Step:  AIC=589.3
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##      Dribbling + LongPassing + BallControl + Acceleration + Agility +
##      Reactions + Balance + ShotPower + LongShots + Interceptions +
##      Positioning + Vision + Penalties + Composure + Marking +
##      StandingTackle + SlidingTackle
##
##              Df Sum of Sq      RSS      AIC
## - Dribbling     1      5.04 1421.8 584.67
## - Agility       1      6.18 1423.0 584.90
## - Finishing     1      6.77 1423.6 585.03
## - LongPassing   1     10.29 1427.1 585.76
## - Interceptions 1     10.84 1427.7 585.87

```

```

## - Penalties          1      12.94 1429.8 586.31
## - StandingTackle     1      13.74 1430.5 586.48
## - Balance            1      18.96 1435.8 587.56
## - Crossing           1      19.69 1436.5 587.71
## - Positioning        1      19.71 1436.5 587.71
## - LongShots          1      20.26 1437.1 587.83
## <none>                1416.8 589.30
## - SlidingTackle      1      28.17 1445.0 589.46
## - ShotPower          1      31.03 1447.8 590.05
## - Acceleration       1      35.18 1452.0 590.90
## + Volleys            1       4.43 1412.4 594.07
## + SprintSpeed        1       4.24 1412.6 594.11
## + Stamina            1       3.12 1413.7 594.34
## - Marking            1      52.24 1469.0 594.36
## + Strength           1       2.86 1414.0 594.40
## + Curve              1       2.36 1414.5 594.50
## + FKAccuracy         1       0.75 1416.1 594.84
## + Jumping            1       0.66 1416.2 594.86
## + Aggression         1       0.08 1416.7 594.98
## - Vision             1      72.05 1488.9 598.34
## - ShortPassing       1      80.96 1497.8 600.11
## - BallControl        1     105.93 1522.7 605.03
## - HeadingAccuracy    1     110.50 1527.3 605.92
## - Composure          1     145.36 1562.2 612.62
## - Reactions          1     497.49 1914.3 672.99
##
## Step:  AIC=584.67
## Overall ~ Crossing + Finishing + HeadingAccuracy + ShortPassing +
##      LongPassing + BallControl + Acceleration + Agility + Reactions +
##      Balance + ShotPower + LongShots + Interceptions + Positioning +
##      Vision + Penalties + Composure + Marking + StandingTackle +
##      SlidingTackle
##
##           Df Sum of Sq    RSS    AIC
## - Finishing      1      5.62 1427.5 580.14
## - Agility        1      6.25 1428.1 580.27
## - LongPassing    1     10.50 1432.3 581.16
## - Penalties      1     10.96 1432.8 581.25
## - Interceptions  1     11.59 1433.4 581.38
## - StandingTackle 1     13.98 1435.8 581.88
## - Crossing       1     17.00 1438.8 582.50
## - LongShots      1     19.63 1441.5 583.04
## - Balance        1     19.99 1441.8 583.12
## - Positioning    1     22.35 1444.2 583.60
## <none>           1421.8 584.67
## - SlidingTackle  1     29.53 1451.4 585.08
## - Acceleration   1     30.38 1452.2 585.25
## - ShotPower      1     32.14 1454.0 585.61
## + Dribbling      1       5.04 1416.8 589.30
## + Volleys        1       4.83 1417.0 589.35

```



```

## + Stamina          1      4.64 1417.2 589.39
## + SprintSpeed      1      4.36 1417.5 589.45
## + Strength         1      2.66 1419.2 589.80
## + Curve            1      2.57 1419.3 589.82
## - Marking          1     54.10 1476.0 590.06
## + Jumping          1      0.98 1420.9 590.15
## + FKAccuracy       1      0.54 1421.3 590.25
## + Aggression       1      0.08 1421.8 590.34
## - Vision           1     75.97 1497.8 594.43
## - ShortPassing     1     78.69 1500.5 594.97
## - BallControl      1    109.38 1531.2 600.98
## - HeadingAccuracy  1    116.66 1538.5 602.39
## - Composure        1    141.67 1563.5 607.18
## - Reactions        1    510.90 1932.8 670.15
##
## Step:  AIC=580.14
## Overall ~ Crossing + HeadingAccuracy + ShortPassing + LongPassing +
##      BallControl + Acceleration + Agility + Reactions + Balance +
##      ShotPower + LongShots + Interceptions + Positioning + Vision +
##      Penalties + Composure + Marking + StandingTackle + SlidingTackle
##
##              Df Sum of Sq    RSS    AIC
## - Agility      1      5.58 1433.0 575.61
## - LongPassing   1      9.77 1437.2 576.47
## - Interceptions 1     10.97 1438.4 576.72
## - StandingTackle 1     13.24 1440.7 577.19
## - Penalties     1     13.98 1441.5 577.34
## - LongShots     1     14.74 1442.2 577.50
## - Crossing      1     15.33 1442.8 577.62
## - Positioning   1     17.25 1444.7 578.02
## - Balance       1     20.30 1447.8 578.64
## <none>          1427.5 580.14
## - SlidingTackle 1     31.27 1458.7 580.89
## - Acceleration  1     33.18 1460.7 581.27
## - ShotPower     1     37.82 1465.3 582.22
## + Finishing     1      5.62 1421.8 584.67
## + SprintSpeed   1      5.35 1422.1 584.72
## + Stamina       1      4.29 1423.2 584.94
## + Dribbling     1      3.89 1423.6 585.03
## + Volleys       1      3.58 1423.9 585.09
## + Curve         1      2.92 1424.5 585.23
## - Marking       1     52.87 1480.3 585.25
## + Strength      1      2.25 1425.2 585.37
## + FKAccuracy    1      0.85 1426.6 585.66
## + Jumping       1      0.50 1427.0 585.73
## + Aggression    1      0.03 1427.4 585.83
## - Vision        1     74.83 1502.3 589.62
## - ShortPassing  1     77.28 1504.7 590.11
## - BallControl   1    119.13 1546.6 598.25
## - HeadingAccuracy 1    121.62 1549.1 598.73

```

```

## - Composure      1      136.97 1564.4 601.66
## - Reactions      1      512.01 1939.5 665.48
##
## Step:  AIC=575.61
## Overall ~ Crossing + HeadingAccuracy + ShortPassing + LongPassing +
##      BallControl + Acceleration + Reactions + Balance + ShotPower +
##      LongShots + Interceptions + Positioning + Vision + Penalties +
##      Composure + Marking + StandingTackle + SlidingTackle
##
##              Df Sum of Sq    RSS    AIC
## - LongPassing    1       7.91 1441.0 571.55
## - StandingTackle  1      11.91 1445.0 572.37
## - Interceptions   1      12.49 1445.5 572.49
## - Penalties       1      13.54 1446.6 572.71
## - LongShots       1      14.46 1447.5 572.90
## - Balance         1      15.63 1448.7 573.14
## - Crossing        1      17.14 1450.2 573.44
## - Positioning     1      18.69 1451.7 573.76
## <none>              1433.0 575.61
## - SlidingTackle   1      31.43 1464.5 576.36
## - ShotPower       1      39.12 1472.2 577.91
## + SprintSpeed     1       6.39 1426.7 579.97
## + Agility         1       5.58 1427.5 580.14
## + Stamina         1       5.31 1427.7 580.20
## + Finishing       1       4.95 1428.1 580.27
## + Dribbling       1       4.00 1429.0 580.47
## - Marking         1      51.91 1485.0 580.48
## + Volleys         1       3.65 1429.4 580.54
## + Strength        1       2.11 1430.9 580.86
## + Curve           1       1.88 1431.2 580.91
## + Jumping         1       1.26 1431.8 581.04
## + FKAccuracy      1       0.45 1432.6 581.21
## + Aggression      1       0.00 1433.0 581.30
## - Acceleration    1      69.84 1502.9 584.05
## - ShortPassing    1      72.49 1505.5 584.57
## - Vision          1      74.85 1507.9 585.03
## - HeadingAccuracy  1     116.74 1549.8 593.17
## - BallControl     1     133.81 1566.9 596.43
## - Composure       1     135.51 1568.6 596.75
## - Reactions       1     529.05 1962.1 663.23
##
## Step:  AIC=571.55
## Overall ~ Crossing + HeadingAccuracy + ShortPassing + BallControl +
##      Acceleration + Reactions + Balance + ShotPower + LongShots +
##      Interceptions + Positioning + Vision + Penalties + Composure +
##      Marking + StandingTackle + SlidingTackle
##
##              Df Sum of Sq    RSS    AIC
## - Interceptions    1      10.81 1451.8 568.07
## - StandingTackle    1      11.92 1452.9 568.30

```

```

## - Penalties      1      12.22 1453.2 568.36
## - Crossing       1      13.64 1454.6 568.65
## - LongShots      1      16.85 1457.8 569.31
## - Balance        1      17.26 1458.2 569.39
## - Positioning    1      17.38 1458.3 569.42
## <none>           1441.0 571.55
## - SlidingTackle  1      35.69 1476.6 573.12
## - ShotPower      1      41.68 1482.6 574.32
## + LongPassing    1       7.91 1433.0 575.61
## + SprintSpeed    1       7.52 1433.4 575.69
## + Stamina        1       4.70 1436.2 576.27
## + Finishing      1       4.43 1436.5 576.33
## + Dribbling      1       4.21 1436.8 576.37
## + Volleys        1       4.10 1436.9 576.40
## + Agility        1       3.72 1437.2 576.47
## + Curve          1       2.23 1438.7 576.78
## - Marking        1      54.06 1495.0 576.79
## + Strength       1       1.84 1439.1 576.86
## + Jumping        1       1.08 1439.9 577.02
## + FKAccuracy     1       0.99 1440.0 577.04
## + Aggression     1       0.00 1441.0 577.24
## - ShortPassing   1      68.64 1509.6 579.68
## - Acceleration   1      75.32 1516.3 580.99
## - Vision         1      78.29 1519.2 581.57
## - HeadingAccuracy 1     127.91 1568.9 591.11
## - Composure      1     132.26 1573.2 591.93
## - BallControl    1     132.57 1573.5 591.99
## - Reactions      1     555.87 1996.8 662.75
##
## Step:  AIC=568.07
## Overall ~ Crossing + HeadingAccuracy + ShortPassing + BallControl +
##      Acceleration + Reactions + Balance + ShotPower + LongShots +
##      Positioning + Vision + Penalties + Composure + Marking +
##      StandingTackle + SlidingTackle
##
##      Df Sum of Sq    RSS    AIC
## - Penalties      1     10.77 1462.5 564.58
## - Crossing       1     14.62 1466.4 565.36
## - LongShots      1     15.39 1467.2 565.51
## - Positioning    1     17.74 1469.5 565.99
## - Balance        1     19.42 1471.2 566.33
## - StandingTackle 1     25.57 1477.3 567.57
## <none>           1451.8 568.07
## - SlidingTackle  1     32.08 1483.8 568.87
## - ShotPower      1     39.21 1491.0 570.29
## + Interceptions  1     10.81 1441.0 571.55
## + SprintSpeed    1      6.84 1444.9 572.36
## + Stamina        1      6.50 1445.3 572.44
## + LongPassing    1      6.22 1445.5 572.49
## + Volleys        1      5.13 1446.6 572.72

```

```

## + Agility          1      5.06 1446.7 572.73
## + Dribbling        1      4.93 1446.8 572.76
## + Finishing         1      3.87 1447.9 572.97
## + Strength          1      2.22 1449.5 573.31
## + Curve             1      2.06 1449.7 573.35
## + Jumping           1      1.37 1450.4 573.49
## + FKAccuracy        1      0.79 1451.0 573.60
## + Aggression        1      0.30 1451.5 573.70
## - Marking           1     66.80 1518.6 575.74
## - ShortPassing      1     68.39 1520.2 576.05
## - Acceleration      1     72.73 1524.5 576.90
## - Vision            1     76.40 1528.2 577.61
## - HeadingAccuracy   1    124.27 1576.0 586.77
## - BallControl       1    129.57 1581.3 587.77
## - Composure         1    133.54 1585.3 588.51
## - Reactions         1    615.13 2066.9 667.30
##
## Step:  AIC=564.58
## Overall ~ Crossing + HeadingAccuracy + ShortPassing + BallControl +
##      Acceleration + Reactions + Balance + ShotPower + LongShots +
##      Positioning + Vision + Composure + Marking + StandingTackle +
##      SlidingTackle
##
##              Df Sum of Sq    RSS    AIC
## - LongShots    1      9.69 1472.2 560.84
## - Crossing     1     15.22 1477.8 561.96
## - Positioning  1     15.39 1477.9 561.99
## - Balance      1     16.52 1479.1 562.22
## - StandingTackle 1     21.83 1484.4 563.28
## <none>                1462.5 564.58
## - SlidingTackle 1     32.31 1494.8 565.37
## - ShotPower    1     43.67 1506.2 567.62
## + Penalties    1     10.77 1451.8 568.07
## + Interceptions 1      9.36 1453.2 568.36
## + Finishing     1      6.20 1456.3 569.01
## + LongPassing   1      5.22 1457.3 569.21
## + SprintSpeed   1      5.17 1457.4 569.22
## + Agility       1      4.74 1457.8 569.31
## + Stamina       1      4.17 1458.4 569.42
## + Dribbling     1      2.70 1459.8 569.72
## + Volleys       1      2.55 1460.0 569.75
## + Strength      1      1.78 1460.8 569.91
## + Jumping       1      1.00 1461.5 570.07
## + Curve         1      0.44 1462.1 570.18
## + FKAccuracy    1      0.11 1462.4 570.25
## + Aggression    1      0.02 1462.5 570.27
## - ShortPassing  1     67.07 1529.6 572.20
## - Marking       1     67.44 1530.0 572.27
## - Acceleration  1     68.37 1530.9 572.45
## - Vision        1     72.41 1535.0 573.23

```

```

## - BallControl      1    127.60 1590.1 583.72
## - Composure        1    134.00 1596.5 584.92
## - HeadingAccuracy  1    143.56 1606.1 586.69
## - Reactions         1    633.65 2096.2 665.79
##
## Step: AIC=560.84
## Overall ~ Crossing + HeadingAccuracy + ShortPassing + BallControl +
##      Acceleration + Reactions + Balance + ShotPower + Positioning +
##      Vision + Composure + Marking + StandingTackle + SlidingTackle
##
##              Df Sum of Sq    RSS    AIC
## - Crossing      1     12.94 1485.2 557.75
## - Balance        1     18.37 1490.6 558.83
## - StandingTackle 1     18.90 1491.1 558.94
## - Positioning    1     20.13 1492.4 559.18
## - SlidingTackle  1     27.66 1499.9 560.68
## <none>              1472.2 560.84
## - ShotPower      1     34.20 1506.4 561.97
## + LongShots       1      9.69 1462.5 564.58
## + Interceptions   1      8.61 1463.6 564.80
## + LongPassing     1      7.09 1465.1 565.10
## + SprintSpeed     1      6.92 1465.3 565.14
## + Volleys         1      6.91 1465.3 565.14
## + Penalties       1      5.08 1467.2 565.51
## + Agility         1      4.33 1467.9 565.66
## + Stamina         1      4.21 1468.0 565.69
## + Dribbling       1      3.28 1468.9 565.87
## + Strength        1      1.48 1470.8 566.24
## + Jumping         1      1.47 1470.8 566.24
## + Curve           1      1.18 1471.0 566.30
## + Finishing       1      1.03 1471.2 566.33
## + FKAccuracy      1      0.15 1472.1 566.51
## + Aggression      1      0.06 1472.2 566.53
## - Marking         1     71.07 1543.3 569.15
## - Acceleration    1     73.28 1545.5 569.58
## - ShortPassing    1     73.57 1545.8 569.63
## - Vision          1     85.19 1557.4 571.86
## - BallControl     1    120.58 1592.8 578.53
## - Composure       1    133.95 1606.2 581.01
## - HeadingAccuracy 1    142.27 1614.5 582.55
## - Reactions       1    644.05 2116.3 662.93
##
## Step: AIC=557.75
## Overall ~ HeadingAccuracy + ShortPassing + BallControl + Acceleration +
##      Reactions + Balance + ShotPower + Positioning + Vision +
##      Composure + Marking + StandingTackle + SlidingTackle
##
##              Df Sum of Sq    RSS    AIC
## - Positioning     1     14.13 1499.3 554.87
## - Balance          1     15.27 1500.4 555.09

```

```

## - StandingTackle 1 19.18 1504.3 555.87
## - SlidingTackle 1 24.75 1509.9 556.97
## <none> 1485.2 557.75
## - ShotPower 1 29.75 1514.9 557.95
## + Crossing 1 12.94 1472.2 560.84
## + Interceptions 1 9.49 1475.7 561.54
## + LongShots 1 7.42 1477.8 561.96
## + SprintSpeed 1 7.19 1478.0 562.00
## + Agility 1 6.26 1478.9 562.19
## + Penalties 1 5.94 1479.2 562.25
## + Volleys 1 4.18 1481.0 562.61
## + LongPassing 1 3.63 1481.5 562.72
## + Stamina 1 3.51 1481.7 562.74
## + Jumping 1 1.78 1483.4 563.09
## + Dribbling 1 1.42 1483.8 563.16
## + Strength 1 1.41 1483.8 563.16
## + Finishing 1 0.75 1484.4 563.29
## + Curve 1 0.41 1484.8 563.36
## + FKAccuracy 1 0.36 1484.8 563.37
## + Aggression 1 0.02 1485.2 563.44
## - Marking 1 70.98 1556.2 565.92
## - Vision 1 78.28 1563.5 567.31
## - ShortPassing 1 86.32 1571.5 568.83
## - Acceleration 1 90.10 1575.3 569.55
## - BallControl 1 128.18 1613.3 576.64
## - HeadingAccuracy 1 132.97 1618.1 577.52
## - Composure 1 141.11 1626.3 579.01
## - Reactions 1 643.98 2129.2 659.03
##
## Step: AIC=554.87
## Overall ~ HeadingAccuracy + ShortPassing + BallControl + Acceleration +
## Reactions + Balance + ShotPower + Vision + Composure + Marking +
## StandingTackle + SlidingTackle
##
## Df Sum of Sq RSS AIC
## - Balance 1 15.78 1515.1 552.28
## - StandingTackle 1 20.53 1519.8 553.21
## - ShotPower 1 22.25 1521.5 553.55
## - SlidingTackle 1 23.18 1522.5 553.73
## <none> 1499.3 554.87
## + Positioning 1 14.13 1485.2 557.75
## + LongShots 1 11.46 1487.8 558.28
## + Interceptions 1 9.57 1489.7 558.66
## + Agility 1 7.16 1492.1 559.14
## + Crossing 1 6.94 1492.4 559.18
## + Volleys 1 6.87 1492.4 559.20
## + SprintSpeed 1 6.62 1492.7 559.25
## + Dribbling 1 4.05 1495.3 559.76
## + LongPassing 1 3.84 1495.5 559.80
## + Penalties 1 3.37 1495.9 559.89

```

```

## + Jumping      1      2.15 1497.2 560.14
## + Stamina      1      1.73 1497.6 560.22
## + Finishing    1      0.51 1498.8 560.46
## + Strength     1      0.38 1498.9 560.49
## + FKAccuracy   1      0.28 1499.0 560.51
## + Aggression   1      0.13 1499.2 560.54
## + Curve        1      0.00 1499.3 560.56
## - Marking      1     78.17 1577.5 564.27
## - Acceleration 1     80.07 1579.4 564.63
## - ShortPassing 1     95.95 1595.2 567.60
## - Vision       1    105.35 1604.7 569.34
## - BallControl  1    114.06 1613.4 570.95
## - HeadingAccuracy 1  125.66 1625.0 573.08
## - Composure    1    146.98 1646.3 576.95
## - Reactions    1    635.63 2134.9 654.14
##
## Step:  AIC=552.28
## Overall ~ HeadingAccuracy + ShortPassing + BallControl + Acceleration +
##      Reactions + ShotPower + Vision + Composure + Marking + StandingTackle
##      +
##      SlidingTackle
##
##      Df Sum of Sq    RSS    AIC
## - StandingTackle  1     19.76 1534.8 550.44
## - SlidingTackle   1     21.40 1536.5 550.76
## - ShotPower       1     25.41 1540.5 551.53
## <none>                1515.1 552.28
## + Balance        1     15.78 1499.3 554.87
## + Positioning     1     14.64 1500.4 555.09
## + LongShots       1     13.67 1501.4 555.29
## + Interceptions   1     11.43 1503.7 555.73
## + SprintSpeed     1      9.95 1505.1 556.02
## + Volleys         1      8.80 1506.3 556.25
## + Dribbling       1      5.63 1509.5 556.87
## + LongPassing     1      5.47 1509.6 556.90
## + Crossing        1      4.71 1510.4 557.05
## + Strength        1      3.43 1511.7 557.31
## + Stamina         1      1.85 1513.2 557.62
## + Penalties       1      1.66 1513.4 557.65
## + Agility         1      1.41 1513.7 557.70
## + Finishing       1      0.62 1514.5 557.86
## + Aggression      1      0.53 1514.5 557.87
## + Curve          1      0.31 1514.8 557.92
## + Jumping         1      0.21 1514.9 557.94
## + FKAccuracy      1      0.01 1515.1 557.98
## - Acceleration    1     65.03 1580.1 559.07
## - Marking         1     76.34 1591.4 561.19
## - ShortPassing    1     99.96 1615.0 565.57
## - BallControl     1    107.56 1622.6 566.96
## - Vision          1    109.39 1624.5 567.30

```

```

## - Composure      1      143.54 1658.6 573.47
## - HeadingAccuracy 1      189.71 1704.8 581.63
## - Reactions       1      620.00 2135.1 648.47
##
## Step:  AIC=550.44
## Overall ~ HeadingAccuracy + ShortPassing + BallControl + Acceleration +
##      Reactions + ShotPower + Vision + Composure + Marking + SlidingTackle
##
##              Df Sum of Sq    RSS    AIC
## - SlidingTackle  1         2.38 1537.2 545.21
## - ShotPower      1        25.02 1559.9 549.55
## <none>                                1534.8 550.44
## + Interceptions  1        23.44 1511.4 551.56
## + StandingTackle 1        19.76 1515.1 552.28
## + Positioning     1        15.97 1518.9 553.03
## + Balance         1        15.01 1519.8 553.21
## + LongShots       1        10.29 1524.6 554.14
## + SprintSpeed     1         9.80 1525.0 554.23
## + Volleys         1         8.30 1526.5 554.52
## + Dribbling       1         6.92 1527.9 554.79
## + Strength        1         5.38 1529.5 555.09
## + Crossing        1         4.74 1530.1 555.21
## + LongPassing     1         4.54 1530.3 555.25
## + Stamina         1         2.73 1532.1 555.60
## + Agility         1         1.10 1533.7 555.92
## + Finishing       1         0.94 1533.9 555.95
## + Penalties       1         0.75 1534.1 555.99
## + Curve           1         0.26 1534.6 556.08
## + Jumping         1         0.17 1534.7 556.10
## + FKAccuracy      1         0.02 1534.8 556.13
## + Aggression      1         0.00 1534.8 556.13
## - Acceleration    1        60.25 1595.1 556.18
## - Marking         1        89.73 1624.6 561.62
## - BallControl     1       100.29 1635.1 563.55
## - Vision          1       111.46 1646.3 565.57
## - ShortPassing    1       111.66 1646.5 565.60
## - Composure       1       157.24 1692.1 573.71
## - HeadingAccuracy 1       188.63 1723.5 579.17
## - Reactions       1       625.60 2160.4 646.29
##
## Step:  AIC=545.21
## Overall ~ HeadingAccuracy + ShortPassing + BallControl + Acceleration +
##      Reactions + ShotPower + Vision + Composure + Marking
##
##              Df Sum of Sq    RSS    AIC
## <none>                                1537.2 545.21
## - ShotPower      1        29.79 1567.0 545.21
## + Balance        1        14.25 1523.0 548.13
## + Positioning    1        13.72 1523.5 548.24
## + SprintSpeed    1         9.80 1527.4 549.00

```


## + LongShots	1	8.82	1528.4	549.19
## + Interceptions	1	6.85	1530.4	549.57
## + Dribbling	1	6.59	1530.6	549.63
## + LongPassing	1	6.23	1531.0	549.69
## + Volleys	1	5.55	1531.7	549.83
## + Strength	1	4.80	1532.4	549.97
## + Crossing	1	3.80	1533.4	550.16
## + SlidingTackle	1	2.38	1534.8	550.44
## + Stamina	1	2.36	1534.9	550.44
## + Penalties	1	1.58	1535.7	550.60
## + Agility	1	1.20	1536.0	550.67
## + StandingTackle	1	0.74	1536.5	550.76
## + Curve	1	0.31	1536.9	550.84
## + Jumping	1	0.21	1537.0	550.86
## + Finishing	1	0.17	1537.0	550.87
## + Aggression	1	0.17	1537.0	550.87
## + FkAccuracy	1	0.01	1537.2	550.90
## - Acceleration	1	62.43	1599.7	551.34
## - Vision	1	109.10	1646.3	559.88
## - BallControl	1	110.28	1647.5	560.09
## - ShortPassing	1	115.27	1652.5	560.99
## - Composure	1	158.13	1695.4	568.59
## - Marking	1	162.93	1700.2	569.43
## - HeadingAccuracy	1	200.62	1737.8	575.94
## - Reactions	1	624.70	2161.9	640.80

The SBC method removed all non-significant predictors and left ShotPower, Acceleration, Vision, BallControl, ShortPassing, Composure, Marking, HeadingAccuracy and Reactions in the model.

Interactions

Next, we added all the possible two-way interaction effects to the stepwise regression model which is above using the SBC criterion.

```
fit1sbc.int = lm (Overall ~ (ShotPower + Acceleration + Vision + BallControl
+ ShortPassing + Composure + Marking + HeadingAccuracy + Reactions)^2, data=latestfifa19)
summary (fit1sbc.int)

##
## Call:
## lm(formula = Overall ~ (ShotPower + Acceleration + Vision + BallControl +
##     ShortPassing + Composure + Marking + HeadingAccuracy + Reactions)^2,
##     data = latestfifa19)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -4.5909 -0.9710  0.1171  0.9467  5.2285
```

```
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)    9.9063263   8.3142803   1.191  0.23459
## ShotPower      0.0590342   0.1634474   0.361  0.71827
## Acceleration   0.2178254   0.1017967   2.140  0.03333 *
## Vision         0.2318915   0.1815888   1.277  0.20278
## BallControl    0.4347882   0.2927445   1.485  0.13874
## ShortPassing   -0.4960103   0.2199331  -2.255  0.02498 *
## Composure      -0.3234646   0.2391108  -1.353  0.17734
## Marking        0.3669791   0.0887426   4.135 4.84e-05 ***
## HeadingAccuracy 0.5422467   0.1199130   4.522 9.45e-06 ***
## Reactions      -0.1214331   0.2430379  -0.500  0.61776
## ShotPower:Acceleration 0.0022097   0.0014002   1.578  0.11580
## ShotPower:Vision -0.0010568   0.0018564  -0.569  0.56969
## ShotPower:BallControl -0.0052647   0.0024111  -2.184  0.02992 *
## ShotPower:ShortPassing 0.0020037   0.0029140   0.688  0.49232
## ShotPower:Composure 0.0038609   0.0026263   1.470  0.14279
## ShotPower:Marking -0.0043312   0.0010046  -4.312 2.33e-05 ***
## ShotPower:HeadingAccuracy 0.0027042   0.0016728   1.617  0.10722
## ShotPower:Reactions -0.0009259   0.0029842  -0.310  0.75663
## Acceleration:Vision -0.0022944   0.0016659  -1.377  0.16965
## Acceleration:BallControl 0.0009728   0.0022260   0.437  0.66249
## Acceleration:ShortPassing 0.0024026   0.0023949   1.003  0.31673
## Acceleration:Composure 0.0016955   0.0019082   0.889  0.37512
## Acceleration:Marking -0.0004688   0.0007971  -0.588  0.55694
## Acceleration:HeadingAccuracy -0.0059232   0.0009746  -6.077 4.51e-09 ***
## Acceleration:Reactions -0.0011282   0.0023988  -0.470  0.63852
## Vision:BallControl -0.0005120   0.0035371  -0.145  0.88502
## Vision:ShortPassing 0.0026538   0.0033260   0.798  0.42569
## Vision:Composure -0.0004072   0.0030728  -0.133  0.89469
## Vision:Marking -0.0026202   0.0012842  -2.040  0.04236 *
## Vision:HeadingAccuracy -0.0057222   0.0019047  -3.004  0.00293 **
## Vision:Reactions 0.0052399   0.0038319   1.367  0.17272
## BallControl:ShortPassing 0.0064780   0.0033534   1.932  0.05452 .
## BallControl:Composure 0.0019260   0.0047713   0.404  0.68680
## BallControl:Marking -0.0084598   0.0018887  -4.479 1.14e-05 ***
## BallControl:HeadingAccuracy -0.0033173   0.0032416  -1.023  0.30713
## BallControl:Reactions 0.0018076   0.0055977   0.323  0.74702
## ShortPassing:Composure -0.0024325   0.0042132  -0.577  0.56421
## ShortPassing:Marking 0.0031715   0.0014970   2.119  0.03511 *
## ShortPassing:HeadingAccuracy -0.0009664   0.0029893  -0.323  0.74675
## ShortPassing:Reactions -0.0025503   0.0045239  -0.564  0.57344
## Composure:Marking 0.0036989   0.0013328   2.775  0.00593 **
## Composure:HeadingAccuracy 0.0028870   0.0023183   1.245  0.21418
## Composure:Reactions -0.0042446   0.0035759  -1.187  0.23635
## Marking:HeadingAccuracy -0.0001524   0.0008919  -0.171  0.86450
## Marking:Reactions 0.0044604   0.0015584   2.862  0.00456 **
## HeadingAccuracy:Reactions 0.0043580   0.0020006   2.178  0.03031 *
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.616 on 251 degrees of freedom
## Multiple R-squared:  0.9501, Adjusted R-squared:  0.9412
## F-statistic: 106.2 on 45 and 251 DF,  p-value: < 2.2e-16
```

This model presented here above has a much higher adjusted R^2 (0.94 vs 0.88) and a much lower residual standard error (1.616 vs 2.293).

Therefore, we used the stepwise regression method to remove all the non-significant predictors.

```
fit1.int.sbc = step (fit1sbc.int, direction = "both", k=log(n))

## Start:  AIC=497.18
## Overall ~ (ShotPower + Acceleration + Vision + BallControl +
##           ShortPassing + Composure + Marking + HeadingAccuracy + Reactions)^2
##
##               Df Sum of Sq    RSS    AIC
## - Vision:Composure      1      0.046 655.87 491.51
## - Vision:BallControl     1      0.055 655.88 491.51
## - Marking:HeadingAccuracy 1      0.076 655.90 491.52
## - ShotPower:Reactions     1      0.252 656.08 491.60
## - BallControl:Reactions   1      0.272 656.10 491.61
## - ShortPassing:HeadingAccuracy 1      0.273 656.10 491.61
## - BallControl:Composure   1      0.426 656.25 491.68
## - Acceleration:BallControl 1      0.499 656.32 491.72
## - Acceleration:Reactions  1      0.578 656.40 491.75
## - ShortPassing:Reactions  1      0.830 656.66 491.87
## - ShotPower:Vision        1      0.847 656.67 491.87
## - ShortPassing:Composure   1      0.871 656.70 491.88
## - Acceleration:Marking     1      0.904 656.73 491.90
## - ShotPower:ShortPassing   1      1.235 657.06 492.05
## - Vision:ShortPassing      1      1.663 657.49 492.24
## - Acceleration:Composure   1      2.063 657.89 492.42
## - Acceleration:ShortPassing 1      2.630 658.45 492.68
## - BallControl:HeadingAccuracy 1      2.736 658.56 492.73
## - Composure:Reactions      1      3.681 659.51 493.15
## - Composure:HeadingAccuracy 1      4.052 659.88 493.32
## - Vision:Reactions         1      4.886 660.71 493.69
## - Acceleration:Vision      1      4.956 660.78 493.73
## - ShotPower:Composure      1      5.647 661.47 494.04
## - ShotPower:Acceleration   1      6.507 662.33 494.42
## - ShotPower:HeadingAccuracy 1      6.828 662.65 494.57
## - BallControl:ShortPassing 1      9.750 665.58 495.87
## - Vision:Marking           1     10.878 666.70 496.38
## - ShortPassing:Marking      1     11.727 667.55 496.75
## - HeadingAccuracy:Reactions 1     12.398 668.22 497.05
## - ShotPower:BallControl    1     12.458 668.28 497.08
## <none>                     655.83 497.18
```

```

## - Composure:Marking          1    20.125 675.95 500.47
## - Marking:Reactions          1    21.404 677.23 501.03
## - Vision:HeadingAccuracy     1    23.582 679.41 501.98
## - ShotPower:Marking          1    48.573 704.40 512.71
## - BallControl:Marking        1    52.423 708.25 514.33
## - Acceleration:HeadingAccuracy 1    96.508 752.33 532.26
##
## Step:  AIC=491.51
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##      Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
tion +
##      ShotPower:Vision + ShotPower:BallControl + ShotPower:ShortPassing +
##      ShotPower:Composure + ShotPower:Marking + ShotPower:HeadingAccuracy +
##      ShotPower:Reactions + Acceleration:Vision + Acceleration:BallControl +
##      Acceleration:ShortPassing + Acceleration:Composure + Acceleration:Mark
ing +
##      Acceleration:HeadingAccuracy + Acceleration:Reactions + Vision:BallCon
trol +
##      Vision:ShortPassing + Vision:Marking + Vision:HeadingAccuracy +
##      Vision:Reactions + BallControl:ShortPassing + BallControl:Composure +
##      BallControl:Marking + BallControl:HeadingAccuracy + BallControl:Reacti
ons +
##      ShortPassing:Composure + ShortPassing:Marking + ShortPassing:HeadingAc
curacy +
##      ShortPassing:Reactions + Composure:Marking + Composure:HeadingAccuracy
+
##      Composure:Reactions + Marking:HeadingAccuracy + Marking:Reactions +
##      HeadingAccuracy:Reactions
##
##
##              Df Sum of Sq    RSS    AIC
## - Vision:BallControl          1      0.085 655.96 485.86
## - Marking:HeadingAccuracy      1      0.087 655.96 485.86
## - ShotPower:Reactions          1      0.244 656.11 485.93
## - ShortPassing:HeadingAccuracy 1      0.265 656.14 485.94
## - BallControl:Reactions        1      0.365 656.24 485.98
## - BallControl:Composure        1      0.380 656.25 485.99
## - Acceleration:BallControl     1      0.528 656.40 486.06
## - Acceleration:Reactions       1      0.606 656.48 486.09
## - ShortPassing:Reactions       1      0.787 656.66 486.17
## - ShotPower:Vision             1      0.834 656.71 486.19
## - Acceleration:Marking         1      0.896 656.77 486.22
## - ShortPassing:Composure       1      1.179 657.05 486.35
## - ShotPower:ShortPassing       1      1.227 657.10 486.37
## - Vision:ShortPassing          1      1.635 657.51 486.56
## - Acceleration:Composure       1      2.179 658.05 486.80
## - Acceleration:ShortPassing    1      2.623 658.49 487.00
## - BallControl:HeadingAccuracy  1      2.698 658.57 487.04
## - Composure:Reactions          1      3.728 659.60 487.50
## - Composure:HeadingAccuracy    1      4.414 660.28 487.81
## - Acceleration:Vision          1      4.982 660.85 488.06

```

```

## - ShotPower:Composure          1      5.624 661.49 488.35
## - Vision:Reactions             1      6.040 661.91 488.54
## - ShotPower:Acceleration       1      6.461 662.33 488.73
## - ShotPower:HeadingAccuracy    1      6.869 662.74 488.91
## - BallControl:ShortPassing     1     10.503 666.37 490.54
## - Vision:Marking               1     11.011 666.88 490.76
## - ShortPassing:Marking         1     11.991 667.86 491.20
## - HeadingAccuracy:Reactions     1     12.402 668.27 491.38
## - ShotPower:BallControl        1     12.438 668.31 491.40
## <none>                        655.87 491.51
## - Composure:Marking           1     21.329 677.20 495.32
## - Marking:Reactions            1     21.382 677.25 495.35
## + Vision:Composure             1      0.046 655.83 497.18
## - Vision:HeadingAccuracy       1     26.062 681.93 497.39
## - ShotPower:Marking            1     48.648 704.52 507.07
## - BallControl:Marking          1     53.091 708.96 508.93
## - Acceleration:HeadingAccuracy 1     97.368 753.24 526.93
##
## Step:  AIC=485.86
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##      Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
tion +
##      ShotPower:Vision + ShotPower:BallControl + ShotPower:ShortPassing +
##      ShotPower:Composure + ShotPower:Marking + ShotPower:HeadingAccuracy +
##      ShotPower:Reactions + Acceleration:Vision + Acceleration:BallControl +
##      Acceleration:ShortPassing + Acceleration:Composure + Acceleration:Mark
ing +
##      Acceleration:HeadingAccuracy + Acceleration:Reactions + Vision:ShortPa
ssing +
##      Vision:Marking + Vision:HeadingAccuracy + Vision:Reactions +
##      BallControl:ShortPassing + BallControl:Composure + BallControl:Marking
+
##      BallControl:HeadingAccuracy + BallControl:Reactions + ShortPassing:Com
posure +
##      ShortPassing:Marking + ShortPassing:HeadingAccuracy + ShortPassing:Rea
ctions +
##      Composure:Marking + Composure:HeadingAccuracy + Composure:Reactions +
##      Marking:HeadingAccuracy + Marking:Reactions + HeadingAccuracy:Reaction
s
##
##
##      Df Sum of Sq    RSS    AIC
## - Marking:HeadingAccuracy      1      0.070 656.03 480.19
## - ShotPower:Reactions           1      0.249 656.20 480.27
## - BallControl:Composure         1      0.300 656.26 480.30
## - ShortPassing:HeadingAccuracy  1      0.324 656.28 480.31
## - BallControl:Reactions         1      0.335 656.29 480.31
## - Acceleration:BallControl      1      0.519 656.47 480.40
## - Acceleration:Reactions        1      0.616 656.57 480.44
## - ShortPassing:Reactions        1      0.712 656.67 480.48
## - Acceleration:Marking          1      0.877 656.83 480.56

```

```

## - ShotPower:Vision          1      1.070 657.03 480.65
## - ShortPassing:Composure    1      1.102 657.06 480.66
## - ShotPower:ShortPassing    1      1.418 657.37 480.80
## - Vision:ShortPassing       1      1.897 657.85 481.02
## - Acceleration:Composure     1      2.266 658.22 481.19
## - BallControl:HeadingAccuracy 1      2.627 658.58 481.35
## - Acceleration:ShortPassing  1      2.710 658.67 481.39
## - Composure:Reactions        1      3.643 659.60 481.81
## - Composure:HeadingAccuracy  1      4.491 660.45 482.19
## - Acceleration:Vision        1      5.385 661.34 482.59
## - Vision:Reactions           1      6.048 662.00 482.89
## - ShotPower:Composure        1      6.155 662.11 482.94
## - ShotPower:Acceleration     1      6.571 662.53 483.12
## - ShotPower:HeadingAccuracy  1      6.785 662.74 483.22
## - BallControl:ShortPassing   1     10.645 666.60 484.94
## - Vision:Marking             1     11.957 667.91 485.53
## - ShortPassing:Marking        1     11.967 667.92 485.53
## - HeadingAccuracy:Reactions   1     12.335 668.29 485.69
## <none>                       1          655.96 485.86
## - ShotPower:BallControl      1     13.008 668.96 485.99
## - Marking:Reactions           1     21.463 677.42 489.72
## - Composure:Marking          1     21.485 677.44 489.73
## + Vision:BallControl         1      0.085 655.87 491.51
## + Vision:Composure           1      0.076 655.88 491.51
## - Vision:HeadingAccuracy      1     26.370 682.33 491.87
## - ShotPower:Marking           1     51.102 707.06 502.44
## - BallControl:Marking         1     55.387 711.34 504.24
## - Acceleration:HeadingAccuracy 1     97.589 753.54 521.35
##
## Step:  AIC=480.19
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##           Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##           tion +
##           ShotPower:Vision + ShotPower:BallControl + ShotPower:ShortPassing +
##           ShotPower:Composure + ShotPower:Marking + ShotPower:HeadingAccuracy +
##           ShotPower:Reactions + Acceleration:Vision + Acceleration:BallControl +
##           Acceleration:ShortPassing + Acceleration:Composure + Acceleration:Mark
##           ing +
##           Acceleration:HeadingAccuracy + Acceleration:Reactions + Vision:ShortPa
##           ssing +
##           Vision:Marking + Vision:HeadingAccuracy + Vision:Reactions +
##           BallControl:ShortPassing + BallControl:Composure + BallControl:Marking
##           +
##           BallControl:HeadingAccuracy + BallControl:Reactions + ShortPassing:Com
##           posture +
##           ShortPassing:Marking + ShortPassing:HeadingAccuracy + ShortPassing:Rea
##           ctions +
##           Composure:Marking + Composure:HeadingAccuracy + Composure:Reactions +
##           Marking:Reactions + HeadingAccuracy:Reactions
##

```

	Df	Sum of Sq	RSS	AIC
##				
## - ShotPower:Reactions	1	0.275	656.30	474.62
## - BallControl:Composure	1	0.295	656.32	474.63
## - BallControl:Reactions	1	0.301	656.33	474.64
## - ShortPassing:HeadingAccuracy	1	0.481	656.51	474.72
## - Acceleration:BallControl	1	0.617	656.64	474.78
## - Acceleration:Reactions	1	0.645	656.67	474.79
## - ShortPassing:Reactions	1	0.652	656.68	474.79
## - Acceleration:Marking	1	0.857	656.88	474.89
## - ShotPower:Vision	1	1.035	657.06	474.97
## - ShortPassing:Composure	1	1.118	657.14	475.01
## - ShotPower:ShortPassing	1	1.525	657.55	475.19
## - Vision:ShortPassing	1	1.851	657.88	475.34
## - Acceleration:Composure	1	2.196	658.22	475.49
## - BallControl:HeadingAccuracy	1	2.594	658.62	475.67
## - Acceleration:ShortPassing	1	2.648	658.67	475.70
## - Composure:Reactions	1	3.575	659.60	476.11
## - Composure:HeadingAccuracy	1	4.454	660.48	476.51
## - Acceleration:Vision	1	5.387	661.41	476.93
## - ShotPower:Composure	1	6.090	662.12	477.24
## - Vision:Reactions	1	6.131	662.16	477.26
## - ShotPower:Acceleration	1	7.403	663.43	477.83
## - ShotPower:HeadingAccuracy	1	8.371	664.40	478.27
## - BallControl:ShortPassing	1	10.638	666.66	479.28
## - Vision:Marking	1	12.019	668.04	479.89
## - ShortPassing:Marking	1	12.148	668.17	479.95
## - HeadingAccuracy:Reactions	1	12.292	668.32	480.01
## <none>			656.03	480.19
## - ShotPower:BallControl	1	13.251	669.28	480.44
## - Marking:Reactions	1	22.182	678.21	484.38
## - Composure:Marking	1	22.462	678.49	484.50
## + Vision:Composure	1	0.084	655.94	485.85
## + Marking:HeadingAccuracy	1	0.070	655.96	485.86
## + Vision:BallControl	1	0.067	655.96	485.86
## - Vision:HeadingAccuracy	1	26.373	682.40	486.21
## - ShotPower:Marking	1	53.237	709.26	497.67
## - BallControl:Marking	1	55.325	711.35	498.55
## - Acceleration:HeadingAccuracy	1	97.929	753.95	515.82

##

Step: AIC=474.62

Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
tion +

ShotPower:Vision + ShotPower:BallControl + ShotPower:ShortPassing +
ShotPower:Composure + ShotPower:Marking + ShotPower:HeadingAccuracy +
Acceleration:Vision + Acceleration:BallControl + Acceleration:ShortPas
sing +

Acceleration:Composure + Acceleration:Marking + Acceleration:HeadingAc
curacy +

Acceleration:Reactions + Vision:ShortPassing + Vision:Marking +

```

## Vision:HeadingAccuracy + Vision:Reactions + BallControl:ShortPassing +
## BallControl:Composure + BallControl:Marking + BallControl:HeadingAccu
acy +
## BallControl:Reactions + ShortPassing:Composure + ShortPassing:Marking
+
## ShortPassing:HeadingAccuracy + ShortPassing:Reactions + Composure:Mark
ing +
## Composure:HeadingAccuracy + Composure:Reactions + Marking:Reactions +
## HeadingAccuracy:Reactions
##
##
## Df Sum of Sq RSS AIC
## - BallControl:Reactions 1 0.134 656.43 468.99
## - ShortPassing:HeadingAccuracy 1 0.470 656.77 469.14
## - BallControl:Composure 1 0.470 656.77 469.14
## - Acceleration:BallControl 1 0.565 656.86 469.19
## - Acceleration:Reactions 1 0.607 656.91 469.20
## - ShortPassing:Reactions 1 0.646 656.95 469.22
## - Acceleration:Marking 1 0.848 657.15 469.31
## - ShortPassing:Composure 1 1.044 657.34 469.40
## - ShotPower:Vision 1 1.157 657.46 469.45
## - ShotPower:ShortPassing 1 1.389 657.69 469.56
## - Vision:ShortPassing 1 2.022 658.32 469.84
## - Acceleration:Composure 1 2.274 658.57 469.96
## - BallControl:HeadingAccuracy 1 2.490 658.79 470.05
## - Acceleration:ShortPassing 1 2.609 658.91 470.11
## - Composure:Reactions 1 3.904 660.20 470.69
## - Composure:HeadingAccuracy 1 4.864 661.16 471.12
## - Acceleration:Vision 1 5.252 661.55 471.30
## - ShotPower:Composure 1 6.001 662.30 471.63
## - Vision:Reactions 1 6.032 662.33 471.65
## - ShotPower:Acceleration 1 7.369 663.67 472.25
## - ShotPower:HeadingAccuracy 1 8.203 664.50 472.62
## - BallControl:ShortPassing 1 11.285 667.58 473.99
## - HeadingAccuracy:Reactions 1 12.021 668.32 474.32
## - ShortPassing:Marking 1 12.035 668.33 474.33
## - Vision:Marking 1 12.066 668.37 474.34
## <none> 656.30 474.62
## - ShotPower:BallControl 1 14.235 670.54 475.30
## - Composure:Marking 1 22.191 678.49 478.81
## + ShotPower:Reactions 1 0.275 656.03 480.19
## + Marking:HeadingAccuracy 1 0.095 656.20 480.27
## + Vision:Composure 1 0.075 656.22 480.28
## + Vision:BallControl 1 0.070 656.23 480.29
## - Vision:HeadingAccuracy 1 26.099 682.40 480.51
## - Marking:Reactions 1 27.149 683.45 480.97
## - ShotPower:Marking 1 53.558 709.86 492.23
## - BallControl:Marking 1 57.913 714.21 494.05
## - Acceleration:HeadingAccuracy 1 99.448 755.75 510.83
##
## Step: AIC=468.99

```



```

## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##   Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
tion +
##   ShotPower:Vision + ShotPower:BallControl + ShotPower:ShortPassing +
##   ShotPower:Composure + ShotPower:Marking + ShotPower:HeadingAccuracy +
##   Acceleration:Vision + Acceleration:BallControl + Acceleration:ShortPas
sing +
##   Acceleration:Composure + Acceleration:Marking + Acceleration:HeadingAc
curacy +
##   Acceleration:Reactions + Vision:ShortPassing + Vision:Marking +
##   Vision:HeadingAccuracy + Vision:Reactions + BallControl:ShortPassing +
##   BallControl:Composure + BallControl:Marking + BallControl:HeadingAccur
acy +
##   ShortPassing:Composure + ShortPassing:Marking + ShortPassing:HeadingAc
curacy +
##   ShortPassing:Reactions + Composure:Marking + Composure:HeadingAccuracy
+
##   Composure:Reactions + Marking:Reactions + HeadingAccuracy:Reactions
##
##               Df Sum of Sq    RSS    AIC
## - Acceleration:Reactions      1      0.475 656.91 463.51
## - ShortPassing:Reactions      1      0.514 656.95 463.53
## - ShortPassing:HeadingAccuracy  1      0.553 656.99 463.55
## - Acceleration:BallControl     1      0.607 657.04 463.57
## - Acceleration:Marking         1      0.868 657.30 463.69
## - BallControl:Composure        1      0.930 657.36 463.72
## - ShotPower:Vision             1      1.159 657.59 463.82
## - ShotPower:ShortPassing       1      1.546 657.98 464.00
## - ShortPassing:Composure       1      1.632 658.07 464.03
## - Vision:ShortPassing          1      1.893 658.33 464.15
## - Acceleration:Composure       1      2.141 658.58 464.26
## - BallControl:HeadingAccuracy  1      2.368 658.80 464.37
## - Acceleration:ShortPassing    1      2.485 658.92 464.42
## - Composure:Reactions          1      3.817 660.25 465.02
## - Composure:HeadingAccuracy    1      4.793 661.23 465.46
## - Acceleration:Vision          1      5.260 661.69 465.67
## - ShotPower:Composure          1      5.876 662.31 465.94
## - Vision:Reactions             1      7.140 663.57 466.51
## - ShotPower:Acceleration       1      7.504 663.94 466.67
## - ShotPower:HeadingAccuracy    1      8.645 665.08 467.18
## - Vision:Marking              1     12.029 668.46 468.69
## - ShortPassing:Marking         1     12.138 668.57 468.74
## - BallControl:ShortPassing     1     12.689 669.12 468.98
## - HeadingAccuracy:Reactions    1     12.692 669.13 468.98
## <none>                        656.43 468.99
## - ShotPower:BallControl        1     14.215 670.65 469.66
## - Composure:Marking            1     23.511 679.95 473.75
## + BallControl:Reactions        1      0.134 656.30 474.62
## + Vision:Composure             1      0.133 656.30 474.62
## + ShotPower:Reactions          1      0.108 656.33 474.64

```

```

## + Marking:HeadingAccuracy      1      0.056 656.38 474.66
## + Vision:BallControl           1      0.052 656.38 474.66
## - Vision:HeadingAccuracy       1     27.372 683.81 475.43
## - Marking:Reactions            1     28.462 684.90 475.90
## - ShotPower:Marking            1     53.535 709.97 486.58
## - BallControl:Marking          1     58.131 714.57 488.50
## - Acceleration:HeadingAccuracy 1    101.254 757.69 505.90
##
## Step:  AIC=463.51
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##      Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##      tion +
##      ShotPower:Vision + ShotPower:BallControl + ShotPower:ShortPassing +
##      ShotPower:Composure + ShotPower:Marking + ShotPower:HeadingAccuracy +
##      Acceleration:Vision + Acceleration:BallControl + Acceleration:ShortPas
##      sing +
##      Acceleration:Composure + Acceleration:Marking + Acceleration:HeadingAc
##      curacy +
##      Vision:ShortPassing + Vision:Marking + Vision:HeadingAccuracy +
##      Vision:Reactions + BallControl:ShortPassing + BallControl:Composure +
##      BallControl:Marking + BallControl:HeadingAccuracy + ShortPassing:Compo
##      sure +
##      ShortPassing:Marking + ShortPassing:HeadingAccuracy + ShortPassing:Rea
##      ctions +
##      Composure:Marking + Composure:HeadingAccuracy + Composure:Reactions +
##      Marking:Reactions + HeadingAccuracy:Reactions
##
##
##      Df Sum of Sq    RSS    AIC
## - ShortPassing:HeadingAccuracy  1      0.478 657.39 458.03
## - ShortPassing:Reactions        1      0.500 657.41 458.04
## - Acceleration:BallControl      1      0.538 657.45 458.06
## - BallControl:Composure         1      0.968 657.88 458.26
## - ShotPower:Vision              1      1.030 657.94 458.28
## - Acceleration:Marking          1      1.109 658.02 458.32
## - ShotPower:ShortPassing        1      1.532 658.44 458.51
## - Acceleration:Composure        1      1.671 658.58 458.57
## - ShortPassing:Composure        1      1.913 658.82 458.68
## - Vision:ShortPassing           1      2.232 659.14 458.83
## - Acceleration:ShortPassing     1      2.248 659.16 458.83
## - BallControl:HeadingAccuracy   1      2.396 659.30 458.90
## - Composure:Reactions           1      3.537 660.45 459.41
## - Composure:HeadingAccuracy     1      4.319 661.23 459.76
## - Acceleration:Vision           1      5.712 662.62 460.39
## - ShotPower:Composure           1      5.801 662.71 460.43
## - Vision:Reactions              1      6.667 663.58 460.82
## - ShotPower:Acceleration        1      7.330 664.24 461.11
## - ShotPower:HeadingAccuracy     1      8.722 665.63 461.74
## - Vision:Marking                1     11.635 668.54 463.03
## - ShortPassing:Marking          1     11.809 668.72 463.11
## <none>                          656.91 463.51

```

```

## - BallControl:ShortPassing      1      12.918 669.83 463.60
## - ShotPower:BallControl          1      14.412 671.32 464.26
## - HeadingAccuracy:Reactions      1      15.218 672.13 464.62
## - Composure:Marking              1      23.636 680.54 468.32
## + Acceleration:Reactions          1       0.475 656.43 468.99
## + ShotPower:Reactions             1       0.178 656.73 469.13
## + Vision:Composure               1       0.114 656.80 469.15
## + Marking:HeadingAccuracy         1       0.112 656.80 469.15
## + Vision:BallControl              1       0.072 656.84 469.17
## + BallControl:Reactions           1       0.002 656.91 469.20
## - Vision:HeadingAccuracy          1      27.106 684.01 469.83
## - Marking:Reactions               1      28.213 685.12 470.31
## - ShotPower:Marking               1      53.666 710.57 481.14
## - BallControl:Marking             1      58.003 714.91 482.95
## - Acceleration:HeadingAccuracy    1     105.765 762.67 502.16
##
## Step:  AIC=458.03
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##           Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##           tion +
##           ShotPower:Vision + ShotPower:BallControl + ShotPower:ShortPassing +
##           ShotPower:Composure + ShotPower:Marking + ShotPower:HeadingAccuracy +
##           Acceleration:Vision + Acceleration:BallControl + Acceleration:ShortPas
##           sing +
##           Acceleration:Composure + Acceleration:Marking + Acceleration:HeadingAc
##           curacy +
##           Vision:ShortPassing + Vision:Marking + Vision:HeadingAccuracy +
##           Vision:Reactions + BallControl:ShortPassing + BallControl:Composure +
##           BallControl:Marking + BallControl:HeadingAccuracy + ShortPassing:Compo
##           sure +
##           ShortPassing:Marking + ShortPassing:Reactions + Composure:Marking +
##           Composure:HeadingAccuracy + Composure:Reactions + Marking:Reactions +
##           HeadingAccuracy:Reactions
##
##                                     Df Sum of Sq    RSS    AIC
## - Acceleration:BallControl          1      0.357 657.74 452.50
## - ShotPower:Vision                   1      0.906 658.29 452.75
## - ShortPassing:Reactions              1      1.007 658.39 452.80
## - BallControl:Composure               1      1.137 658.52 452.85
## - ShotPower:ShortPassing              1      1.252 658.64 452.91
## - Acceleration:Marking                1      1.256 658.64 452.91
## - Acceleration:Composure              1      1.554 658.94 453.04
## - ShortPassing:Composure              1      2.569 659.96 453.50
## - Vision:ShortPassing                 1      2.625 660.01 453.52
## - Composure:Reactions                 1      3.097 660.48 453.74
## - Composure:HeadingAccuracy           1      3.897 661.28 454.10
## - BallControl:HeadingAccuracy         1      4.315 661.70 454.28
## - Acceleration:ShortPassing           1      4.654 662.04 454.44
## - ShotPower:Composure                 1      5.634 663.02 454.87
## - Vision:Reactions                   1      6.825 664.21 455.41

```

```

## - Acceleration:Vision      1      6.898 664.29 455.44
## - ShotPower:Acceleration    1      7.405 664.79 455.67
## - ShotPower:HeadingAccuracy 1      9.863 667.25 456.76
## - Vision:Marking            1     11.195 668.58 457.36
## - ShortPassing:Marking      1     11.333 668.72 457.42
## <none>                      1      657.39 458.03
## - BallControl:ShortPassing  1     13.037 670.42 458.17
## - ShotPower:BallControl     1     13.984 671.37 458.59
## - HeadingAccuracy:Reactions 1     14.783 672.17 458.95
## - Composure:Marking         1     23.774 681.16 462.89
## + ShortPassing:HeadingAccuracy 1      0.478 656.91 463.51
## + Acceleration:Reactions     1      0.400 656.99 463.55
## + Marking:HeadingAccuracy    1      0.271 657.12 463.61
## + Vision:Composure           1      0.143 657.24 463.66
## + ShotPower:Reactions        1      0.132 657.26 463.67
## + Vision:BallControl         1      0.121 657.27 463.67
## + BallControl:Reactions      1      0.023 657.36 463.72
## - Marking:Reactions          1     28.411 685.80 464.91
## - Vision:HeadingAccuracy     1     31.883 689.27 466.41
## - ShotPower:Marking          1     53.613 711.00 475.63
## - BallControl:Marking        1     57.580 714.97 477.28
## - Acceleration:HeadingAccuracy 1    105.444 762.83 496.52
##
## Step:  AIC=452.5
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##      Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##      tion +
##      ShotPower:Vision + ShotPower:BallControl + ShotPower:ShortPassing +
##      ShotPower:Composure + ShotPower:Marking + ShotPower:HeadingAccuracy +
##      Acceleration:Vision + Acceleration:ShortPassing + Acceleration:Composu
##      re +
##      Acceleration:Marking + Acceleration:HeadingAccuracy + Vision:ShortPass
##      ing +
##      Vision:Marking + Vision:HeadingAccuracy + Vision:Reactions +
##      BallControl:ShortPassing + BallControl:Composure + BallControl:Marking
##      +
##      BallControl:HeadingAccuracy + ShortPassing:Composure + ShortPassing:Ma
##      rking +
##      ShortPassing:Reactions + Composure:Marking + Composure:HeadingAccuracy
##      +
##      Composure:Reactions + Marking:Reactions + HeadingAccuracy:Reactions
##
##
##      Df Sum of Sq    RSS    AIC
## - ShotPower:Vision      1      0.887 658.63 447.21
## - ShortPassing:Reactions 1      1.010 658.75 447.26
## - BallControl:Composure  1      1.282 659.03 447.39
## - ShotPower:ShortPassing 1      1.350 659.09 447.42
## - Acceleration:Composure 1      1.573 659.32 447.52
## - Acceleration:Marking   1      1.607 659.35 447.53
## - Vision:ShortPassing    1      2.277 660.02 447.83

```

```

## - ShortPassing:Composure      1      2.625 660.37 447.99
## - Composure:Reactions         1      3.459 661.20 448.37
## - Composure:HeadingAccuracy   1      4.147 661.89 448.67
## - ShotPower:Composure         1      5.674 663.42 449.36
## - BallControl:HeadingAccuracy 1      6.530 664.27 449.74
## - Acceleration:Vision         1      6.595 664.34 449.77
## - Vision:Reactions           1      7.236 664.98 450.06
## - Acceleration:ShortPassing   1      7.916 665.66 450.36
## - ShotPower:Acceleration      1      9.123 666.87 450.90
## - ShotPower:HeadingAccuracy   1     10.260 668.00 451.41
## - Vision:Marking             1     10.841 668.59 451.66
## - ShortPassing:Marking        1     11.596 669.34 452.00
## <none>                        1     12.300 670.00 452.50
## - ShotPower:BallControl       1     14.276 672.02 453.19
## - BallControl:ShortPassing    1     14.774 672.52 453.41
## - HeadingAccuracy:Reactions   1     15.520 673.26 453.73
## - Composure:Marking          1     24.820 682.56 457.81
## + Acceleration:Reactions      1      0.361 657.38 458.03
## + Acceleration:BallControl    1      0.357 657.39 458.03
## + Marking:HeadingAccuracy     1      0.330 657.41 458.05
## + ShortPassing:HeadingAccuracy 1      0.297 657.45 458.06
## + Vision:Composure           1      0.189 657.56 458.11
## + ShotPower:Reactions        1      0.098 657.65 458.15
## + Vision:BallControl         1      0.088 657.66 458.16
## + BallControl:Reactions      1      0.035 657.71 458.18
## - Marking:Reactions          1     28.546 686.29 459.43
## - Vision:HeadingAccuracy     1     31.787 689.53 460.83
## - ShotPower:Marking          1     53.457 711.20 470.02
## - BallControl:Marking        1     65.141 722.89 474.86
## - Acceleration:HeadingAccuracy 1    105.957 763.70 491.17
##
## Step:  AIC=447.21
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##           Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##           tion +
##           ShotPower:BallControl + ShotPower:ShortPassing + ShotPower:Composure +
##           ShotPower:Marking + ShotPower:HeadingAccuracy + Acceleration:Vision +
##           Acceleration:ShortPassing + Acceleration:Composure + Acceleration:Mark
##           ing +
##           Acceleration:HeadingAccuracy + Vision:ShortPassing + Vision:Marking +
##           Vision:HeadingAccuracy + Vision:Reactions + BallControl:ShortPassing +
##           BallControl:Composure + BallControl:Marking + BallControl:HeadingAccur
##           acy +
##           ShortPassing:Composure + ShortPassing:Marking + ShortPassing:Reactions
##           +
##           Composure:Marking + Composure:HeadingAccuracy + Composure:Reactions +
##           Marking:Reactions + HeadingAccuracy:Reactions
##
##           Df Sum of Sq    RSS    AIC
## - ShortPassing:Reactions      1      0.807 659.44 441.88

```

```

## - ShotPower:ShortPassing      1      0.831 659.46 441.89
## - BallControl:Composure        1      1.387 660.02 442.14
## - Acceleration:Marking         1      1.656 660.29 442.26
## - Acceleration:Composure       1      1.657 660.29 442.26
## - Vision:ShortPassing         1      1.859 660.49 442.35
## - ShortPassing:Composure       1      2.671 661.30 442.72
## - Composure:Reactions          1      2.887 661.52 442.81
## - Composure:HeadingAccuracy    1      4.150 662.78 443.38
## - ShotPower:Composure          1      4.829 663.46 443.68
## - Vision:Reactions            1      6.350 664.98 444.36
## - BallControl:HeadingAccuracy  1      6.663 665.29 444.50
## - Acceleration:Vision         1      7.379 666.01 444.82
## - Acceleration:ShortPassing    1      8.804 667.43 445.46
## - ShotPower:Acceleration       1      9.304 667.94 445.68
## - Vision:Marking              1     10.682 669.31 446.29
## - ShortPassing:Marking         1     11.169 669.80 446.51
## - ShotPower:HeadingAccuracy    1     11.542 670.17 446.67
## <none>                        1     15.234 673.87 448.31
## - HeadingAccuracy:Reactions    1     15.234 673.87 448.31
## - BallControl:ShortPassing     1     16.368 675.00 448.81
## - ShotPower:BallControl        1     16.841 675.47 449.01
## - Composure:Marking           1     24.005 682.64 452.15
## + ShotPower:Vision             1      0.887 657.74 452.50
## + Acceleration:BallControl     1      0.338 658.29 452.75
## + Vision:BallControl          1      0.292 658.34 452.77
## + Acceleration:Reactions       1      0.266 658.37 452.78
## + Marking:HeadingAccuracy      1      0.223 658.41 452.80
## + ShortPassing:HeadingAccuracy 1      0.208 658.42 452.81
## + Vision:Composure            1      0.205 658.43 452.81
## + ShotPower:Reactions          1      0.154 658.48 452.83
## + BallControl:Reactions        1      0.045 658.59 452.88
## - Marking:Reactions            1     28.087 686.72 453.92
## - Vision:HeadingAccuracy       1     31.761 690.39 455.50
## - ShotPower:Marking            1     55.191 713.82 465.41
## - BallControl:Marking          1     73.333 731.96 472.87
## - Acceleration:HeadingAccuracy 1    106.351 764.98 485.97
##
## Step:  AIC=441.88
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##           Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##           tion +
##           ShotPower:BallControl + ShotPower:ShortPassing + ShotPower:Composure +
##           ShotPower:Marking + ShotPower:HeadingAccuracy + Acceleration:Vision +
##           Acceleration:ShortPassing + Acceleration:Composure + Acceleration:Mark
##           ing +
##           Acceleration:HeadingAccuracy + Vision:ShortPassing + Vision:Marking +
##           Vision:HeadingAccuracy + Vision:Reactions + BallControl:ShortPassing +
##           BallControl:Composure + BallControl:Marking + BallControl:HeadingAccur
##           acy +
##           ShortPassing:Composure + ShortPassing:Marking + Composure:Marking +

```

```

##      Composure:HeadingAccuracy + Composure:Reactions + Marking:Reactions +
##      HeadingAccuracy:Reactions
##
##      Df Sum of Sq    RSS    AIC
## - ShotPower:ShortPassing      1      0.848 660.29 436.57
## - Acceleration:Composure      1      1.574 661.01 436.89
## - Acceleration:Marking        1      1.919 661.36 437.05
## - Vision:ShortPassing         1      2.198 661.64 437.17
## - BallControl:Composure       1      2.538 661.98 437.33
## - Composure:Reactions         1      3.983 663.42 437.97
## - Composure:HeadingAccuracy   1      4.405 663.84 438.16
## - ShotPower:Composure         1      5.128 664.57 438.48
## - ShortPassing:Composure      1      5.183 664.62 438.51
## - Vision:Reactions            1      5.673 665.11 438.73
## - Acceleration:Vision         1      6.789 666.23 439.23
## - BallControl:HeadingAccuracy 1      7.970 667.41 439.75
## - Acceleration:ShortPassing   1      8.223 667.66 439.87
## - ShotPower:Acceleration      1      9.177 668.62 440.29
## - Vision:Marking              1     10.305 669.74 440.79
## - ShortPassing:Marking        1     10.595 670.03 440.92
## - ShotPower:HeadingAccuracy   1     11.943 671.38 441.52
## <none>                        659.44 441.88
## - HeadingAccuracy:Reactions   1     14.451 673.89 442.62
## - BallControl:ShortPassing    1     15.901 675.34 443.26
## - ShotPower:BallControl       1     16.694 676.13 443.61
## + ShortPassing:Reactions      1      0.807 658.63 447.21
## + ShotPower:Vision            1      0.684 658.75 447.26
## + ShortPassing:HeadingAccuracy 1      0.544 658.89 447.33
## + Acceleration:BallControl    1      0.343 659.10 447.42
## + ShotPower:Reactions         1      0.314 659.12 447.43
## + Acceleration:Reactions      1      0.235 659.20 447.47
## + Marking:HeadingAccuracy     1      0.209 659.23 447.48
## + Vision:BallControl          1      0.139 659.30 447.51
## + BallControl:Reactions       1      0.043 659.40 447.55
## + Vision:Composure            1      0.003 659.44 447.57
## - Composure:Marking           1     26.525 685.96 447.90
## - Marking:Reactions           1     27.421 686.86 448.28
## - Vision:HeadingAccuracy      1     30.977 690.42 449.82
## - ShotPower:Marking           1     56.439 715.88 460.57
## - BallControl:Marking         1     72.529 731.97 467.18
## - Acceleration:HeadingAccuracy 1    106.768 766.21 480.75
##
## Step:  AIC=436.57
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##      Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##      tion +
##      ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
##      ShotPower:HeadingAccuracy + Acceleration:Vision + Acceleration:ShortPa
##      ssing +
##      Acceleration:Composure + Acceleration:Marking + Acceleration:HeadingAc

```

```

curacy +
## Vision:ShortPassing + Vision:Marking + Vision:HeadingAccuracy +
## Vision:Reactions + BallControl:ShortPassing + BallControl:Composure +
## BallControl:Marking + BallControl:HeadingAccuracy + ShortPassing:Compo
sure +
## ShortPassing:Marking + Composure:Marking + Composure:HeadingAccuracy +
## Composure:Reactions + Marking:Reactions + HeadingAccuracy:Reactions
##
##
## Df Sum of Sq RSS AIC
## - Acceleration:Composure 1 1.584 661.87 431.58
## - BallControl:Composure 1 1.742 662.03 431.65
## - Acceleration:Marking 1 2.011 662.30 431.78
## - Vision:ShortPassing 1 2.700 662.99 432.08
## - Composure:Reactions 1 4.391 664.68 432.84
## - ShortPassing:Composure 1 4.571 664.86 432.92
## - Composure:HeadingAccuracy 1 4.667 664.95 432.96
## - Vision:Reactions 1 5.474 665.76 433.32
## - Acceleration:Vision 1 6.996 667.28 434.00
## - BallControl:HeadingAccuracy 1 7.754 668.04 434.34
## - Acceleration:ShortPassing 1 8.445 668.73 434.65
## - ShotPower:Acceleration 1 8.677 668.96 434.75
## - ShotPower:Composure 1 9.492 669.78 435.11
## - ShortPassing:Marking 1 9.781 670.07 435.24
## - ShotPower:HeadingAccuracy 1 11.199 671.48 435.87
## - Vision:Marking 1 11.357 671.64 435.94
## <none> 660.29 436.57
## - HeadingAccuracy:Reactions 1 13.991 674.28 437.10
## - ShotPower:BallControl 1 17.271 677.56 438.54
## - BallControl:ShortPassing 1 21.749 682.03 440.50
## + ShotPower:ShortPassing 1 0.848 659.44 441.88
## + ShortPassing:Reactions 1 0.823 659.46 441.89
## + Acceleration:BallControl 1 0.428 659.86 442.07
## + ShortPassing:HeadingAccuracy 1 0.310 659.98 442.12
## + Marking:HeadingAccuracy 1 0.271 660.01 442.14
## + Acceleration:Reactions 1 0.266 660.02 442.14
## + ShotPower:Vision 1 0.247 660.04 442.15
## + Vision:BallControl 1 0.184 660.10 442.18
## + ShotPower:Reactions 1 0.139 660.15 442.20
## + BallControl:Reactions 1 0.016 660.27 442.25
## + Vision:Composure 1 0.011 660.27 442.25
## - Composure:Marking 1 27.184 687.47 442.85
## - Marking:Reactions 1 27.540 687.83 443.01
## - Vision:HeadingAccuracy 1 30.221 690.51 444.16
## - ShotPower:Marking 1 55.760 716.05 454.95
## - BallControl:Marking 1 71.716 732.00 461.50
## - Acceleration:HeadingAccuracy 1 106.219 766.51 475.18
##
## Step: AIC=431.58
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
## Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera

```



```

tion +
## ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
## ShotPower:HeadingAccuracy + Acceleration:Vision + Acceleration:ShortPa
ssing +
## Acceleration:Marking + Acceleration:HeadingAccuracy + Vision:ShortPass
ing +
## Vision:Marking + Vision:HeadingAccuracy + Vision:Reactions +
## BallControl:ShortPassing + BallControl:Composure + BallControl:Marking
+
## BallControl:HeadingAccuracy + ShortPassing:Composure + ShortPassing:Ma
rking +
## Composure:Marking + Composure:HeadingAccuracy + Composure:Reactions +
## Marking:Reactions + HeadingAccuracy:Reactions
##
##
## Df Sum of Sq RSS AIC
## - Acceleration:Marking 1 1.824 663.69 426.71
## - BallControl:Composure 1 2.160 664.03 426.86
## - Vision:ShortPassing 1 2.680 664.55 427.09
## - Composure:HeadingAccuracy 1 3.214 665.08 427.33
## - Composure:Reactions 1 3.504 665.37 427.46
## - Vision:Reactions 1 5.230 667.10 428.23
## - ShortPassing:Composure 1 5.514 667.38 428.35
## - Acceleration:Vision 1 5.886 667.76 428.52
## - BallControl:HeadingAccuracy 1 7.254 669.12 429.13
## - ShotPower:Composure 1 9.746 671.62 430.23
## - ShortPassing:Marking 1 10.259 672.13 430.46
## - ShotPower:Acceleration 1 11.387 673.26 430.96
## - ShotPower:HeadingAccuracy 1 11.623 673.49 431.06
## - Vision:Marking 1 12.109 673.98 431.27
## - Acceleration:ShortPassing 1 12.712 674.58 431.54
## <none> 661.87 431.58
## - HeadingAccuracy:Reactions 1 15.590 677.46 432.80
## - ShotPower:BallControl 1 18.395 680.26 434.03
## - BallControl:ShortPassing 1 21.297 683.17 435.30
## + Acceleration:Composure 1 1.584 660.29 436.57
## + ShotPower:ShortPassing 1 0.858 661.01 436.89
## + ShortPassing:Reactions 1 0.739 661.13 436.95
## + Acceleration:BallControl 1 0.447 661.42 437.08
## + Vision:BallControl 1 0.330 661.54 437.13
## + ShotPower:Vision 1 0.293 661.58 437.15
## + ShotPower:Reactions 1 0.248 661.62 437.17
## + ShortPassing:HeadingAccuracy 1 0.203 661.67 437.19
## + Marking:HeadingAccuracy 1 0.061 661.81 437.25
## + Vision:Composure 1 0.048 661.82 437.26
## + BallControl:Reactions 1 0.042 661.83 437.26
## + Acceleration:Reactions 1 0.005 661.87 437.28
## - Composure:Marking 1 26.815 688.68 437.69
## - Marking:Reactions 1 27.123 688.99 437.82
## - Vision:HeadingAccuracy 1 29.167 691.04 438.70
## - ShotPower:Marking 1 54.870 716.74 449.54

```

```

## - BallControl:Marking          1    70.761 732.63 456.06
## - Acceleration:HeadingAccuracy 1   107.448 769.32 470.57
##
## Step:  AIC=426.71
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##      Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##      tion +
##      ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
##      ShotPower:HeadingAccuracy + Acceleration:Vision + Acceleration:ShortPa
##      ssing +
##      Acceleration:HeadingAccuracy + Vision:ShortPassing + Vision:Marking +
##      Vision:HeadingAccuracy + Vision:Reactions + BallControl:ShortPassing +
##      BallControl:Composure + BallControl:Marking + BallControl:HeadingAccur
##      acy +
##      ShortPassing:Composure + ShortPassing:Marking + Composure:Marking +
##      Composure:HeadingAccuracy + Composure:Reactions + Marking:Reactions +
##      HeadingAccuracy:Reactions
##
##
##      Df Sum of Sq    RSS    AIC
## - BallControl:Composure          1      2.091 665.78 421.95
## - Composure:HeadingAccuracy       1      3.006 666.70 422.36
## - Composure:Reactions             1      3.124 666.82 422.41
## - Vision:ShortPassing            1      3.270 666.96 422.47
## - Vision:Reactions               1      4.945 668.64 423.22
## - ShortPassing:Composure          1      5.396 669.09 423.42
## - Acceleration:Vision             1      5.960 669.65 423.67
## - BallControl:HeadingAccuracy     1      7.616 671.31 424.40
## - ShotPower:Composure            1      9.324 673.02 425.16
## - ShortPassing:Marking           1     10.275 673.97 425.58
## - Acceleration:ShortPassing       1     10.889 674.58 425.85
## - Vision:Marking                 1     12.166 675.86 426.41
## - ShotPower:HeadingAccuracy       1     12.461 676.15 426.54
## <none>                          663.69 426.71
## - HeadingAccuracy:Reactions       1     15.330 679.02 427.80
## - ShotPower:BallControl           1     19.999 683.69 429.83
## - ShotPower:Acceleration          1     20.043 683.74 429.85
## - BallControl:ShortPassing        1     21.480 685.17 430.47
## + Acceleration:Marking            1      1.824 661.87 431.58
## + Acceleration:Composure          1      1.397 662.30 431.78
## + ShortPassing:Reactions          1      0.991 662.70 431.96
## + ShotPower:ShortPassing          1      0.945 662.75 431.98
## + Acceleration:BallControl        1      0.868 662.83 432.01
## + Vision:BallControl              1      0.337 663.36 432.25
## + ShortPassing:HeadingAccuracy    1      0.302 663.39 432.27
## + ShotPower:Vision               1      0.284 663.41 432.27
## + ShotPower:Reactions             1      0.231 663.46 432.30
## + Marking:HeadingAccuracy         1      0.112 663.58 432.35
## + BallControl:Reactions           1      0.075 663.62 432.37
## + Acceleration:Reactions          1      0.018 663.68 432.39
## + Vision:Composure               1      0.013 663.68 432.40

```

```

## - Marking:Reactions          1    26.296 689.99 432.55
## - Composure:Marking          1    28.637 692.33 433.56
## - Vision:HeadingAccuracy      1    28.755 692.45 433.61
## - ShotPower:Marking           1    53.532 717.23 444.05
## - BallControl:Marking          1    78.264 741.96 454.12
## - Acceleration:HeadingAccuracy 1   126.156 789.85 472.70
##
## Step:  AIC=421.95
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##      Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
tion +
##      ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
##      ShotPower:HeadingAccuracy + Acceleration:Vision + Acceleration:ShortPa
ssing +
##      Acceleration:HeadingAccuracy + Vision:ShortPassing + Vision:Marking +
##      Vision:HeadingAccuracy + Vision:Reactions + BallControl:ShortPassing +
##      BallControl:Marking + BallControl:HeadingAccuracy + ShortPassing:Compo
sure +
##      ShortPassing:Marking + Composure:Marking + Composure:HeadingAccuracy +
##      Composure:Reactions + Marking:Reactions + HeadingAccuracy:Reactions
##
##                               Df Sum of Sq    RSS    AIC
## - Composure:Reactions          1     1.930 667.71 417.11
## - Composure:HeadingAccuracy      1     2.603 668.39 417.41
## - Vision:ShortPassing            1     2.625 668.41 417.42
## - ShortPassing:Composure          1     3.774 669.56 417.93
## - Vision:Reactions               1     4.903 670.69 418.43
## - Acceleration:Vision            1     5.358 671.14 418.63
## - BallControl:HeadingAccuracy     1     5.932 671.72 418.89
## - ShortPassing:Marking            1     8.890 674.67 420.19
## - Acceleration:ShortPassing       1    10.016 675.80 420.69
## - Vision:Marking                  1    10.984 676.77 421.11
## - ShotPower:HeadingAccuracy        1    11.273 677.06 421.24
## - ShotPower:Composure              1    11.930 677.71 421.53
## <none>                             665.78 421.95
## - HeadingAccuracy:Reactions       1    13.889 679.67 422.39
## - ShotPower:BallControl            1    18.472 684.26 424.38
## - ShotPower:Acceleration           1    19.306 685.09 424.74
## + ShortPassing:Reactions           1     2.154 663.63 426.68
## + BallControl:Composure            1     2.091 663.69 426.71
## + Acceleration:Composure           1     1.788 664.00 426.84
## + Acceleration:Marking              1     1.754 664.03 426.86
## + Acceleration:BallControl          1     1.089 664.70 427.16
## + ShortPassing:HeadingAccuracy      1     0.915 664.87 427.23
## + ShotPower:Reactions              1     0.607 665.18 427.37
## + ShotPower:Vision                 1     0.587 665.20 427.38
## + Vision:Composure                 1     0.483 665.30 427.43
## + Vision:BallControl               1     0.376 665.41 427.47
## + Marking:HeadingAccuracy           1     0.230 665.55 427.54
## + ShotPower:ShortPassing           1     0.045 665.74 427.62

```

```

## + BallControl:Reactions      1      0.018 665.77 427.63
## + Acceleration:Reactions     1      0.001 665.78 427.64
## - Composure:Marking         1     26.974 692.76 428.05
## - Marking:Reactions         1     27.311 693.10 428.19
## - BallControl:ShortPassing   1     29.153 694.94 428.98
## - Vision:HeadingAccuracy     1     30.351 696.14 429.49
## - ShotPower:Marking         1     53.945 719.73 439.39
## - BallControl:Marking       1     76.805 742.59 448.68
## - Acceleration:HeadingAccuracy 1    124.650 790.43 467.22
##
## Step:  AIC=417.11
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##      Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##      tion +
##      ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
##      ShotPower:HeadingAccuracy + Acceleration:Vision + Acceleration:ShortPa
##      ssing +
##      Acceleration:HeadingAccuracy + Vision:ShortPassing + Vision:Marking +
##      Vision:HeadingAccuracy + Vision:Reactions + BallControl:ShortPassing +
##      BallControl:Marking + BallControl:HeadingAccuracy + ShortPassing:Compo
##      sure +
##      ShortPassing:Marking + Composure:Marking + Composure:HeadingAccuracy +
##      Marking:Reactions + HeadingAccuracy:Reactions
##
##
##      Df Sum of Sq    RSS    AIC
## - Composure:HeadingAccuracy      1      1.293 669.01 411.99
## - Vision:Reactions                1      2.976 670.69 412.74
## - Acceleration:Vision              1      4.894 672.61 413.59
## - BallControl:HeadingAccuracy     1      5.593 673.31 413.90
## - Vision:ShortPassing             1      5.646 673.36 413.92
## - ShortPassing:Composure          1      7.363 675.08 414.68
## - Acceleration:ShortPassing       1      8.777 676.49 415.30
## - ShortPassing:Marking            1      9.325 677.04 415.54
## - ShotPower:Composure             1     10.024 677.74 415.85
## - Vision:Marking                 1     11.474 679.19 416.48
## - HeadingAccuracy:Reactions       1     11.962 679.68 416.69
## - ShotPower:HeadingAccuracy       1     12.825 680.54 417.07
## <none>                           667.71 417.11
## - ShotPower:BallControl           1     17.180 684.89 418.97
## - ShotPower:Acceleration          1     19.435 687.15 419.94
## + ShortPassing:Reactions          1      2.719 665.00 421.60
## + Composure:Reactions             1      1.930 665.78 421.95
## + Acceleration:Marking            1      1.462 666.25 422.16
## + Acceleration:BallControl        1      1.449 666.27 422.16
## + ShotPower:Reactions             1      1.056 666.66 422.34
## + Acceleration:Composure          1      0.899 666.82 422.41
## + BallControl:Composure           1      0.897 666.82 422.41
## - Composure:Marking              1     25.568 693.28 422.58
## + Vision:Composure               1      0.488 667.23 422.59
## + Vision:BallControl              1      0.365 667.35 422.65

```

```

## + ShotPower:ShortPassing      1      0.277 667.44 422.68
## + ShortPassing:HeadingAccuracy 1      0.275 667.44 422.69
## + Marking:HeadingAccuracy      1      0.244 667.47 422.70
## + BallControl:Reactions        1      0.203 667.51 422.72
## + ShotPower:Vision             1      0.069 667.65 422.78
## + Acceleration:Reactions       1      0.001 667.71 422.81
## - Marking:Reactions            1     26.630 694.34 423.04
## - BallControl:ShortPassing     1     28.110 695.82 423.67
## - Vision:HeadingAccuracy       1     29.216 696.93 424.14
## - ShotPower:Marking            1     52.545 720.26 433.92
## - BallControl:Marking          1     76.233 743.95 443.53
## - Acceleration:HeadingAccuracy 1    136.483 804.20 466.66
##
## Step:  AIC=411.99
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##           Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##           tion +
##           ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
##           ShotPower:HeadingAccuracy + Acceleration:Vision + Acceleration:ShortPa
##           ssing +
##           Acceleration:HeadingAccuracy + Vision:ShortPassing + Vision:Marking +
##           Vision:HeadingAccuracy + Vision:Reactions + BallControl:ShortPassing +
##           BallControl:Marking + BallControl:HeadingAccuracy + ShortPassing:Compo
##           sure +
##           ShortPassing:Marking + Composure:Marking + Marking:Reactions +
##           HeadingAccuracy:Reactions
##
##
##           Df Sum of Sq    RSS    AIC
## - Vision:Reactions      1      2.992 672.00 407.63
## - BallControl:HeadingAccuracy 1      4.560 673.57 408.32
## - Acceleration:Vision    1      4.754 673.76 408.40
## - Vision:ShortPassing    1      5.401 674.41 408.69
## - ShortPassing:Composure 1      8.414 677.42 410.01
## - Acceleration:ShortPassing 1      8.762 677.77 410.17
## - ShortPassing:Marking   1      9.799 678.81 410.62
## - Vision:Marking         1     11.420 680.43 411.33
## - ShotPower:Composure    1     12.572 681.58 411.83
## <none>                    669.01 411.99
## - ShotPower:HeadingAccuracy 1     14.376 683.38 412.62
## - ShotPower:BallControl   1     18.772 687.78 414.52
## - HeadingAccuracy:Reactions 1     19.007 688.01 414.62
## - ShotPower:Acceleration  1     19.882 688.89 415.00
## + ShortPassing:Reactions  1      2.661 666.35 416.50
## + Acceleration:BallControl 1      1.543 667.46 417.00
## + Acceleration:Marking    1      1.432 667.58 417.05
## + ShotPower:Reactions     1      1.299 667.71 417.11
## + Composure:HeadingAccuracy 1      1.293 667.71 417.11
## + BallControl:Composure   1      1.004 668.00 417.24
## + Composure:Reactions     1      0.620 668.39 417.41
## + Marking:HeadingAccuracy  1      0.423 668.58 417.50

```

```

## + Vision:Composure          1      0.299 668.71 417.56
## + Vision:BallControl        1      0.278 668.73 417.57
## + ShotPower:ShortPassing    1      0.277 668.73 417.57
## + Acceleration:Composure    1      0.208 668.80 417.60
## + BallControl:Reactions     1      0.196 668.81 417.60
## + ShortPassing:HeadingAccuracy 1      0.168 668.84 417.61
## + ShotPower:Vision          1      0.132 668.87 417.63
## + Acceleration:Reactions    1      0.011 669.00 417.68
## - Marking:Reactions         1     26.797 695.80 417.96
## - Vision:HeadingAccuracy    1     28.408 697.41 418.65
## - BallControl:ShortPassing  1     28.913 697.92 418.87
## - Composure:Marking         1     32.566 701.57 420.42
## - ShotPower:Marking         1     57.627 726.63 430.84
## - BallControl:Marking       1     80.635 749.64 440.10
## - Acceleration:HeadingAccuracy 1    140.685 809.69 462.99
##
## Step:  AIC=407.63
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##           Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##           tion +
##           ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
##           ShotPower:HeadingAccuracy + Acceleration:Vision + Acceleration:ShortPa
##           ssing +
##           Acceleration:HeadingAccuracy + Vision:ShortPassing + Vision:Marking +
##           Vision:HeadingAccuracy + BallControl:ShortPassing + BallControl:Markin
##           g +
##           BallControl:HeadingAccuracy + ShortPassing:Composure + ShortPassing:Ma
##           rking +
##           Composure:Marking + Marking:Reactions + HeadingAccuracy:Reactions
##
##
##           Df Sum of Sq    RSS    AIC
## - Acceleration:Vision          1      3.239 675.24 403.36
## - BallControl:HeadingAccuracy  1      5.051 677.05 404.16
## - ShortPassing:Composure        1      6.721 678.72 404.89
## - Acceleration:ShortPassing     1      7.448 679.45 405.21
## - ShortPassing:Marking          1      8.646 680.64 405.73
## - Vision:Marking                1     10.750 682.75 406.65
## - Vision:ShortPassing           1     11.459 683.46 406.95
## - ShotPower:Composure           1     12.908 684.91 407.58
## <none>                          672.00 407.63
## - ShotPower:HeadingAccuracy     1     13.096 685.09 407.66
## - ShotPower:BallControl         1     17.586 689.58 409.60
## - HeadingAccuracy:Reactions     1     18.324 690.32 409.92
## - ShotPower:Acceleration        1     18.656 690.65 410.07
## + Vision:Reactions              1      2.992 669.01 411.99
## + BallControl:Composure         1      1.952 670.05 412.46
## + Acceleration:BallControl      1      1.752 670.25 412.54
## + Vision:Composure              1      1.491 670.51 412.66
## + Acceleration:Marking          1      1.449 670.55 412.68
## + Composure:HeadingAccuracy     1      1.308 670.69 412.74

```

```

## + Vision:BallControl          1      1.163 670.84 412.81
## + BallControl:Reactions        1      0.976 671.02 412.89
## - Vision:HeadingAccuracy       1     25.496 697.50 412.99
## + Acceleration:Composure       1      0.494 671.50 413.10
## - Marking:Reactions            1     25.821 697.82 413.13
## + Acceleration:Reactions       1      0.327 671.67 413.18
## + ShortPassing:HeadingAccuracy  1      0.323 671.68 413.18
## + Marking:HeadingAccuracy      1      0.261 671.74 413.20
## + Composure:Reactions         1      0.191 671.81 413.24
## + ShortPassing:Reactions       1      0.044 671.95 413.30
## + ShotPower:Vision            1      0.021 671.98 413.31
## + ShotPower:ShortPassing       1      0.008 671.99 413.32
## + ShotPower:Reactions         1      0.001 672.00 413.32
## - BallControl:ShortPassing     1     27.552 699.55 413.87
## - Composure:Marking           1     31.833 703.83 415.68
## - ShotPower:Marking           1     57.121 729.12 426.16
## - BallControl:Marking          1     78.790 750.79 434.86
## - Acceleration:HeadingAccuracy  1    138.533 810.53 457.60
##
## Step:  AIC=403.36
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##           Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##           tion +
##           ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
##           ShotPower:HeadingAccuracy + Acceleration:ShortPassing + Acceleration:H
##           eadingAccuracy +
##           Vision:ShortPassing + Vision:Marking + Vision:HeadingAccuracy +
##           BallControl:ShortPassing + BallControl:Marking + BallControl:HeadingAc
##           curacy +
##           ShortPassing:Composure + ShortPassing:Marking + Composure:Marking +
##           Marking:Reactions + HeadingAccuracy:Reactions
##
##
##           Df Sum of Sq    RSS    AIC
## - Acceleration:ShortPassing    1      4.235 679.47 399.52
## - ShortPassing:Composure        1      6.569 681.81 400.54
## - BallControl:HeadingAccuracy   1      7.016 682.25 400.74
## - ShortPassing:Marking          1      7.984 683.22 401.16
## - Vision:ShortPassing           1      9.139 684.38 401.66
## - Vision:Marking                1      9.235 684.47 401.70
## - ShotPower:Composure           1     12.773 688.01 403.23
## - ShotPower:HeadingAccuracy     1     12.938 688.18 403.30
## <none>                          675.24 403.36
## - ShotPower:Acceleration        1     15.513 690.75 404.41
## - ShotPower:BallControl         1     16.740 691.98 404.94
## - HeadingAccuracy:Reactions     1     18.262 693.50 405.59
## - Vision:HeadingAccuracy        1     22.516 697.75 407.41
## + Acceleration:Vision           1      3.239 672.00 407.63
## + Acceleration:Marking          1      1.532 673.71 408.38
## + Vision:Reactions              1      1.476 673.76 408.40
## + BallControl:Composure         1      1.319 673.92 408.47

```

```

## + Composure:HeadingAccuracy      1      1.183 674.05 408.53
## + ShortPassing:HeadingAccuracy    1      0.859 674.38 408.68
## + Vision:Composure                1      0.611 674.63 408.79
## + BallControl:Reactions           1      0.513 674.72 408.83
## + Acceleration:BallControl        1      0.363 674.88 408.89
## + ShotPower:Vision                1      0.190 675.05 408.97
## + Vision:BallControl              1      0.172 675.07 408.98
## + Marking:HeadingAccuracy         1      0.137 675.10 408.99
## + ShotPower:ShortPassing          1      0.096 675.14 409.01
## + Acceleration:Composure          1      0.081 675.16 409.02
## + Composure:Reactions             1      0.054 675.18 409.03
## + ShortPassing:Reactions          1      0.050 675.19 409.03
## + ShotPower:Reactions             1      0.006 675.23 409.05
## + Acceleration:Reactions          1      0.003 675.24 409.05
## - Marking:Reactions               1     27.297 702.53 409.44
## - BallControl:ShortPassing        1     31.421 706.66 411.18
## - Composure:Marking               1     32.168 707.41 411.49
## - ShotPower:Marking               1     58.943 734.18 422.52
## - BallControl:Marking             1     78.153 753.39 430.19
## - Acceleration:HeadingAccuracy    1    135.298 810.54 451.91
##
## Step:  AIC=399.52
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##      Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##      tion +
##      ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
##      ShotPower:HeadingAccuracy + Acceleration:HeadingAccuracy +
##      Vision:ShortPassing + Vision:Marking + Vision:HeadingAccuracy +
##      BallControl:ShortPassing + BallControl:Marking + BallControl:HeadingAc
##      curacy +
##      ShortPassing:Composure + ShortPassing:Marking + Composure:Marking +
##      Marking:Reactions + HeadingAccuracy:Reactions
##
##              Df Sum of Sq    RSS    AIC
## - ShortPassing:Composure      1      5.722 685.19 396.32
## - ShortPassing:Marking         1      6.337 685.81 396.59
## - Vision:ShortPassing          1      8.619 688.09 397.57
## - BallControl:HeadingAccuracy  1      8.873 688.35 397.68
## - Vision:Marking              1      9.380 688.85 397.90
## - ShotPower:Composure         1     11.267 690.74 398.71
## <none>                        679.47 399.52
## - ShotPower:BallControl       1     15.827 695.30 400.67
## - HeadingAccuracy:Reactions    1     15.962 695.43 400.73
## - ShotPower:HeadingAccuracy    1     17.724 697.20 401.48
## + Acceleration:ShortPassing    1      4.235 675.24 403.36
## + Acceleration:BallControl     1      3.363 676.11 403.74
## - ShotPower:Acceleration       1     23.368 702.84 403.87
## - Vision:HeadingAccuracy       1     23.785 703.26 404.05
## + ShortPassing:HeadingAccuracy  1      2.490 676.98 404.13
## + Acceleration:Composure       1      1.891 677.58 404.39

```



```

## + Acceleration:Reactions      1      1.662 677.81 404.49
## + Vision:Reactions            1      1.524 677.95 404.55
## + BallControl:Composure       1      1.308 678.16 404.64
## + Composure:HeadingAccuracy   1      1.275 678.20 404.66
## + BallControl:Reactions       1      0.761 678.71 404.88
## + ShotPower:Vision            1      0.557 678.92 404.97
## + Composure:Reactions         1      0.257 679.22 405.10
## + Vision:Composure            1      0.234 679.24 405.11
## + ShotPower:ShortPassing      1      0.088 679.38 405.18
## + Marking:HeadingAccuracy     1      0.087 679.39 405.18
## + Acceleration:Vision         1      0.026 679.45 405.21
## + Acceleration:Marking        1      0.013 679.46 405.21
## + ShortPassing:Reactions      1      0.013 679.46 405.21
## + Vision:BallControl          1      0.011 679.46 405.21
## + ShotPower:Reactions         1      0.000 679.47 405.22
## - Composure:Marking           1     30.722 710.19 406.96
## - Marking:Reactions           1     30.727 710.20 406.97
## - BallControl:ShortPassing    1     35.372 714.84 408.90
## - ShotPower:Marking           1     59.479 738.95 418.75
## - BallControl:Marking         1     76.565 756.04 425.54
## - Acceleration:HeadingAccuracy 1    131.413 810.89 446.34
##
## Step:  AIC=396.32
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##      Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
tion +
##      ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
##      ShotPower:HeadingAccuracy + Acceleration:HeadingAccuracy +
##      Vision:ShortPassing + Vision:Marking + Vision:HeadingAccuracy +
##      BallControl:ShortPassing + BallControl:Marking + BallControl:HeadingAc
curacy +
##      ShortPassing:Marking + Composure:Marking + Marking:Reactions +
##      HeadingAccuracy:Reactions
##
##              Df Sum of Sq    RSS    AIC
## - ShortPassing:Marking      1      3.250 688.44 392.03
## - Vision:ShortPassing       1      4.943 690.14 392.76
## - ShotPower:Composure       1      6.202 691.40 393.30
## - Vision:Marking            1      7.159 692.35 393.71
## - BallControl:HeadingAccuracy 1     11.225 696.42 395.45
## - ShotPower:BallControl     1     12.474 697.67 395.98
## <none>                      685.19 396.32
## - HeadingAccuracy:Reactions 1     17.073 702.27 397.94
## + ShortPassing:Composure     1      5.722 679.47 399.52
## - ShotPower:HeadingAccuracy  1     20.938 706.13 399.57
## + ShortPassing:HeadingAccuracy 1      3.764 681.43 400.38
## + Acceleration:ShortPassing  1      3.388 681.81 400.54
## + Acceleration:BallControl   1      3.094 682.10 400.67
## - ShotPower:Acceleration     1     24.271 709.47 400.96
## + Composure:HeadingAccuracy  1      2.119 683.08 401.09

```

```

## - Vision:HeadingAccuracy      1    25.196 710.39 401.35
## - Composure:Marking           1    25.318 710.51 401.40
## + Acceleration:Composure      1     1.261 683.93 401.47
## + ShortPassing:Reactions      1     0.953 684.24 401.60
## + Acceleration:Reactions      1     0.938 684.26 401.61
## + Vision:Composure           1     0.549 684.65 401.78
## + Vision:Reactions           1     0.522 684.67 401.79
## + ShotPower:ShortPassing     1     0.350 684.84 401.86
## + Composure:Reactions        1     0.193 685.00 401.93
## + ShotPower:Vision           1     0.138 685.06 401.95
## + Marking:HeadingAccuracy     1     0.099 685.10 401.97
## + Vision:BallControl         1     0.087 685.11 401.98
## + BallControl:Reactions      1     0.075 685.12 401.98
## + Acceleration:Vision        1     0.066 685.13 401.99
## + BallControl:Composure      1     0.027 685.17 402.00
## + Acceleration:Marking       1     0.010 685.18 402.01
## + ShotPower:Reactions        1     0.000 685.19 402.01
## - BallControl:ShortPassing   1    29.658 714.85 403.21
## - Marking:Reactions          1    29.757 714.95 403.25
## - ShotPower:Marking          1    55.052 740.25 413.58
## - BallControl:Marking        1    71.434 756.63 420.08
## - Acceleration:HeadingAccuracy 1   127.885 813.08 441.45
##
## Step:  AIC=392.03
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##      Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
tion +
##      ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
##      ShotPower:HeadingAccuracy + Acceleration:HeadingAccuracy +
##      Vision:ShortPassing + Vision:Marking + Vision:HeadingAccuracy +
##      BallControl:ShortPassing + BallControl:Marking + BallControl:HeadingAc
curacy +
##      Composure:Marking + Marking:Reactions + HeadingAccuracy:Reactions
##
##              Df Sum of Sq    RSS    AIC
## - Vision:ShortPassing      1      4.025 692.47 388.07
## - Vision:Marking           1      4.334 692.78 388.20
## - ShotPower:Composure      1      6.337 694.78 389.06
## - BallControl:HeadingAccuracy 1     12.322 700.77 391.61
## <none>                      688.44 392.03
## - ShotPower:BallControl    1     14.321 702.77 392.45
## - HeadingAccuracy:Reactions 1     17.962 706.41 393.99
## - ShotPower:HeadingAccuracy 1     19.626 708.07 394.69
## + ShortPassing:Marking     1      3.250 685.19 396.32
## - Vision:HeadingAccuracy   1     23.931 712.38 396.49
## - ShotPower:Acceleration   1     24.088 712.53 396.55
## + Acceleration:BallControl  1      2.651 685.79 396.58
## + ShortPassing:Composure   1      2.635 685.81 396.59
## + Acceleration:ShortPassing 1      2.426 686.02 396.68
## + Composure:HeadingAccuracy 1      2.189 686.26 396.78

```

```

## + ShortPassing:HeadingAccuracy 1 1.196 687.25 397.21
## + Acceleration:Composure 1 1.000 687.45 397.29
## + Acceleration:Reactions 1 0.924 687.52 397.33
## + Vision:Composure 1 0.565 687.88 397.48
## + Vision:Reactions 1 0.433 688.01 397.54
## + ShortPassing:Reactions 1 0.335 688.11 397.58
## + Marking:HeadingAccuracy 1 0.151 688.29 397.66
## + ShotPower:Vision 1 0.143 688.30 397.66
## + Composure:Reactions 1 0.141 688.30 397.66
## + ShotPower:ShortPassing 1 0.120 688.32 397.67
## + Acceleration:Vision 1 0.106 688.34 397.68
## + Vision:BallControl 1 0.070 688.37 397.70
## + Acceleration:Marking 1 0.065 688.38 397.70
## + BallControl:Reactions 1 0.059 688.39 397.70
## + BallControl:Composure 1 0.043 688.40 397.71
## + ShotPower:Reactions 1 0.003 688.44 397.72
## - Composure:Marking 1 27.760 716.20 398.08
## - Marking:Reactions 1 31.623 720.07 399.68
## - BallControl:ShortPassing 1 35.420 723.86 401.24
## - ShotPower:Marking 1 56.362 744.81 409.71
## - BallControl:Marking 1 70.096 758.54 415.14
## - Acceleration:HeadingAccuracy 1 128.869 817.31 437.30
##
## Step: AIC=388.07
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
## Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
tion +
## ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
## ShotPower:HeadingAccuracy + Acceleration:HeadingAccuracy +
## Vision:Marking + Vision:HeadingAccuracy + BallControl:ShortPassing +
## BallControl:Marking + BallControl:HeadingAccuracy + Composure:Marking
+
## Marking:Reactions + HeadingAccuracy:Reactions
##
## Df Sum of Sq RSS AIC
## - Vision:Marking 1 2.450 694.92 383.42
## - ShotPower:Composure 1 8.680 701.15 386.08
## <none> 692.47 388.07
## - BallControl:HeadingAccuracy 1 13.820 706.29 388.24
## - ShotPower:BallControl 1 14.194 706.66 388.40
## - HeadingAccuracy:Reactions 1 17.570 710.04 389.82
## - ShotPower:HeadingAccuracy 1 18.069 710.54 390.03
## - ShotPower:Acceleration 1 21.687 714.16 391.53
## + Vision:ShortPassing 1 4.025 688.44 392.03
## - Vision:HeadingAccuracy 1 23.115 715.58 392.13
## + Vision:Reactions 1 2.721 689.75 392.59
## + Acceleration:ShortPassing 1 2.464 690.01 392.70
## + ShortPassing:Marking 1 2.333 690.14 392.76
## + Vision:BallControl 1 2.048 690.42 392.88
## + Acceleration:BallControl 1 1.675 690.80 393.04

```

```

## + Composure:HeadingAccuracy      1      1.588 690.88 393.08
## + ShortPassing:HeadingAccuracy    1      1.508 690.96 393.12
## + Acceleration:Composure          1      1.116 691.35 393.28
## + Acceleration:Reactions           1      0.916 691.55 393.37
## + ShortPassing:Composure           1      0.871 691.60 393.39
## + ShotPower:ShortPassing           1      0.508 691.96 393.55
## + ShotPower:Vision                 1      0.407 692.06 393.59
## + Vision:Composure                1      0.297 692.17 393.64
## + Acceleration:Marking             1      0.237 692.23 393.66
## + BallControl:Reactions            1      0.207 692.26 393.67
## + Marking:HeadingAccuracy          1      0.117 692.35 393.71
## + Composure:Reactions              1      0.039 692.43 393.75
## + BallControl:Composure            1      0.015 692.45 393.76
## + Acceleration:Vision              1      0.013 692.46 393.76
## + ShortPassing:Reactions           1      0.001 692.47 393.76
## + ShotPower:Reactions              1      0.000 692.47 393.76
## - Composure:Marking               1     28.758 721.23 394.46
## - Marking:Reactions                1     31.484 723.95 395.58
## - ShotPower:Marking                1     56.869 749.34 405.82
## - BallControl:Marking              1     79.885 772.36 414.80
## - BallControl:ShortPassing         1    108.302 800.77 425.53
## - Acceleration:HeadingAccuracy     1    125.097 817.57 431.70
##
## Step:  AIC=383.42
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##           Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##           tion +
##           ShotPower:BallControl + ShotPower:Composure + ShotPower:Marking +
##           ShotPower:HeadingAccuracy + Acceleration:HeadingAccuracy +
##           Vision:HeadingAccuracy + BallControl:ShortPassing + BallControl:Markin
##           g +
##           BallControl:HeadingAccuracy + Composure:Marking + Marking:Reactions +
##           HeadingAccuracy:Reactions
##
##           Df Sum of Sq    RSS    AIC
## - ShotPower:Composure      1      9.171 704.09 381.63
## <none>                      694.92 383.42
## - BallControl:HeadingAccuracy  1     13.851 708.77 383.59
## - ShotPower:BallControl      1     15.732 710.65 384.38
## - ShotPower:HeadingAccuracy   1     17.506 712.43 385.12
## - HeadingAccuracy:Reactions   1     20.217 715.14 386.25
## - ShotPower:Acceleration      1     21.894 716.81 386.94
## + Acceleration:ShortPassing   1      2.992 691.93 387.84
## - Vision:HeadingAccuracy      1     24.085 719.00 387.85
## + Vision:BallControl          1      2.457 692.46 388.07
## + Vision:Marking              1      2.450 692.47 388.07
## + Vision:ShortPassing         1      2.141 692.78 388.20
## + Vision:Reactions            1      2.031 692.89 388.25
## + Composure:HeadingAccuracy    1      1.556 693.36 388.45
## + Acceleration:BallControl     1      1.555 693.36 388.45

```

```

## + Acceleration:Composure      1      1.553 693.37 388.45
## + ShotPower:Vision             1      1.501 693.42 388.48
## + ShortPassing:HeadingAccuracy 1      1.341 693.58 388.55
## + Acceleration:Reactions       1      1.318 693.60 388.55
## + ShortPassing:Composure       1      1.104 693.82 388.65
## + ShotPower:ShortPassing       1      1.032 693.89 388.68
## + Marking:HeadingAccuracy      1      0.486 694.43 388.91
## + ShortPassing:Marking         1      0.460 694.46 388.92
## - Composure:Marking           1     26.782 721.70 388.96
## + BallControl:Reactions        1      0.174 694.75 389.04
## + Vision:Composure             1      0.127 694.79 389.06
## + Acceleration:Marking         1      0.124 694.80 389.07
## + Acceleration:Vision          1      0.084 694.84 389.08
## + Composure:Reactions          1      0.057 694.86 389.09
## + BallControl:Composure        1      0.039 694.88 389.10
## + ShotPower:Reactions          1      0.004 694.92 389.12
## + ShortPassing:Reactions       1      0.002 694.92 389.12
## - Marking:Reactions           1     31.648 726.57 390.96
## - ShotPower:Marking            1     57.400 752.32 401.30
## - BallControl:Marking          1    106.899 801.82 420.23
## - BallControl:ShortPassing     1    113.393 808.31 422.62
## - Acceleration:HeadingAccuracy 1    125.957 820.88 427.20
##
## Step:  AIC=381.63
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##           Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##           tion +
##           ShotPower:BallControl + ShotPower:Marking + ShotPower:HeadingAccuracy
##           +
##           Acceleration:HeadingAccuracy + Vision:HeadingAccuracy + BallControl:Sh
##           ortPassing +
##           BallControl:Marking + BallControl:HeadingAccuracy + Composure:Marking
##           +
##           Marking:Reactions + HeadingAccuracy:Reactions
##
##           Df Sum of Sq    RSS    AIC
## - ShotPower:BallControl      1      6.895 710.99 378.83
## <none>                        704.09 381.63
## - BallControl:HeadingAccuracy 1     16.495 720.59 382.81
## + ShotPower:Composure        1      9.171 694.92 383.42
## - ShotPower:Acceleration     1     20.167 724.26 384.32
## - Composure:Marking          1     20.244 724.34 384.35
## + ShotPower:Vision            1      5.009 699.08 385.20
## - HeadingAccuracy:Reactions   1     22.454 726.54 385.26
## + Vision:Reactions            1      4.205 699.89 385.54
## - Vision:HeadingAccuracy      1     23.242 727.33 385.58
## + Vision:ShortPassing        1      3.786 700.31 385.72
## + Vision:BallControl          1      3.726 700.36 385.74
## + ShotPower:ShortPassing      1      3.621 700.47 385.79
## + Composure:HeadingAccuracy   1      3.160 700.93 385.98

```

```

## + Vision:Composure          1      3.069 701.02 386.02
## + Vision:Marking            1      2.941 701.15 386.08
## + BallControl:Composure      1      2.327 701.76 386.34
## + ShotPower:Reactions        1      2.230 701.86 386.38
## + Acceleration:ShortPassing  1      2.195 701.90 386.39
## + Composure:Reactions        1      2.047 702.04 386.45
## + Acceleration:Composure      1      2.009 702.08 386.47
## + Acceleration:Reactions      1      1.650 702.44 386.62
## + BallControl:Reactions      1      1.439 702.65 386.71
## + Marking:HeadingAccuracy     1      1.079 703.01 386.86
## + Acceleration:BallControl    1      1.062 703.03 386.87
## + ShortPassing:HeadingAccuracy 1      0.823 703.27 386.97
## + ShortPassing:Composure      1      0.400 703.69 387.15
## + ShortPassing:Reactions      1      0.355 703.74 387.17
## + ShortPassing:Marking        1      0.341 703.75 387.18
## + Acceleration:Marking        1      0.254 703.84 387.21
## + Acceleration:Vision         1      0.078 704.01 387.29
## - ShotPower:HeadingAccuracy   1     30.624 734.71 388.58
## - Marking:Reactions           1     31.477 735.57 388.92
## - ShotPower:Marking           1     53.578 757.67 397.71
## - BallControl:Marking         1     97.793 801.88 414.56
## - BallControl:ShortPassing    1    108.927 813.02 418.65
## - Acceleration:HeadingAccuracy 1    122.316 826.41 423.50
##
## Step:  AIC=378.83
## Overall ~ ShotPower + Acceleration + Vision + BallControl + ShortPassing +
##           Composure + Marking + HeadingAccuracy + Reactions + ShotPower:Accelera
##           tion +
##           ShotPower:Marking + ShotPower:HeadingAccuracy + Acceleration:HeadingAc
##           curacy +
##           Vision:HeadingAccuracy + BallControl:ShortPassing + BallControl:Markin
##           g +
##           BallControl:HeadingAccuracy + Composure:Marking + Marking:Reactions +
##           HeadingAccuracy:Reactions
##
##              Df Sum of Sq    RSS    AIC
## <none>                710.99 378.83
## - ShotPower:Acceleration      1    14.752 725.74 379.23
## - BallControl:HeadingAccuracy  1    18.487 729.47 380.76
## + ShotPower:BallControl        1     6.895 704.09 381.63
## - Composure:Marking            1    21.353 732.34 381.92
## - Vision:HeadingAccuracy        1    23.456 734.44 382.77
## + Vision:Marking                1     3.915 707.07 382.88
## + Composure:HeadingAccuracy     1     2.987 708.00 383.27
## - HeadingAccuracy:Reactions     1    24.895 735.88 383.35
## + Acceleration:ShortPassing     1     2.266 708.72 383.57
## - ShotPower:HeadingAccuracy     1    25.680 736.67 383.67
## + Acceleration:Composure        1     1.984 709.00 383.69
## + Vision:ShortPassing           1     1.969 709.02 383.70
## + Vision:Reactions              1     1.855 709.13 383.74

```

```
## + Acceleration:Reactions      1      1.539 709.45 383.88
## + Marking:HeadingAccuracy      1      1.277 709.71 383.99
## + Acceleration:BallControl     1      1.271 709.71 383.99
## + Vision:BallControl           1      0.816 710.17 384.18
## + Acceleration:Marking         1      0.794 710.19 384.19
## + ShortPassing:Marking         1      0.753 710.23 384.20
## + Vision:Composure            1      0.610 710.38 384.26
## + Composure:Reactions          1      0.479 710.51 384.32
## + ShotPower:Composure          1      0.334 710.65 384.38
## + ShortPassing:Reactions       1      0.305 710.68 384.39
## + BallControl:Reactions        1      0.175 710.81 384.45
## + Acceleration:Vision          1      0.147 710.84 384.46
## + ShortPassing:HeadingAccuracy 1      0.145 710.84 384.46
## + ShotPower:Reactions          1      0.124 710.86 384.47
## + ShotPower:Vision            1      0.067 710.92 384.49
## + BallControl:Composure        1      0.056 710.93 384.50
## + ShotPower:ShortPassing       1      0.038 710.95 384.50
## + ShortPassing:Composure       1      0.036 710.95 384.50
## - Marking:Reactions            1     29.952 740.94 385.39
## - ShotPower:Marking            1     54.783 765.77 395.18
## - BallControl:Marking          1     91.432 802.42 409.06
## - Acceleration:HeadingAccuracy 1    120.929 831.91 419.78
## - BallControl:ShortPassing     1    176.646 887.63 439.04
```

summary (fit1.int.sbc)

```
##
## Call:
## lm(formula = Overall ~ ShotPower + Acceleration + Vision + BallControl +
##   ShortPassing + Composure + Marking + HeadingAccuracy + Reactions +
##   ShotPower:Acceleration + ShotPower:Marking + ShotPower:HeadingAccuracy
## +
##   Acceleration:HeadingAccuracy + Vision:HeadingAccuracy + BallControl:Sh
ortPassing +
##   BallControl:Marking + BallControl:HeadingAccuracy + Composure:Marking
## +
##   Marking:Reactions + HeadingAccuracy:Reactions, data = latestfifa19)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -4.6335 -1.1160  0.1463  1.0222  5.4566
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   7.4872503   6.2722075    1.194  0.233613
## ShotPower    -0.0964089   0.1022901   -0.943  0.346759
## Acceleration   0.2840395   0.0715780    3.968 9.24e-05 ***
## Vision        0.1896001   0.0835126    2.270 0.023959 *
## BallControl   0.3505161   0.1188613    2.949 0.003462 **
## ShortPassing -0.3314715   0.0609255   -5.441 1.17e-07 ***
```

```

## Composure -0.0677086 0.0473262 -1.431 0.153653
## Marking 0.3256855 0.0537380 6.061 4.44e-09 ***
## HeadingAccuracy 0.5672217 0.0895551 6.334 9.68e-10 ***
## Reactions -0.2353453 0.0791279 -2.974 0.003197 **
## ShotPower:Acceleration 0.0020118 0.0008407 2.393 0.017378 *
## ShotPower:Marking -0.0039171 0.0008494 -4.612 6.12e-06 ***
## ShotPower:HeadingAccuracy 0.0036603 0.0011593 3.157 0.001769 **
## Acceleration:HeadingAccuracy -0.0053158 0.0007759 -6.852 4.75e-11 ***
## Vision:HeadingAccuracy -0.0039584 0.0013118 -3.018 0.002787 **
## BallControl:ShortPassing 0.0076742 0.0009267 8.281 5.32e-15 ***
## BallControl:Marking -0.0070225 0.0011787 -5.958 7.78e-09 ***
## BallControl:HeadingAccuracy -0.0052085 0.0019442 -2.679 0.007829 **
## Composure:Marking 0.0027310 0.0009486 2.879 0.004301 **
## Marking:Reactions 0.0042775 0.0012545 3.410 0.000747 ***
## HeadingAccuracy:Reactions 0.0042788 0.0013764 3.109 0.002075 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.605 on 276 degrees of freedom
## Multiple R-squared:  0.9459, Adjusted R-squared:  0.942
## F-statistic: 241.3 on 20 and 276 DF, p-value: < 2.2e-16

```

Eleven interaction effects were retained in the model by the SBC criterion; ShotPower vs Acceleration, ShotPower vs Marking, ShotPower vs HeadingAccuracy, Acceleration vs HeadingAccuracy, Vision vs HeadingAccuracy, BallControl vs ShortPassing, BallControl vs Marking, BallControl vs HeadingAccuracy, Composure vs Marking, Marking vs Reactions and HeadingAccuracy vs Reactions. It indicates that the slope between Overall and Shot Power is different for different levels of Acceleration. It also indicates that the slope between Overall and Shot Power is different for different levels of Marking. It also indicates that the slope between Overall and Shot Power is different for different levels of HeadingAccuracy. It also indicates that the slope between Overall and Acceleration is different for different levels of HeadingAccuracy. It also indicates that the slope between Overall and Vision is different for different levels of HeadingAccuracy. It also indicates that the slope between Overall and BallControl is different for different levels of ShortPassing. It also indicates that the slope between Overall and BallControl is different for different levels of Marking. It also indicates that the slope between Overall and BallControl is different for different levels of HeadingAccuracy. It also indicates that the slope between Overall and Composure is different for different levels of Marking. It also indicates that the slope between Overall and Marking is different for different levels of Reactions. It also indicates that the slope between Overall and HeadingAccuracy is different for different levels of Reactions.

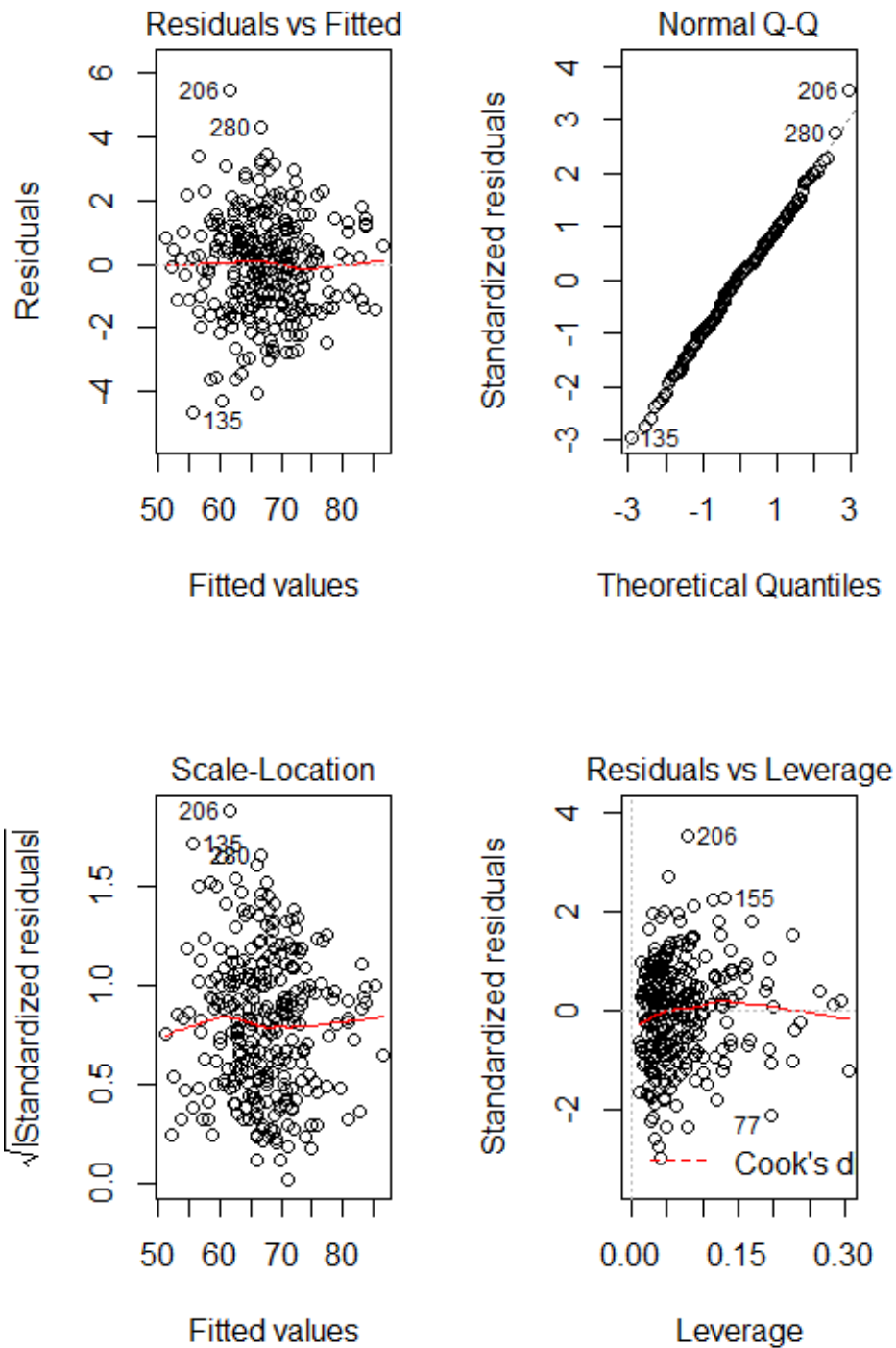
Final Model

The model shown above looks to be the best final model.

Residual and Influence Analysis

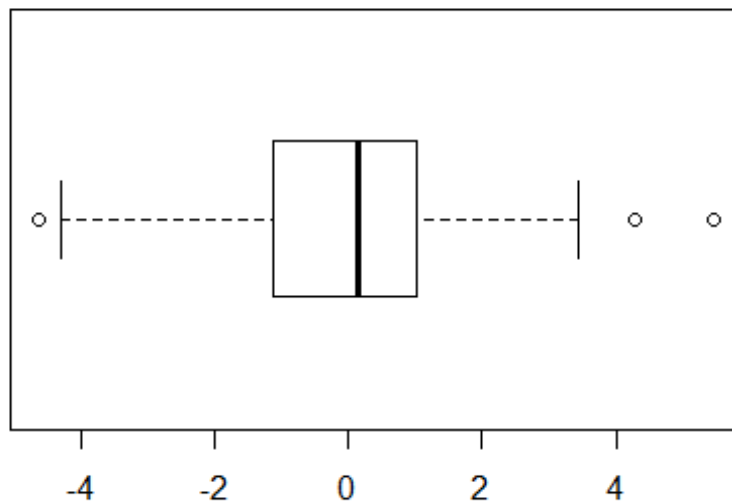
It is also important to view the residuals of this final model.

```
par (mfrow = c(1,2))  
plot(fit1.int.sbc)
```



Looking at the four residual plots, they look perfectly fine for the model.

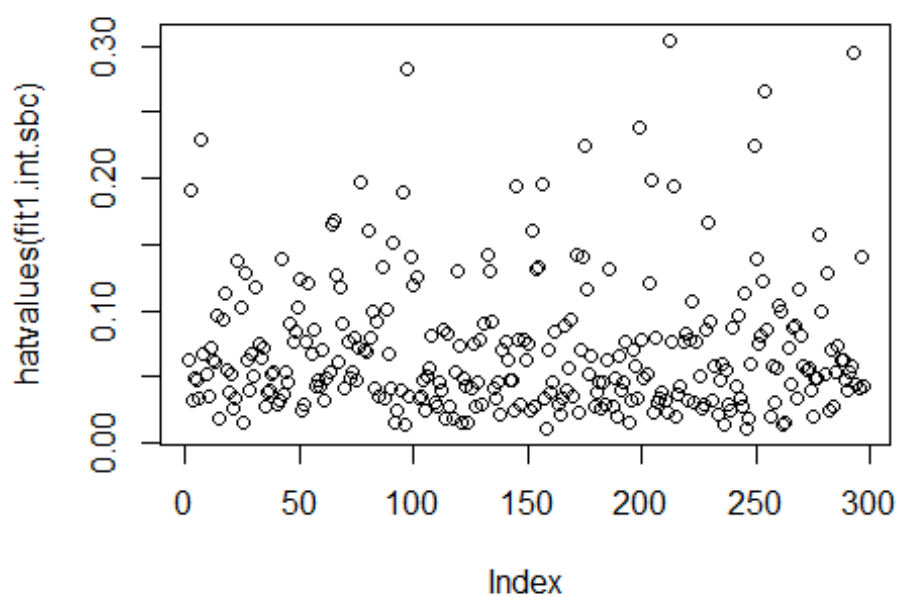
```
boxplot (fit1.int.sbc$residuals, horizontal = T)
```



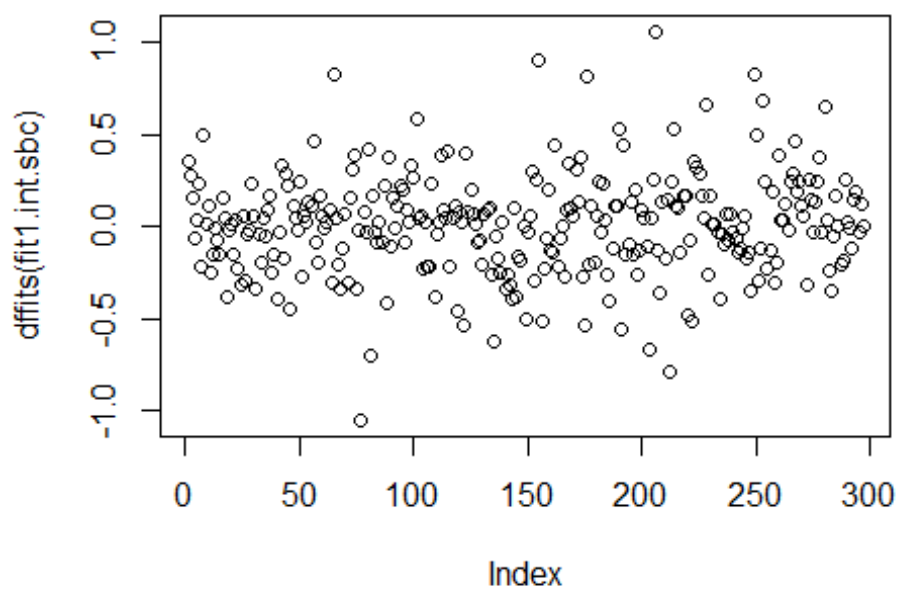
Residual plots boxplot seems relatively fine for the model. A symmetric distribution is seen with no obvious outliers.

Further analysis will involve diagnostics around the hat diagonals, DFFITS and variance inflation factors.

```
plot(hatvalues(fit1.int.sbc))
```



```
plot (dffits(fit1.int.sbc))
```



```
latestfifa19 [which (dffits (fit1.int.sbc) < -1),]
```

```
## # A tibble: 1 x 32
##   Overall Crossing Finishing HeadingAccuracy ShortPassing Volleys Dribbling
##   <dbl>      <dbl>      <dbl>          <dbl>          <dbl> <dbl>      <dbl>
## 1      65        61        69            74            65      68        6
## # ... with 25 more variables: Curve <dbl>, FKAccuracy <dbl>,
## #   LongPassing <dbl>, BallControl <dbl>, Acceleration <dbl>,
## #   SprintSpeed <dbl>, Agility <dbl>, Reactions <dbl>, Balance <dbl>,
## #   ShotPower <dbl>, Jumping <dbl>, Stamina <dbl>, Strength <dbl>,
## #   LongShots <dbl>, Aggression <dbl>, Interceptions <dbl>,
## #   Positioning <dbl>, Vision <dbl>, Penalties <dbl>, Composure <dbl>,
## #   Marking <dbl>, StandingTackle <dbl>, SlidingTackle <dbl>,
## #   ShotPower.c <dbl>, ShotPowersq <dbl>
```

The hat values seem scattered around the same area which is perfectly fine. Moreover, the DFFITS values also look perfectly fine.

```
library("car")

## Loading required package: carData

car::vif (fit1.int.sbc)

##           ShotPower           Acceleration
##           187.37311           78.91708
##           Vision           BallControl
##           108.13143           140.15299
##           ShortPassing           Composure
##           34.08308           25.73433
##           Marking           HeadingAccuracy
##           105.65961           115.01018
##           Reactions           ShotPower:Acceleration
##           50.94166           117.87342
##           ShotPower:Marking           ShotPower:HeadingAccuracy
##           109.44962           192.88161
##           Acceleration:HeadingAccuracy           Vision:HeadingAccuracy
##           47.06364           177.13482
##           BallControl:ShortPassing           BallControl:Marking
##           116.00683           242.87034
##           BallControl:HeadingAccuracy           Composure:Marking
##           408.24307           178.26130
##           Marking:Reactions           HeadingAccuracy:Reactions
##           308.90389           228.71720
```

The VIF values appear to be very big for all the predictors and all the interaction effects. A way to improve the model could be to center ShotPower, Acceleration, Vision, BallControl, Composure, Marking and HeadingAccuracy variables.

```

latestfifa19$ShotPower.c = latestfifa19$ShotPower - mean(latestfifa19$ShotPower)
latestfifa19$Acceleration.c = latestfifa19$Acceleration - mean(latestfifa19$Acceleration)
latestfifa19$Vision.c = latestfifa19$Vision - mean(latestfifa19$Vision)
latestfifa19$BallControl.c = latestfifa19$BallControl - mean(latestfifa19$BallControl)
latestfifa19$Composure.c = latestfifa19$Composure - mean(latestfifa19$Composure)
latestfifa19$Marking.c = latestfifa19$Marking - mean(latestfifa19$Marking)
latestfifa19$HeadingAccuracy.c = latestfifa19$HeadingAccuracy - mean(latestfifa19$HeadingAccuracy)

```

```

fit1.int.sbc2 = lm(Overall ~ ShotPower.c + Acceleration.c + Vision.c + BallControl.c + ShortPassing + Composure.c + Marking.c + HeadingAccuracy.c + Reactions, data=latestfifa19)
car::vif(fit1.int.sbc2)

```

```

##      ShotPower.c      Acceleration.c      Vision.c      BallControl.c
##      2.390316      1.521871      3.454175      5.136215
##      ShortPassing      Composure.c      Marking.c      HeadingAccuracy.c
##      4.292034      3.401793      1.816858      1.977704
##      Reactions
##      3.262490

```

```
summary(fit1.int.sbc2)
```

```

##
## Call:
## lm(formula = Overall ~ ShotPower.c + Acceleration.c + Vision.c +
##      BallControl.c + ShortPassing + Composure.c + Marking.c +
##      HeadingAccuracy.c + Reactions, data = latestfifa19)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.2580 -1.5283 -0.0265  1.4601  8.3864
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  38.47054   2.54013  15.145  < 2e-16 ***
## ShotPower.c    0.03929   0.01666   2.358  0.019029 *
## Acceleration.c  0.04893   0.01433   3.414  0.000733 ***
## Vision.c      -0.09714   0.02152  -4.513  9.33e-06 ***
## BallControl.c  0.14888   0.03281   4.538  8.38e-06 ***
## ShortPassing   0.14462   0.03118   4.639  5.33e-06 ***
## Composure.c    0.13481   0.02481   5.433  1.18e-07 ***
## Marking.c      0.05604   0.01016   5.515  7.77e-08 ***
## HeadingAccuracy.c 0.10364   0.01693   6.120  3.06e-09 ***
## Reactions      0.31184   0.02887  10.800  < 2e-16 ***
## ---

```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.314 on 287 degrees of freedom
## Multiple R-squared:  0.883, Adjusted R-squared:  0.8794
## F-statistic: 240.7 on 9 and 287 DF,  p-value: < 2.2e-16
```

Centering the ShotPower, Acceleration, Vision, BallControl, Composure, Marking and HeadingAccuracy variables significantly dropped the big VIF factors as seen in the prior model. These values were more appropriate because the model would work best with VIF factors around 5 or less.

Interaction Plots

Following this, we decided to plot the interaction effects of the model.

```
par (mfrow=c(1,1))
# Function to categorize a continuous variable into its quartiles
categorize = function (x) {
  quartiles = summary (x) [c(2, 3, 5)]
  result = rep ("Q1", length (x))
  result [which ((quartiles[1] < x) & (x <= quartiles [2]))] = "Q2"
  result [which ((quartiles[2] < x) & (x <= quartiles [3]))] = "Q3"
  result [which (quartiles[3] < x)] = "Q4"
  return (result)
}

library(ggplot2)
library(dplyr)

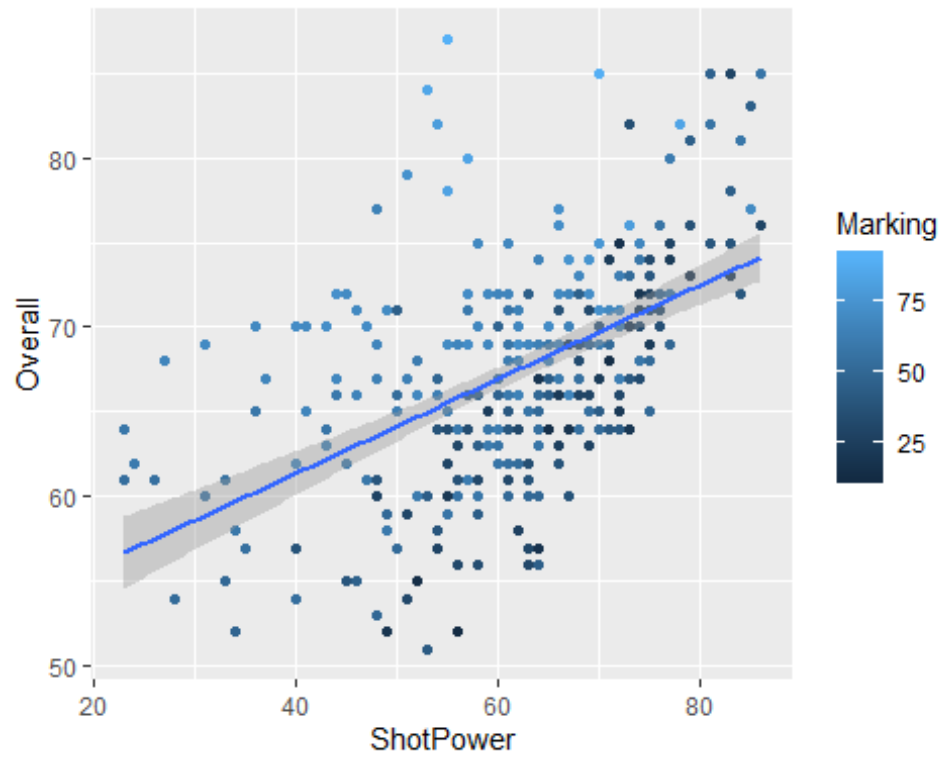
##
## Attaching package: 'dplyr'

## The following object is masked from 'package:car':
##
##      recode

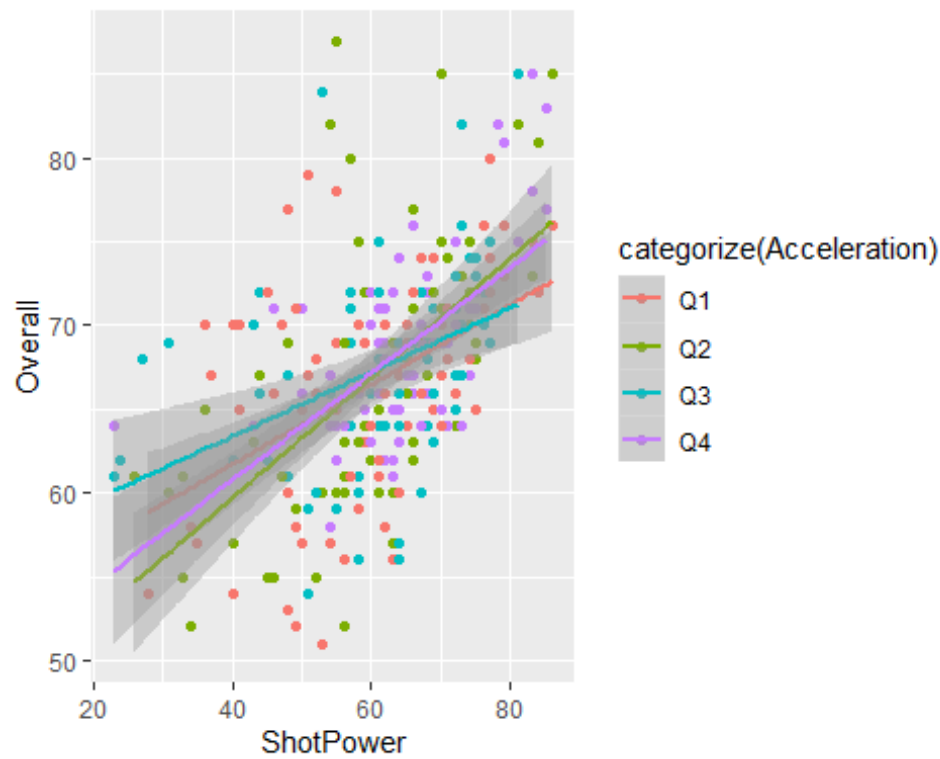
## The following objects are masked from 'package:stats':
##
##      filter, lag

## The following objects are masked from 'package:base':
##
##      intersect, setdiff, setequal, union

with (latestfifa19, qplot(x=ShotPower, y=Overall, color=Marking)) + geom_smooth(
method="lm")
```

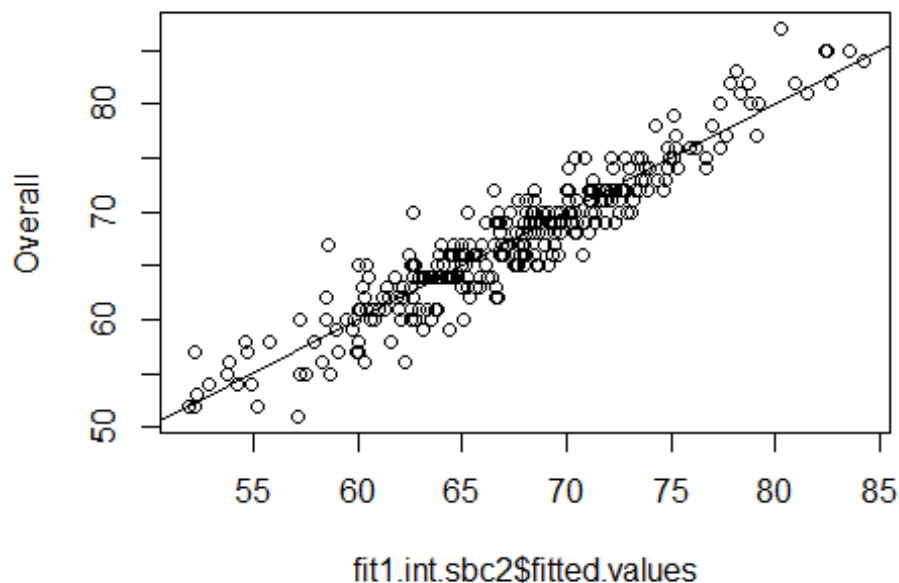


```
with (latestfifa19, qplot(x=ShotPower, y=Overall, color=categorize(Acceleration))
) + geom_smooth(method="lm")
```



The plot above indicates that the relationship between Overall and ShotPower is much steeper for players in the lower quartile of players with low acceleration numbers as opposed to players with high acceleration numbers.

```
plot (Overall ~ fit1.int.sbc2$fitted.values, data = latestfifa19)
abline (0,1)
```



The plot of Overall vs fitted Overall shows a good fit to the model with the data.

Conclusions

Our final model is; $\text{Predicted Overall} = 38.5 + 0.0393 * \text{ShotPower} + 0.05 * \text{Acceleration} - 0.097 * \text{Vision} + 0.149 * \text{BallControl} + 0.145 * \text{ShortPassing} + 0.135 * \text{Composure} + 0.0560 * \text{Marking} + 0.104 * \text{HeadingAccuracy} + 0.312 * \text{Reactions}$

This is our final prediction model. To get the model with significant values all the variables except ShortPassing and Reactions variables had to be centered. Note that log transformation was not required on the response variable (Overall) because of the box cox method.

Based on our eleven interaction effects, we see that we can get a slope for each variable because we are using continuous data. Moreover certain variables such as HeadingAccuracy, ShortPassing, BallControl, Acceleration, Reactions, Vision, Composure and Marking explain the Overall rating much better as we would expect in real life Soccer.

The final model has adjusted $R^2=0.88$, which means that 88% of the variation on Overall is explained by the model. The residual standard error is 2.31 Overall.

To illustrate working with the model for prediction, we tried to predict players Overall rating using the variables in the formula above.

```
# Save the predictions and pred. limits for every player in the data frame
# Converting back to the actual scale
preds = predict (fit1.int.sbc2, interval='prediction')

## Warning in predict.lm(fit1.int.sbc2, interval = "prediction"): predictions
on current data refer to _future_ responses

latestfifa19$pred.Overall = (preds [,1])
latestfifa19$pred.lower = (preds [,2])
latestfifa19$pred.upper = (preds [,3])
latestfifa19 [c(16,33,67,91,202,107,45,217), c("HeadingAccuracy", "ShortPassing", "BallControl", "Acceleration", "Reactions", "Vision", "Composure", "Marking", "pred.Overall", "pred.lower", "pred.upper")]

## # A tibble: 8 x 11
##   HeadingAccuracy ShortPassing BallControl Acceleration Reactions Vision
##           <dbl>         <dbl>         <dbl>         <dbl>         <dbl> <dbl>
## 1             40             72             80             74             70      74
## 2             59             56             70             84             61      48
## 3             45             65             73             86             68      59
## 4             59             54             59             79             57      54
## 5             71             74             63             66             62      60
## 6             45             63             60             66             65      61
## 7             71             68             67             52             68      70
## 8             69             65             61             50             70      57
## # ... with 5 more variables: Composure <dbl>, Marking <dbl>,
## #   pred.Overall <dbl>, pred.lower <dbl>, pred.upper <dbl>

latestfifa19$in.interval = ifelse (latestfifa19$pred.lower <= latestfifa19$Overall & latestfifa19$Overall <= latestfifa19$pred.upper, 1, 0)
mean (latestfifa19$in.interval)

## [1] 0.952862
```

Among the eight examples of Fifa players Overall shown above, with 71.4 as the highest overall and 55.9 being the lowest Overall rating, these two highest and lowest Overall as far as the chosen eight, do have the prediction interval that contain the observed Overall rating. The Overall of all the players in the data set, 95.3% have the prediction intervals that contain the observed Overall. We expect 95%.