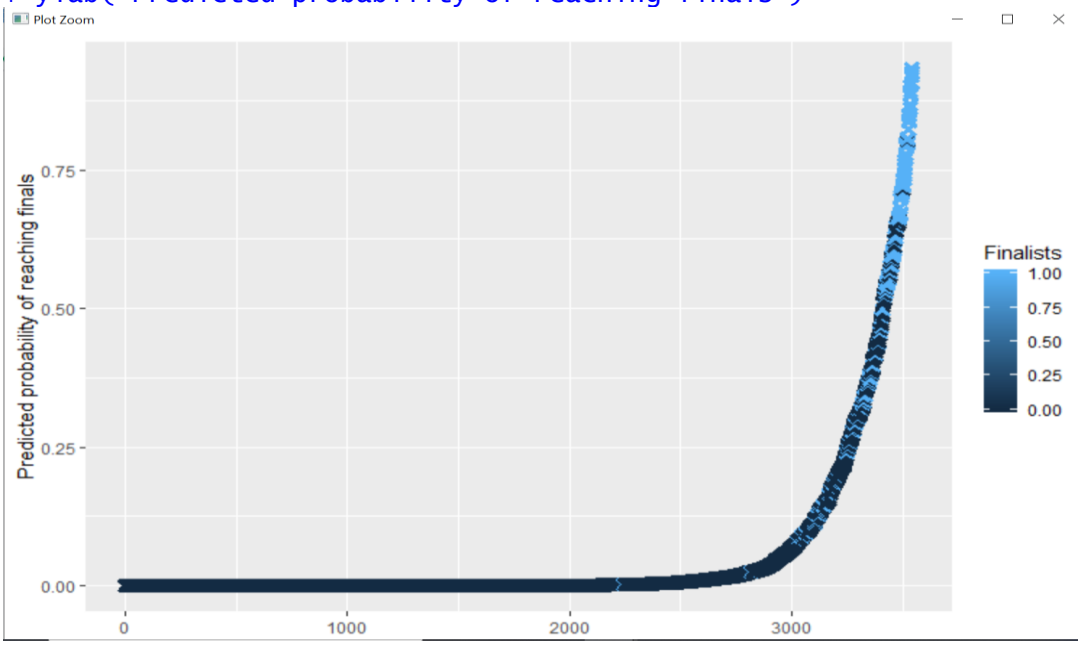
Logistic Regression

```
> head(train,5)
# A tibble: 5 x 28
  PlayerName  Year Round AvgMinsPerGame AvgSecsPerPoint AvgMinsPerSet TotalMa
tchMins Points   Age
  <chr>      <dbl> <chr>          <dbl>           <dbl>         <dbl>
<dbl>  <dbl> <dbl>
1 Adrian Ma~  2009 1st ~           3.95            39.8          29
87    726    21
2 Adrian Ma~  2011 1st ~           3.66            37            35.3
106    669    23
3 Adrian Ma~  2011 2nd ~           4.26            39.2          44
132    669    23
4 Adrian Ma~  2012 1st ~           4.84            44.9          44.8
179    598    24
5 Adrian Ma~  2013 1st ~           3.3             38.3          25.3
76    315    25
> train_numeric<-subset(train,select = c("Age","Rank","avgOdds","SP_Percent",
"BP_Win_Percentage","Aces","firstServeReturnsWon","SecondServeReturnsWon","Fi
rstServesIn","DoubleFaults","FirstServePercentage","winPercentage","Finalists
"))
> test_numeric<-subset(test,select = c("Age","Rank","avgOdds","SP_Percent","B
P_Win_Percentage","Aces","firstServeReturnsWon","SecondServeReturnsWon","Firs
tServesIn","DoubleFaults","FirstServePercentage","winPercentage","Finalists")
)



> #Logistic Regression
> logistic_regres <- glm( Finalists ~. ,data=train_numeric, family="binomial"
)
Warning message:
glm.fit: fitted probabilities numerically 0 or 1 occurred
> summary(logistic_regres)

Call:
glm(formula = Finalists ~ ., family = "binomial", data = train_numeric)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.8024  -0.1045  -0.0123  -0.0006   3.5031

Coefficients:
                          Estimate Std. Error z value Pr(>|z|)
(Intercept)             -9.460347   3.350010  -2.824  0.00474 **
Age                     -0.298000   0.039295  -7.584 3.36e-14 ***
Rank                    -0.013912   0.004698  -2.961  0.00306 **
avgOdds                 -0.006920   0.118146  -0.059  0.95329
SP_Percent              -2.066922   3.888442  -0.532  0.59503
BP_Win_Percentage       -0.078844   0.341574  -0.231  0.81745
Aces                     0.014404   0.017685   0.814  0.41539
firstServeReturnsWon     0.010664   0.023956   0.445  0.65621
SecondServeReturnsWon -0.004101   0.023803  -0.172  0.86321
FirstServesIn            0.004202   0.013460   0.312  0.75491
DoubleFaults            -0.147165   0.051011  -2.885  0.00391 **
FirstServePercentage    -3.417584   1.891920  -1.806  0.07085 .
winPercentage           24.197176   1.860427  13.006  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)
```

```
    Null deviance: 1510.07  on 3543  degrees of freedom
Residual deviance:  687.84  on 3531  degrees of freedom
AIC: 713.84

Number of Fisher Scoring iterations: 9
> #Mcfadden R2 Value
> ll.null <- logistic_regres$null.deviance/-2
> ll.proposed <- logistic_regres$deviance/-2
> ll.null
[1] -755.0364
> ll.proposed
[1] -343.9176
> (ll.null - ll.proposed) / ll.null
[1] 0.544502


> #probablity_pred
> predicted.data<-data.frame(probability.of.final=logistic_regres$fitted.valu
es,Finalists=train_numeric$Finalists)
> predicted.data <- predicted.data[order(predicted.data$probability.of.final,
decreasing=FALSE),]
> predicted.data$rank <- 1:nrow(predicted.data)


> library("ggplot2")
> ggplot(data=predicted.data, aes(x=rank, y=probability.of.final)) +
+ geom_point(aes(color=Finalists), alpha=1, shape=4, stroke=2) +
+ xlab("Index") +
+ ylab("Predicted probability of reaching finals")
```




```
> library(regclass)
> confusion_matrix(logistic_regres)
         Predicted 0 Predicted 1 Total
Actual 0        3316          33  3349
Actual 1          94         101   195
```

```
Total           3410         134   3544


> #install.packages("caret")
> library(caret)
> pdata <- predict(logistic_regres,newdata=test_numeric,type="response")
> pdata
           1            2            3            4            5            6
7
1.187297e-09 4.604923e-07 7.026290e-07 1.614038e-06 6.645895e-07 4.737068e-07
1.425842e-07
           8            9           10           11           12           13
14
1.221054e-06 9.027007e-07 1.046743e-06 4.437855e-07 8.826090e-09 4.241719e-10
2.801420e-10
          15           16           17           18           19           20
21
1.570239e-08 9.562898e-09 4.465457e-09 3.417364e-07 2.992086e-07 2.879883e-07
3.642191e-05
          22           23           24           25           26           27
28
7.532842e-05 1.179725e-05 3.665720e-10 9.329600e-07 7.769573e-07 1.503137e-10
9.476195e-09
          29           30           31           32           33           34
35
2.946591e-13 1.066031e-10 2.911186e-06 3.716961e-06 2.172095e-06 1.583707e-05
3.311700e-05
          36           37           38           39           40           41
42
2.339892e-06 7.132415e-04 8.245556e-04 5.562586e-04 3.939319e-05 7.964418e-05
8.194357e-11
          43           44           45           46           47           48
49
1.112181e-09 6.271610e-04 3.504918e-04 3.561409e-04 3.427874e-03 6.985220e-03
4.434747e-03
          50           51           52           53           54           55
56
1.502283e-02 1.280118e-02 4.583876e-03 5.071075e-03 3.617633e-03 3.259533e-03
1.346736e-03
          57           58           59           60           61           62
63
4.135740e-04 1.782063e-04 1.333527e-04 1.093611e-04 2.765948e-04 5.014174e-04
2.443679e-04
          64           65           66           67           68           69
70
2.863213e-12 1.549806e-04 1.006439e-04 2.068422e-04 1.784845e-10 1.561411e-10
4.084892e-10
          71           72           73           74           75           76
77
1.604745e-10 1.777079e-10 1.806914e-10 1.131101e-05 3.522049e-05 8.981907e-10
8.644927e-06
          78           79           80           81           82           83
84
6.020232e-06 2.846789e-05 3.117907e-05 2.671878e-05 1.884664e-05 5.137037e-05
4.842765e-05
          85           86           87           88           89           90
91
3.944031e-05 2.598687e-05 3.413708e-05 2.250853e-05 2.332724e-05 5.843904e-05
4.698404e-05
          92           93           94           95           96           97
98
6.878065e-05 3.357539e-05 5.983916e-05 7.434617e-05 4.885547e-05 2.150800e-05
1.364639e-05
```

```
          99           100           101           102           103           104
105
2.465320e-07 8.421453e-08 8.657191e-05 1.028806e-04 1.000022e-03 1.701275e-03
2.121009e-03
         106           107           108           109           110           111
112
1.544450e-03 5.505178e-04 2.561773e-04 1.745357e-04 2.982716e-03 3.481589e-03
2.081292e-03
         113           114           115           116           117           118
119
1.397889e-04 1.338001e-01 1.512583e-01 1.301124e-01 1.264855e-01 1.311034e-01
1.439369e-01
         120           121           122           123           124           125
126
1.572112e-01 1.989340e-01 1.490063e-01 1.264856e-01 1.392641e-01 1.353798e-01
8.452777e-02
         127           128           129           130           131           132
133
1.611850e-01 6.866945e-02 1.362659e-01 1.185452e-01 2.253261e-01 8.975479e-02
6.464704e-02
         134           135           136           137           138           139
140
7.545294e-02 1.055116e-01 8.773780e-02 1.805667e-03 5.175113e-05 3.028956e-05
5.473109e-08
         141           142           143           144           145           146
147
8.738299e-07 3.862466e-07 8.508348e-07 6.794056e-08 4.075370e-05 6.184413e-05
2.815648e-05
         148           149           150           151           152           153
154
5.699195e-06 1.754781e-05 2.350384e-05 1.400039e-05 2.875132e-06 2.731865e-06
2.593708e-03
         155           156           157           158           159           160
161
4.065548e-03 6.031664e-03 4.588659e-03 8.724274e-03 1.774906e-02 2.097076e-02
2.042889e-02
         162           163           164           165           166           167
168
1.512105e-02 1.289270e-02 1.175211e-02 1.173470e-02 1.207364e-03 3.334814e-10
3.111102e-10
         169           170           171           172           173           174
175
1.614160e-10 7.186087e-11 2.838406e-05 2.887249e-05 3.748904e-06 1.557862e-06
1.654365e-05
         176           177           178           179           180           181
182
1.376954e-05 9.334391e-07 4.251513e-09 4.255653e-09 1.828163e-09 2.596389e-09
1.428373e-05
         183           184           185           186           187           188
189
2.897604e-05 1.602924e-05 2.313250e-05 2.470203e-10 1.894234e-10 3.978472e-07
1.165575e-09
         190           191           192           193           194           195
196
9.885625e-08 1.368697e-08 3.048964e-08 2.641164e-08 1.936939e-04 2.089989e-04
8.063688e-11
         197           198           199           200           201           202
203
5.969617e-10 1.658797e-10 8.250277e-11 9.171187e-10 1.998088e-03 1.793541e-03
4.336655e-03
         204           205           206           207           208           209
210
1.829769e-03 3.851432e-04 4.673912e-05 4.085833e-04 4.668093e-04 5.627322e-04
6.439712e-05
```

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         211           212           213           214           215           216
217
1.045693e-07 6.107089e-08 4.054378e-08 4.276856e-11 8.646435e-04 4.518833e-04
1.672273e-04
         218           219           220           221           222           223
224
1.129827e-03 3.042557e-05 3.360174e-05 4.125629e-09 1.079132e-09 1.900451e-11
8.634884e-10
         225           226           227           228           229           230
231
4.454816e-06 2.814893e-06 1.499072e-03 1.948712e-03 2.506644e-03 2.746594e-03
1.007196e-02
         232           233           234           235           236           237
238
8.141384e-03 1.416929e-02 7.569962e-03 8.045189e-03 5.625918e-03 4.519455e-03
3.401141e-03
         239           240           241           242           243           244
245
3.675054e-03 4.972959e-03 5.047782e-03 5.018685e-03 6.312891e-03 3.695239e-03
1.582223e-03
         246           247           248           249           250           251
252
2.470219e-03 2.958057e-03 6.237919e-04 5.216971e-06 3.509240e-06 7.382399e-04
8.589073e-04
         253           254           255           256           257           258
259
7.493046e-04 2.102311e-03 1.606958e-02 8.689040e-03 1.030994e-02 7.326867e-03
1.489496e-02
         260           261           262           263           264           265
266
2.523865e-03 6.883859e-03 2.751509e-03 3.596869e-03 2.546595e-03 3.012306e-11
5.405901e-05
         267           268           269           270           271           272
273
2.828624e-05 2.595015e-05 2.047595e-05 6.103504e-06 8.741934e-06 6.126125e-06
7.377412e-06
         274           275           276           277           278           279
280
7.053263e-06 1.237553e-05 1.144996e-05 1.908182e-06 9.675953e-10 3.345211e-10
1.925407e-07
         281           282           283           284           285           286
287
1.599729e-07 5.291112e-08 9.366794e-08 5.812260e-07 1.647427e-06 5.681085e-04
4.218800e-04
         288           289           290           291           292           293
294
5.134343e-03 8.078690e-03 6.522817e-03 6.894405e-11 1.818975e-10 4.295385e-11
2.721310e-09
         295           296           297           298           299           300
301
1.432050e-09 3.663073e-07 3.959899e-07 2.901206e-04 2.225206e-04 2.311065e-04
3.382463e-04
         302           303           304           305           306           307
308
5.227256e-04 4.666242e-04 5.798872e-04 1.669327e-06 1.628807e-06 3.905991e-07
6.036318e-10
         309           310           311           312           313           314
315
1.488503e-04 3.471427e-04 1.396838e-05 4.400540e-04 8.743521e-04 3.541312e-04
4.149534e-03
         316           317           318           319           320           321
322
5.587788e-03 3.279072e-03 4.138893e-03 7.234044e-03 1.044002e-02 1.363203e-02
1.605558e-02
```

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         323           324           325           326           327           328
329
2.781735e-03 1.392107e-03 1.755719e-05 1.440507e-05 5.731153e-06 1.062099e-05
3.172083e-05
         330           331           332           333           334           335
336
1.226079e-05 7.690734e-06 6.397279e-06 3.304082e-06 7.349008e-07 1.342294e-06
9.596169e-07
         337           338           339           340           341           342
343
1.127178e-06 2.656474e-06 5.197757e-06 6.522852e-06 2.565635e-06 3.387200e-06
1.290971e-06
         344           345           346           347           348           349
350
5.034407e-05 4.496319e-05 3.091448e-06 4.280049e-06 5.713919e-06 7.450266e-06
6.630716e-06
         351           352           353           354           355           356
357
1.195510e-06 4.848497e-07 2.358290e-11 2.877370e-11 5.131948e-12 2.769590e-05
2.295489e-05
         358           359           360           361           362           363
364
4.987213e-05 5.849166e-06 7.586570e-06 4.106972e-10 5.634688e-10 1.605786e-04
1.942003e-04
         365           366           367           368           369           370
371
4.258539e-07 1.971746e-07 5.375143e-08 6.378766e-09 5.636494e-09 9.695332e-04
5.393975e-04
         372           373           374           375           376           377
378
2.008941e-04 2.229643e-04 1.021376e-04 8.859237e-05 4.811334e-06 6.908865e-06
1.450926e-06
         379           380           381           382           383           384
385
1.290636e-06 4.961665e-07 1.850448e-07 4.582703e-07 8.616872e-07 3.153058e-06
4.142987e-06
         386           387           388           389           390           391
392
4.403936e-06 6.091664e-06 5.972202e-06 8.488470e-06 6.103345e-06 3.035694e-10
1.394944e-09
         393           394           395           396           397           398
399
5.919457e-10 7.171218e-06 6.436083e-06 1.358332e-05 9.248452e-07 2.030674e-07
9.052769e-08
         400           401           402           403           404           405
406
2.037694e-04 8.578393e-05 2.054752e-04 3.658545e-04 3.989803e-04 2.155885e-04
3.275507e-04
         407           408           409           410           411           412
413
1.004790e-04 4.018471e-04 1.255796e-04 4.019172e-05 2.459367e-05 9.919094e-06
1.174134e-04
         414           415           416           417           418           419
420
5.302144e-04 4.163431e-04 4.571827e-04 3.269937e-04 1.751318e-04 1.691854e-04
1.409402e-04
         421           422           423           424           425           426
427
4.991399e-05 8.463313e-05 8.483523e-05 9.921556e-05 7.900657e-05 7.406427e-10
1.407998e-10
         428           429           430           431           432           433
434
5.740847e-06 3.710254e-06 5.744478e-06 3.545292e-10 1.431043e-04 1.091406e-04
1.510755e-04
```

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         435           436           437           438           439           440
441
1.683697e-04 1.663561e-05 6.913717e-06 3.177218e-04 4.028008e-04 9.016677e-06
9.599030e-03
         442           443           444           445           446           447
448
8.994732e-03 9.267183e-03 9.854153e-03 7.897806e-03 3.904129e-09 3.287757e-03
1.778335e-03
         449           450           451           452           453           454
455
1.465100e-03 1.187520e-03 2.010070e-03 3.800918e-03 1.873903e-03 2.489918e-03
2.589864e-03
         456           457           458           459           460           461
462
1.265284e-03 1.315895e-03 4.544156e-03 2.791924e-03 1.887537e-03 2.897527e-04
4.233964e-04
         463           464           465           466           467           468
469
1.010269e-03 6.617543e-04 3.478501e-10 1.784088e-10 1.710587e-10 9.483155e-06
5.615673e-06
         470           471           472           473           474           475
476
1.160944e-05 9.288065e-06 7.037599e-06 1.190927e-05 6.257484e-06 5.300325e-06
6.605407e-06
         477           478           479           480           481           482
483
1.039024e-05 1.081149e-05 2.428749e-03 5.511015e-04 1.917905e-03 1.763256e-03
2.407282e-03
         484           485           486           487           488           489
490
2.484408e-03 2.102893e-03 1.624407e-03 1.785698e-03 1.368587e-03 7.367369e-04
2.071773e-03
         491           492           493           494           495           496
497
7.808237e-04 5.104549e-04 2.232715e-04 4.599248e-04 2.286760e-04 1.045911e-11
2.866211e-08
         498           499           500           501           502           503
504
3.746827e-07 3.633886e-07 2.928674e-08 3.038212e-03 3.812719e-03 4.177994e-03
4.467138e-03
         505           506           507           508           509           510
511
3.474627e-03 1.513973e-02 4.718085e-03 1.120746e-02 7.799664e-03 6.189705e-03
6.274304e-03
         512           513           514           515           516           517
518
4.612279e-03 1.997617e-02 1.476060e-02 3.554536e-02 1.457055e-02 1.755746e-02
1.162615e-02
         519           520           521           522           523           524
525
5.512228e-03 2.513210e-02 1.382814e-02 9.686767e-03 1.251861e-02 1.621202e-02
9.636105e-03
         526           527           528           529           530           531
532
1.454057e-02 1.771344e-02 2.019751e-10 1.111751e-06 4.539859e-07 5.211100e-08
4.175472e-08
         533           534           535           536           537           538
539
1.032371e-08 1.039877e-05 5.723617e-06 2.770325e-05 4.388495e-05 3.272008e-05
2.555330e-05
         540           541           542           543           544           545
546
3.551177e-05 4.030966e-05 3.469268e-05 1.105215e-05 9.764519e-06 6.802543e-06
1.813317e-05
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         547          548          549          550          551          552
553
2.709496e-05 2.085639e-10 1.424706e-10 3.561214e-11 4.003828e-11 6.632810e-10
2.256354e-09
         554          555          556          557          558          559
560
2.829313e-06 5.541667e-06 1.983422e-02 1.825370e-02 9.998940e-03 1.119056e-02
9.393355e-03
         561          562          563          564          565          566
567
1.584347e-02 4.541854e-02 5.220837e-10 2.180032e-10 1.407536e-07 1.490256e-07
3.533373e-08
         568          569          570          571          572          573
574
3.112418e-05 2.984379e-05 3.097004e-10 6.662693e-05 2.310700e-05 1.136951e-05
2.186555e-05
         575          576          577          578          579          580
581
3.169357e-06 1.939180e-07 1.601490e-06 1.707568e-06 1.560856e-06 5.095146e-07
1.000942e-06
         582          583          584          585          586          587
588
7.709537e-07 1.133121e-06 3.344771e-07 6.259068e-07 4.974569e-07 1.012740e-06
5.889147e-07
         589          590          591          592          593          594
595
9.056223e-05 7.115969e-05 2.547446e-04 1.914776e-04 1.224007e-03 1.287071e-03
8.701159e-04
         596          597          598          599          600          601
602
1.349478e-04 6.760195e-06 8.016548e-06 8.464854e-06 1.423130e-05 2.345590e-06
8.243603e-07
         603          604          605          606          607          608
609
1.359557e-08 1.306240e-10 1.461222e-09 5.543645e-08 3.576724e-10 9.440566e-10
1.634806e-10
         610          611          612          613          614          615
616
4.524680e-08 2.374679e-08 3.128024e-05 1.490875e-09 3.471445e-09 3.260265e-05
5.619580e-05
         617          618          619          620          621          622
623
3.199659e-05 9.204890e-06 2.025411e-05 1.867213e-11 1.001221e-10 2.604382e-10
1.538767e-09
         624          625          626          627          628          629
630
1.506171e-04 1.235689e-04 1.678928e-04 1.741871e-04 7.046949e-05 1.365815e-05
4.634509e-05
         631          632          633          634          635          636
637
2.786563e-05 3.556179e-05 9.092971e-06 1.836308e-05 1.229623e-05 1.994892e-02
7.326195e-03
         638          639          640          641          642          643
644
8.476027e-03 4.311110e-03 7.096418e-03 4.555059e-03 6.498795e-04 5.767504e-06
8.596271e-11
         645          646          647          648          649          650
651
1.563416e-08 5.658337e-09 6.258554e-10 1.408399e-09 1.059171e-09 3.109885e-10
1.118644e-08
         652          653          654          655          656          657
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3.023946e-08 3.977518e-09 7.605647e-02 2.946010e-02 5.617563e-02 5.311712e-02
1.217447e-02
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2.823013e-02 2.082808e-02 1.562794e-02 3.511627e-02 2.698946e-02 2.531220e-02
2.766928e-02
         666           667           668           669           670           671
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1.811850e-02 1.298780e-02 9.150034e-03 1.017445e-02 3.293471e-06 1.105417e-04
6.590016e-05
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1.151713e-04 5.481067e-04 2.848272e-04 5.990728e-04 6.626894e-05 1.742705e-05
4.536583e-05
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1.304301e-04 1.190931e-04 9.389667e-05 1.465833e-10 9.750108e-05 2.124000e-04
1.243441e-04
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693
1.990913e-04 6.510841e-04 1.995029e-04 5.381654e-04 2.627850e-04 2.389296e-04
1.303720e-04
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9.950184e-05 4.399719e-05 7.059240e-11 4.437511e-06 3.505997e-06 2.730115e-06
3.003514e-06
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2.656601e-06 9.786709e-06 8.615608e-06 6.452595e-11 4.586613e-11 2.418852e-10
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1.873866e-07 3.520517e-08 1.766551e-07 2.006367e-07 5.649260e-11 1.719333e-02
2.606289e-02
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5.248591e-03 5.919906e-03 5.769547e-03 8.529742e-07 4.958814e-07 7.664326e-11
3.525973e-06
         722           723           724           725           726           727
728
5.901687e-06 3.286369e-06 6.071595e-11 2.473446e-07 9.511516e-07 6.818863e-07
7.071735e-06
         729           730           731           732           733           734
735
4.923961e-06 1.892906e-07 1.283419e-10 5.772937e-04 3.384388e-04 4.117596e-04
3.528153e-04
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742
2.780590e-03 2.926462e-03 1.898755e-03 4.511330e-02 4.261940e-02 3.493745e-02
7.282249e-02
         743           744           745           746           747           748
749
4.799825e-02 5.036467e-02 4.656076e-02 9.615793e-02 8.504952e-02 6.044035e-02
6.432781e-02
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5.911784e-02 5.352912e-02 7.184021e-02 8.520520e-02 5.920711e-02 3.130042e-02
4.495177e-02
         757           758           759           760           761           762
763
7.607439e-02 2.260836e-02 1.052796e-02 2.425372e-02 2.851277e-02 2.411681e-07
1.892648e-07
         764           765           766           767           768           769
770
4.418030e-08 1.805284e-04 1.342446e-04 9.110016e-05 1.038212e-04 5.383431e-04
2.687946e-04
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3.251802e-04 2.620344e-04 4.634061e-05 7.991593e-05 2.788970e-05 3.513142e-05
1.827516e-11
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784
3.525018e-11 3.806374e-10 3.353826e-09 6.093434e-07 1.196803e-06 1.799355e-03
3.025504e-03
         785           786           787           788           789           790
791
6.409089e-03 2.469950e-03 1.616007e-03 3.517550e-03 6.530268e-04 7.395144e-10
7.674859e-10
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798
1.131171e-10 5.082797e-09 1.907935e-08 1.424897e-07 1.662599e-07 3.693231e-08
1.176091e-07
         799           800           801           802           803           804
805
4.202920e-08 1.151675e-07 1.653168e-07 1.012997e-03 2.866814e-04 2.386299e-04
6.838377e-06
         806           807           808           809           810           811
812
6.805327e-06 4.895433e-10 1.659412e-05 2.347651e-05 1.319619e-11 8.781248e-12
1.787547e-10
         813           814           815           816           817           818
819
6.843146e-10 8.164185e-10 1.153592e-09 1.457267e-09 3.920950e-05 8.671495e-05
8.097810e-05
         820           821           822           823           824           825
826
5.367110e-05 3.661284e-05 3.980393e-05 1.527235e-06 6.190349e-06 2.068627e-06
5.828961e-06
         827           828           829           830           831           832
833
3.569224e-06 3.601472e-06 7.878828e-06 2.834713e-06 5.147047e-08 9.048374e-07
1.145715e-06
         834           835           836           837           838           839
840
3.402198e-06 1.168310e-05 5.411979e-06 2.035263e-07 3.710020e-10 2.004638e-05
2.652669e-05
         841           842           843           844           845           846
847
1.290261e-04 1.013214e-04 6.642893e-04 1.232242e-03 1.163967e-03 4.496617e-06
6.910829e-05
         848           849           850           851           852           853
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4.392454e-05 9.822270e-05 9.144191e-06 2.117122e-05 7.765304e-06 1.975784e-10
1.697803e-07
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2.286421e-06 2.388087e-06 9.982164e-07 3.099995e-06 2.015462e-06 1.439893e-07
5.210230e-10
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7.304883e-10 1.409448e-05 5.238347e-06 2.021592e-03 2.930655e-03 8.579511e-04
2.215929e-03
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1.453361e-03 8.968377e-04 1.867743e-03 3.595094e-04 1.563905e-04 3.367875e-02
2.837449e-02
         876           877           878           879           880           881
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1.392774e-02 2.676757e-02 3.691033e-02 8.919509e-03 1.298150e-02 1.671920e-02
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2.678792e-02 2.329419e-02 1.140040e-02 1.230483e-02 2.421447e-02 1.142789e-02
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1.639446e-02 1.567849e-02 1.591942e-10 3.179965e-09 2.556289e-09 3.561076e-05
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1.099590e-06 4.601176e-06 3.660512e-06 2.996770e-08 6.806461e-05 5.221635e-05
7.138607e-05
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6.019452e-05 1.514971e-04 5.471827e-06 2.668160e-06 1.308001e-02 3.924196e-02
4.160202e-02
         911           912           913           914           915           916
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1.952790e-02 6.799786e-04 5.061303e-10 5.269858e-10 2.313700e-07 3.476973e-07
4.896319e-08
         918           919           920           921           922           923
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1.066863e-07 1.263305e-07 6.381624e-08 2.768104e-07 1.746769e-07 7.434784e-09
8.271616e-03
         925           926           927           928           929           930
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6.114895e-03 1.827599e-02 1.234208e-03 1.367133e-03 3.807616e-11 1.459208e-07
1.361496e-07
         932           933           934           935           936           937
938
7.446564e-09 4.545253e-10 4.874300e-10 8.278600e-10 1.520602e-10 3.527371e-07
5.884860e-07
         939           940           941           942           943           944
945
1.909290e-05 3.738459e-06 5.898102e-07 1.636350e-07 1.025187e-07 5.556395e-08
2.867921e-04
         946           947           948           949           950           951
952
3.030110e-04 5.076941e-05 1.830955e-05 1.613195e-05 5.166803e-02 4.971517e-02
7.542695e-02
         953           954           955           956           957           958
959
5.835118e-02 7.952205e-02 9.974629e-02 7.043874e-02 5.845892e-02 1.094350e-01
8.442666e-02
         960           961           962           963           964           965
966
1.012343e-01 5.471175e-02 1.089260e-01 9.196913e-02 9.968125e-02 7.551029e-02
9.040527e-02
         967           968           969           970           971           972
973
1.219390e-01 1.072482e-01 3.646928e-02 2.209313e-02 3.204350e-02 2.454047e-02
3.715663e-02
         974           975           976           977           978           979
980
1.296226e-09 3.458731e-05 3.865357e-05 3.883164e-07 1.298628e-05 5.091867e-06
1.241033e-05
         981           982           983           984           985           986
987
1.722655e-05 1.999488e-05 2.092877e-06 8.358578e-07 2.998420e-11 3.940769e-05
5.084327e-05
         988           989           990           991           992           993
994
6.840795e-02 6.406558e-02 8.766052e-02 7.989953e-02 8.536844e-02 8.468984e-02
7.571734e-02
```

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         995          996          997          998          999         1000
1.167658e-01 3.252687e-02 1.565368e-02 2.632423e-02 3.364186e-02 3.024003e-02
 [ reached getOption("max.print") -- omitted 504 entries ]
> train_numeric$Finalists=as.factor(train_numeric$Finalists)
> test_numeric$Finalists=as.factor(test_numeric$Finalists)
> str(pdata)
 Named num [1:1504] 1.19e-09 4.60e-07 7.03e-07 1.61e-06 6.65e-07 ...
 - attr(*, "names")= chr [1:1504] "1" "2" "3" "4" ...
> str(train_numeric$Finalists)
 Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...


> pdataF<- as.factor(ifelse(test=as.numeric(pdata>0.54)==0,yes=0,no=1))
> library(e1071)
> confusionMatrix(pdataF,test_numeric$Finalists)
Confusion Matrix and Statistics

          Reference
Prediction    0    1
         0 1415   70
         1    7   12

               Accuracy : 0.9488
                 95% CI : (0.9364, 0.9594)
    No Information Rate : 0.9455
    P-Value [Acc > NIR] : 0.3091

                  Kappa : 0.2217

 Mcnemar's Test P-Value : 1.6e-12

            Sensitivity : 0.9951
            Specificity : 0.1463
         Pos Pred Value : 0.9529
         Neg Pred Value : 0.6316
             Prevalence : 0.9455
         Detection Rate : 0.9408
   Detection Prevalence : 0.9874
      Balanced Accuracy : 0.5707

       'Positive' Class : 0


> roc(train_numeric$Finalists,logistic_regres$fitted.values,plot=TRUE, legacy
.axes=TRUE, xlab="False Positive Percentage", ylab="True Postive Percentage",
col="#377eb8", lwd=4,print.auc= TRUE)
Setting levels: control = 0, case = 1
Setting direction: controls < cases

Call:
roc.default(response = train_numeric$Finalists, predictor = logistic_regres$f
itted.values,     plot = TRUE, legacy.axes = TRUE, xlab = "False Positive Per
centage",     ylab = "True Postive Percentage", col = "#377eb8", lwd = 4,
print.auc = TRUE)

Data: logistic_regres$fitted.values in 3349 controls (train_numeric$Finalists
0) < 195 cases (train_numeric$Finalists 1).
Area under the curve: 0.9638
```

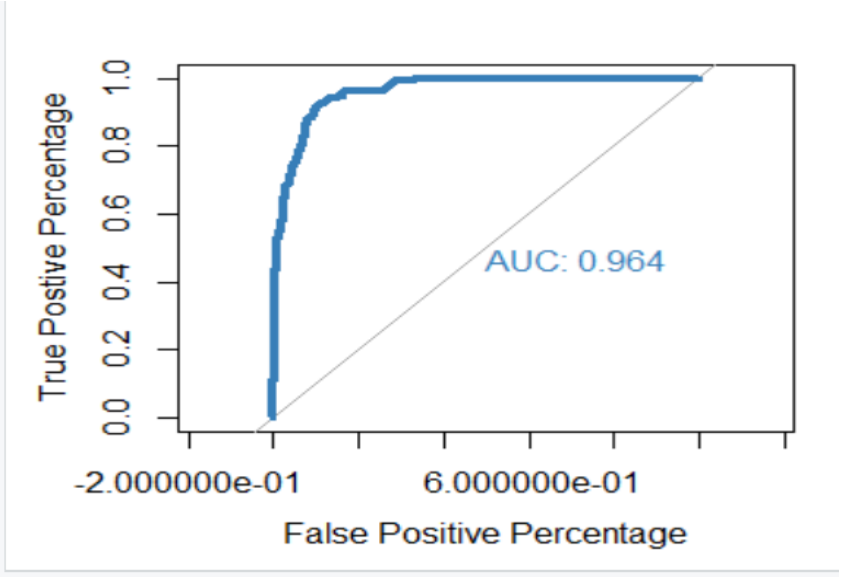

Re-modelling by adding/dropping Win_percentage and Rank

Logistic Regression Model	**Confusion MatrixAccuracy**	**ROC**	**Significant variable**
Without Win Percentage and Rank	91.09%	0.7832	Aces,FirstServe_Return_won Second_Servereturn_won First_serves_in,Double_Faults First_Serve_Percentage
With Win percentage and not Rank	94.80%	0.962	Age,Win_percentage, Double_faults
With Rank and without Win percentage	94.60%	0.893	Rank,Double_Faults
With both Rank and Win Percentage	94.80%	0.9638	Age,Rank,Double_faults, Win_percentage