BasketBall_Free_Throw_Analysis.R

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Wed Mar 21 19:13:23 2018

```r
#Basket Ball free throws Analysis

#Seasons
Seasons <- c("2005","2006","2007","2008","2009","2010","2011","2012","2013","2014")

#Players
Players <- c("KobeBryant","JoeJohnson","LeBronJames","CarmeloAnthony","DwightHoward","ChrisBosh"
,"ChrisPaul","KevinDurant","DerrickRose","DwayneWade")

#Free Throws
KobeBryant_FT <- c(696,667,623,483,439,483,381,525,18,196)
JoeJohnson_FT <- c(261,235,316,299,220,195,158,132,159,141)
LeBronJames_FT <- c(601,489,549,594,593,503,387,403,439,375)
CarmeloAnthony_FT <- c(573,459,464,371,508,507,295,425,459,189)
DwightHoward_FT <- c(356,390,529,504,483,546,281,355,349,143)
ChrisBosh_FT <- c(474,463,472,504,470,384,229,241,223,179)
ChrisPaul_FT <- c(394,292,332,455,161,337,260,286,295,289)
KevinDurant_FT <- c(209,209,391,452,756,594,431,679,703,146)
DerrickRose_FT <- c(146,146,146,197,259,476,194,0,27,152)
DwayneWade_FT <- c(629,432,354,590,534,494,235,308,189,284)


# Creating Matrix for above vectors

FreeThrows <- rbind(KobeBryant_FT ,JoeJohnson_FT ,LeBronJames_FT ,CarmeloAnthony_FT ,DwightHowar
d_FT ,ChrisBosh_FT ,ChrisPaul_FT ,KevinDurant_FT ,DerrickRose_FT ,DwayneWade_FT);
FreeThrows
```

```
##                    [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
## KobeBryant_FT       696  667  623  483  439  483  381  525   18   196
## JoeJohnson_FT       261  235  316  299  220  195  158  132  159   141
## LeBronJames_FT      601  489  549  594  593  503  387  403  439   375
## CarmeloAnthony_FT   573  459  464  371  508  507  295  425  459   189
## DwightHoward_FT     356  390  529  504  483  546  281  355  349   143
## ChrisBosh_FT        474  463  472  504  470  384  229  241  223   179
## ChrisPaul_FT        394  292  332  455  161  337  260  286  295   289
## KevinDurant_FT      209  209  391  452  756  594  431  679  703   146
## DerrickRose_FT      146  146  146  197  259  476  194    0   27   152
## DwayneWade_FT       629  432  354  590  534  494  235  308  189   284
```

```
# Now we have matrix we can remove vectors

rm(KobeBryant_FT ,JoeJohnson_FT ,LeBronJames_FT ,CarmeloAnthony_FT ,DwightHoward_FT ,ChrisBosh_F
T ,ChrisPaul_FT ,KevinDurant_FT ,DerrickRose_FT ,DwayneWade_FT)

# Checking colnames and rownames
colnames(FreeThrows)
```

```
## NULL
```

```
#There are no colnames, Lets assign rownames and colnames.

colnames(FreeThrows) <- Seasons
rownames(FreeThrows) <- Players

FreeThrows # Checking Matrix now
```

```
##                 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
## KobeBryant       696  667  623  483  439  483  381  525   18  196
## JoeJohnson       261  235  316  299  220  195  158  132  159  141
## LeBronJames      601  489  549  594  593  503  387  403  439  375
## CarmeloAnthony   573  459  464  371  508  507  295  425  459  189
## DwightHoward     356  390  529  504  483  546  281  355  349  143
## ChrisBosh        474  463  472  504  470  384  229  241  223  179
## ChrisPaul        394  292  332  455  161  337  260  286  295  289
## KevinDurant      209  209  391  452  756  594  431  679  703  146
## DerrickRose      146  146  146  197  259  476  194    0   27  152
## DwayneWade       629  432  354  590  534  494  235  308  189  284
```

```
#Free Throw Attempts
KobeBryant_FTA <- c(819,768,742,564,541,583,451,626,21,241)
JoeJohnson_FTA <- c(330,314,379,362,269,243,186,161,195,176)
LeBronJames_FTA <- c(814,701,771,762,773,663,502,535,585,528)
CarmeloAnthony_FTA <- c(709,568,590,468,612,605,367,512,541,237)
DwightHoward_FTA <- c(598,666,897,849,816,916,572,721,638,271)
ChrisBosh_FTA <- c(581,590,559,617,590,471,279,302,272,232)
ChrisPaul_FTA <- c(465,357,390,524,190,384,302,323,345,321)
KevinDurant_FTA <- c(256,256,448,524,840,675,501,750,805,171)
DerrickRose_FTA <- c(205,205,205,250,338,555,239,0,32,187)
DwayneWade_FTA <- c(803,535,467,771,702,652,297,425,258,370)

# Creating Another Matrix

FreeThrowsAttempts <- rbind(KobeBryant_FTA ,JoeJohnson_FTA ,LeBronJames_FTA ,CarmeloAnthony_FTA
 ,DwightHoward_FTA ,ChrisBosh_FTA ,ChrisPaul_FTA ,KevinDurant_FTA ,DerrickRose_FTA ,DwayneWade_F
TA)
FreeThrowsAttempts
```

```
##                           [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
## KobeBryant_FTA            819  768  742  564  541  583  451  626   21   241
## JoeJohnson_FTA            330  314  379  362  269  243  186  161  195   176
## LeBronJames_FTA           814  701  771  762  773  663  502  535  585   528
## CarmeloAnthony_FTA        709  568  590  468  612  605  367  512  541   237
## DwightHoward_FTA          598  666  897  849  816  916  572  721  638   271
## ChrisBosh_FTA             581  590  559  617  590  471  279  302  272   232
## ChrisPaul_FTA             465  357  390  524  190  384  302  323  345   321
## KevinDurant_FTA           256  256  448  524  840  675  501  750  805   171
## DerrickRose_FTA           205  205  205  250  338  555  239    0   32   187
## DwayneWade_FTA            803  535  467  771  702  652  297  425  258   370
```

```
#Removing Vectors again
rm(KobeBryant_FTA ,JoeJohnson_FTA ,LeBronJames_FTA ,CarmeloAnthony_FTA ,DwightHoward_FTA ,ChrisB
osh_FTA ,ChrisPaul_FTA ,KevinDurant_FTA ,DerrickRose_FTA ,DwayneWade_FTA)

#Assigning rownames and colnames
colnames(FreeThrowsAttempts) <- Seasons
rownames(FreeThrowsAttempts) <- Players
FreeThrowsAttempts
```

```
##                2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
## KobeBryant      819  768  742  564  541  583  451  626   21  241
## JoeJohnson      330  314  379  362  269  243  186  161  195  176
## LeBronJames     814  701  771  762  773  663  502  535  585  528
## CarmeloAnthony  709  568  590  468  612  605  367  512  541  237
## DwightHoward    598  666  897  849  816  916  572  721  638  271
## ChrisBosh       581  590  559  617  590  471  279  302  272  232
## ChrisPaul       465  357  390  524  190  384  302  323  345  321
## KevinDurant     256  256  448  524  840  675  501  750  805  171
## DerrickRose     205  205  205  250  338  555  239    0   32  187
## DwayneWade      803  535  467  771  702  652  297  425  258  370
```

```r
#Games
KobeBryant_G <- c(80,77,82,82,73,82,58,78,6,35)
JoeJohnson_G <- c(82,57,82,79,76,72,60,72,79,80)
LeBronJames_G <- c(79,78,75,81,76,79,62,76,77,69)
CarmeloAnthony_G <- c(80,65,77,66,69,77,55,67,77,40)
DwightHoward_G <- c(82,82,82,79,82,78,54,76,71,41)
ChrisBosh_G <- c(70,69,67,77,70,77,57,74,79,44)
ChrisPaul_G <- c(78,64,80,78,45,80,60,70,62,82)
KevinDurant_G <- c(35,35,80,74,82,78,66,81,81,27)
DerrickRose_G <- c(40,40,40,81,78,81,39,0,10,51)
DwayneWade_G <- c(75,51,51,79,77,76,49,69,54,62)
#Matrix
Games <- rbind(KobeBryant_G, JoeJohnson_G, LeBronJames_G, CarmeloAnthony_G, DwightHoward_G, Chri
sBosh_G, ChrisPaul_G, KevinDurant_G, DerrickRose_G, DwayneWade_G)
rm(KobeBryant_G, JoeJohnson_G, CarmeloAnthony_G, DwightHoward_G, ChrisBosh_G, LeBronJames_G, Chr
isPaul_G, DerrickRose_G, DwayneWade_G, KevinDurant_G)
colnames(Games) <- Seasons
rownames(Games) <- Players


#Points
KobeBryant_PTS <- c(2832,2430,2323,2201,1970,2078,1616,2133,83,782)
JoeJohnson_PTS <- c(1653,1426,1779,1688,1619,1312,1129,1170,1245,1154)
LeBronJames_PTS <- c(2478,2132,2250,2304,2258,2111,1683,2036,2089,1743)
CarmeloAnthony_PTS <- c(2122,1881,1978,1504,1943,1970,1245,1920,2112,966)
DwightHoward_PTS <- c(1292,1443,1695,1624,1503,1784,1113,1296,1297,646)
ChrisBosh_PTS <- c(1572,1561,1496,1746,1678,1438,1025,1232,1281,928)
ChrisPaul_PTS <- c(1258,1104,1684,1781,841,1268,1189,1186,1185,1564)
KevinDurant_PTS <- c(903,903,1624,1871,2472,2161,1850,2280,2593,686)
DerrickRose_PTS <- c(597,597,597,1361,1619,2026,852,0,159,904)
DwayneWade_PTS <- c(2040,1397,1254,2386,2045,1941,1082,1463,1028,1331)
#Matrix
Points <- rbind(KobeBryant_PTS, JoeJohnson_PTS, LeBronJames_PTS, CarmeloAnthony_PTS, DwightHowar
d_PTS, ChrisBosh_PTS, ChrisPaul_PTS, KevinDurant_PTS, DerrickRose_PTS, DwayneWade_PTS)
rm(KobeBryant_PTS, JoeJohnson_PTS, LeBronJames_PTS, CarmeloAnthony_PTS, DwightHoward_PTS, ChrisB
osh_PTS, ChrisPaul_PTS, KevinDurant_PTS, DerrickRose_PTS, DwayneWade_PTS)
colnames(Points) <- Seasons
rownames(Points) <- Players


#Field Goals
KobeBryant_FG <- c(978,813,775,800,716,740,574,738,31,266)
JoeJohnson_FG <- c(632,536,647,620,635,514,423,445,462,446)
LeBronJames_FG <- c(875,772,794,789,768,758,621,765,767,624)
CarmeloAnthony_FG <- c(756,691,728,535,688,684,441,669,743,358)
DwightHoward_FG <- c(468,526,583,560,510,619,416,470,473,251)
ChrisBosh_FG <- c(549,543,507,615,600,524,393,485,492,343)
ChrisPaul_FG <- c(407,381,630,631,314,430,425,412,406,568)
KevinDurant_FG <- c(306,306,587,661,794,711,643,731,849,238)
DerrickRose_FG <- c(208,208,208,574,672,711,302,0,58,338)
DwayneWade_FG <- c(699,472,439,854,719,692,416,569,415,509)
#Matrix
FieldGoals <- rbind(KobeBryant_FG, JoeJohnson_FG, LeBronJames_FG, CarmeloAnthony_FG, DwightHowar
d_FG, ChrisBosh_FG, ChrisPaul_FG, KevinDurant_FG, DerrickRose_FG, DwayneWade_FG)
rm(KobeBryant_FG, JoeJohnson_FG, LeBronJames_FG, CarmeloAnthony_FG, DwightHoward_FG, ChrisBosh_F
```
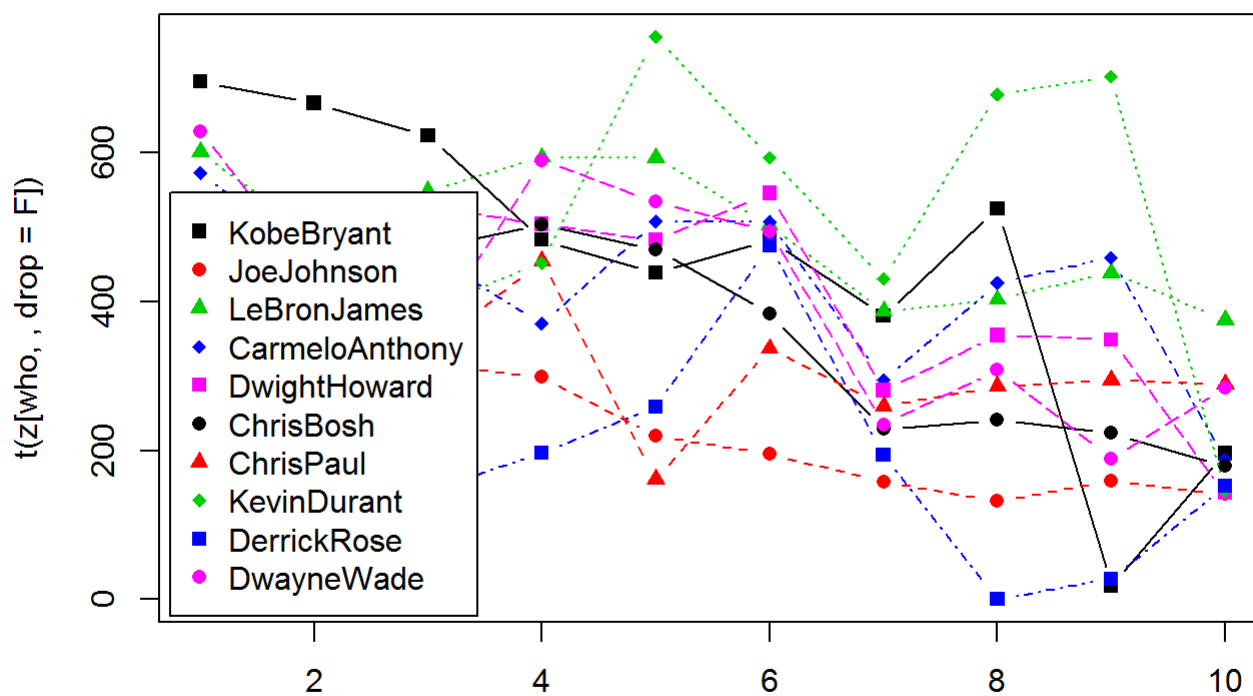
```
G, ChrisPaul_FG, KevinDurant_FG, DerrickRose_FG, DwayneWade_FG)
colnames(FieldGoals) <- Seasons
rownames(FieldGoals) <- Players


#Creating Plots
myplot <- function(z, who=1:10) {
  matplot(t(z[who,,drop=F]), type="b", pch=15:18, col=c(1:4,6), main="Basketball Players Analysi
s")
  legend("bottomleft", inset=0.01, legend=Players[who], col=c(1:4,6), pch=15:18, horiz=F)
}

myplot(FreeThrows)
```
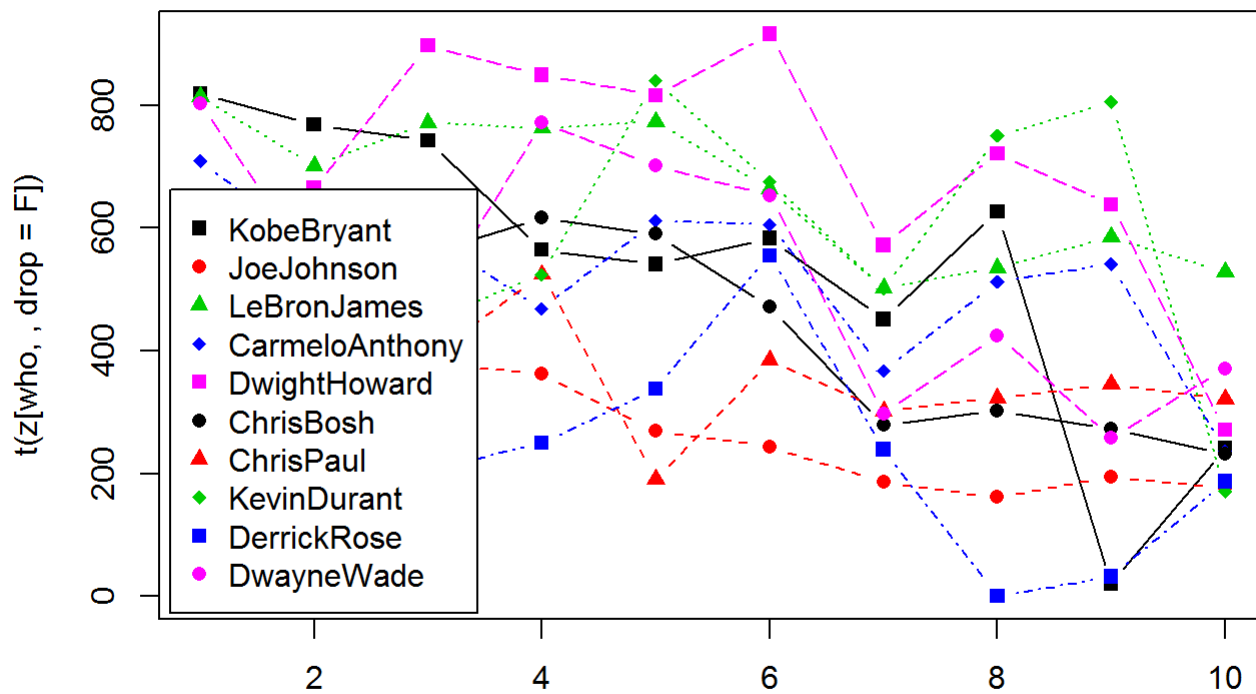
Basketball Players Analysis


```
myplot(FreeThrowsAttempts)
```
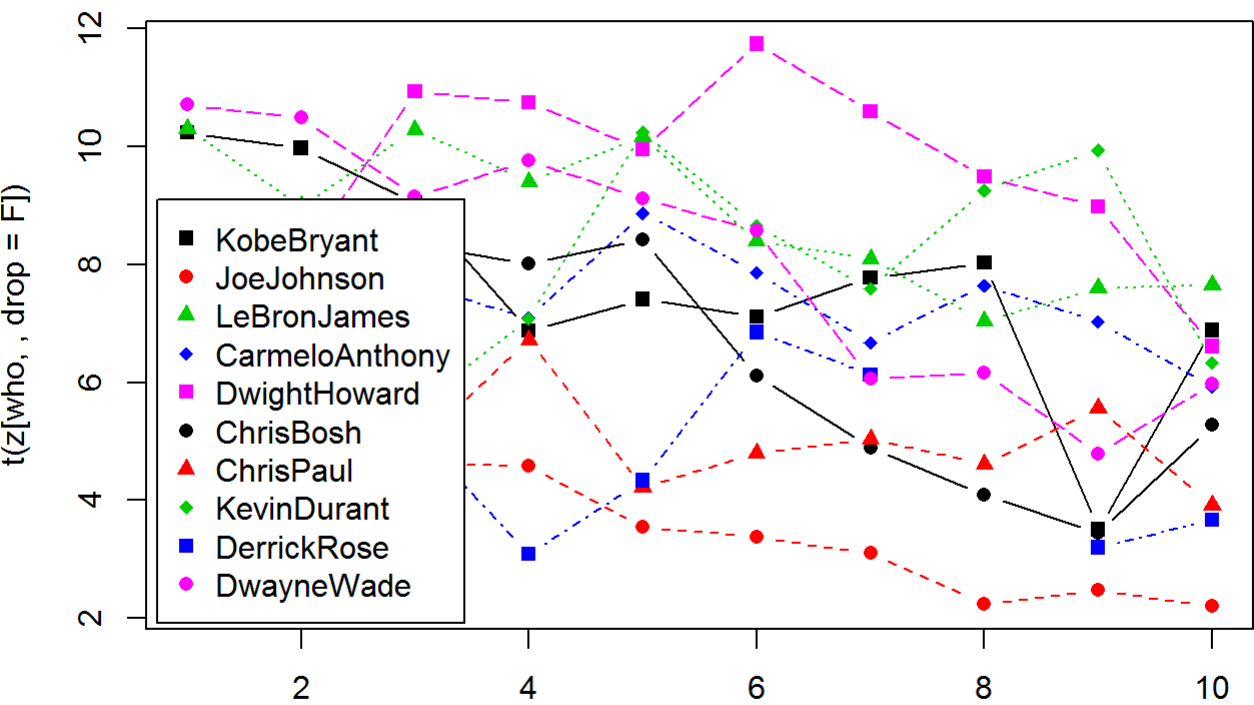
Basketball Players Analysis


```
# Free Throw Attempts per Game
FreeThrowsAttempts/Games
```

##	2005	2006	2007	2008	2009	2010
## KobeBryant	10.237500	9.974026	9.048780	6.878049	7.410959	7.109756
## JoeJohnson	4.024390	5.508772	4.621951	4.582278	3.539474	3.375000
## LeBronJames	10.303797	8.987179	10.280000	9.407407	10.171053	8.392405
## CarmeloAnthony	8.862500	8.738462	7.662338	7.090909	8.869565	7.857143
## DwightHoward	7.292683	8.121951	10.939024	10.746835	9.951220	11.743590
## ChrisBosh	8.300000	8.550725	8.343284	8.012987	8.428571	6.116883
## ChrisPaul	5.961538	5.578125	4.875000	6.717949	4.222222	4.800000
## KevinDurant	7.314286	7.314286	5.600000	7.081081	10.243902	8.653846
## DerrickRose	5.125000	5.125000	5.125000	3.086420	4.333333	6.851852
## DwayneWade	10.706667	10.490196	9.156863	9.759494	9.116883	8.578947
##	2011	2012	2013	2014		
## KobeBryant	7.775862	8.025641	3.500000	6.885714		
## JoeJohnson	3.100000	2.236111	2.468354	2.200000		
## LeBronJames	8.096774	7.039474	7.597403	7.652174		
## CarmeloAnthony	6.672727	7.641791	7.025974	5.925000		
## DwightHoward	10.592593	9.486842	8.985915	6.609756		
## ChrisBosh	4.894737	4.081081	3.443038	5.272727		
## ChrisPaul	5.033333	4.614286	5.564516	3.914634		
## KevinDurant	7.590909	9.259259	9.938272	6.333333		
## DerrickRose	6.128205	NaN	3.200000	3.666667		
## DwayneWade	6.061224	6.159420	4.777778	5.967742		

```
myplot(FreeThrowsAttempts/Games)
```


Basketball Players Analysis

```
# Free Throw Accuracy

FreeThrows/FreeThrowsAttempts
```
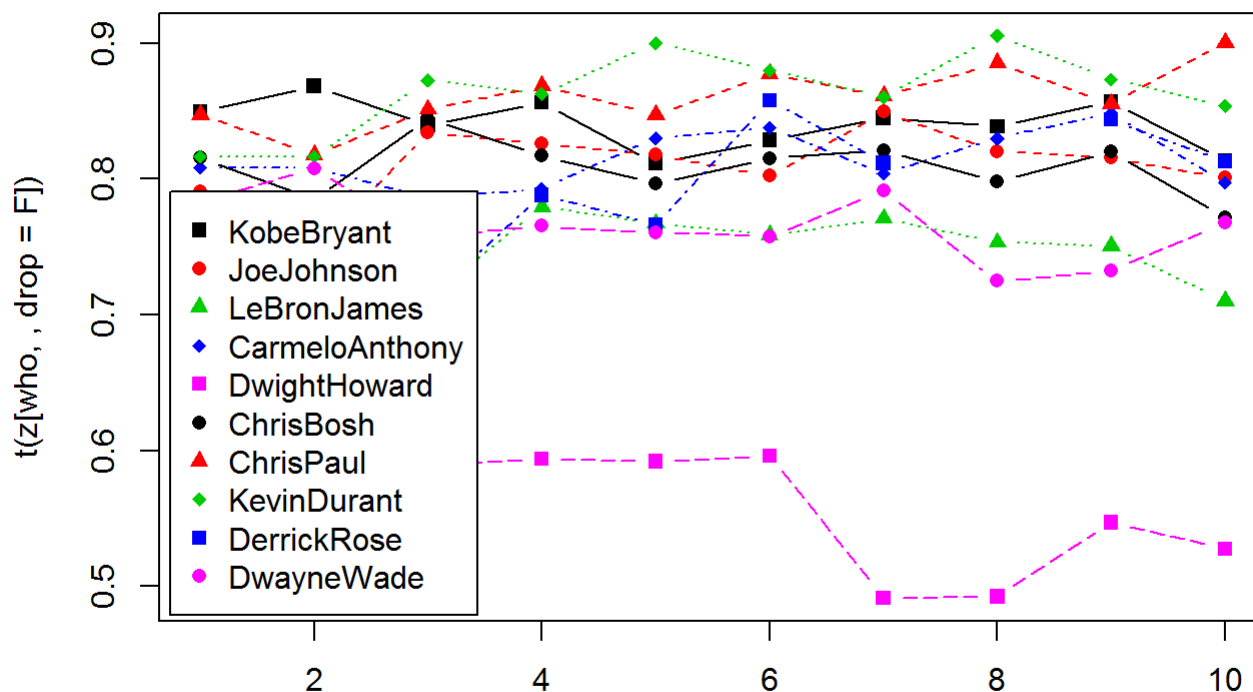
```
##                      2005      2006      2007      2008      2009      2010
## KobeBryant      0.8498168 0.8684896 0.8396226 0.8563830 0.8114603 0.8284734
## JoeJohnson      0.7909091 0.7484076 0.8337731 0.8259669 0.8178439 0.8024691
## LeBronJames     0.7383292 0.6975749 0.7120623 0.7795276 0.7671410 0.7586727
## CarmeloAnthony  0.8081805 0.8080986 0.7864407 0.7927350 0.8300654 0.8380165
## DwightHoward    0.5953177 0.5855856 0.5897436 0.5936396 0.5919118 0.5960699
## ChrisBosh       0.8158348 0.7847458 0.8443649 0.8168558 0.7966102 0.8152866
## ChrisPaul       0.8473118 0.8179272 0.8512821 0.8683206 0.8473684 0.8776042
## KevinDurant     0.8164062 0.8164062 0.8727679 0.8625954 0.9000000 0.8800000
## DerrickRose     0.7121951 0.7121951 0.7121951 0.7880000 0.7662722 0.8576577
## DwayneWade      0.7833126 0.8074766 0.7580300 0.7652399 0.7606838 0.7576687
##                      2011      2012      2013      2014
## KobeBryant      0.8447894 0.8386581 0.8571429 0.8132780
## JoeJohnson      0.8494624 0.8198758 0.8153846 0.8011364
## LeBronJames     0.7709163 0.7532710 0.7504274 0.7102273
## CarmeloAnthony  0.8038147 0.8300781 0.8484288 0.7974684
## DwightHoward    0.4912587 0.4923717 0.5470219 0.5276753
## ChrisBosh       0.8207885 0.7980132 0.8198529 0.7715517
## ChrisPaul       0.8609272 0.8854489 0.8550725 0.9003115
## KevinDurant     0.8602794 0.9053333 0.8732919 0.8538012
## DerrickRose     0.8117155       NaN 0.8437500 0.8128342
## DwayneWade      0.7912458 0.7247059 0.7325581 0.7675676
```

```
myplot(FreeThrows/FreeThrowsAttempts)
```
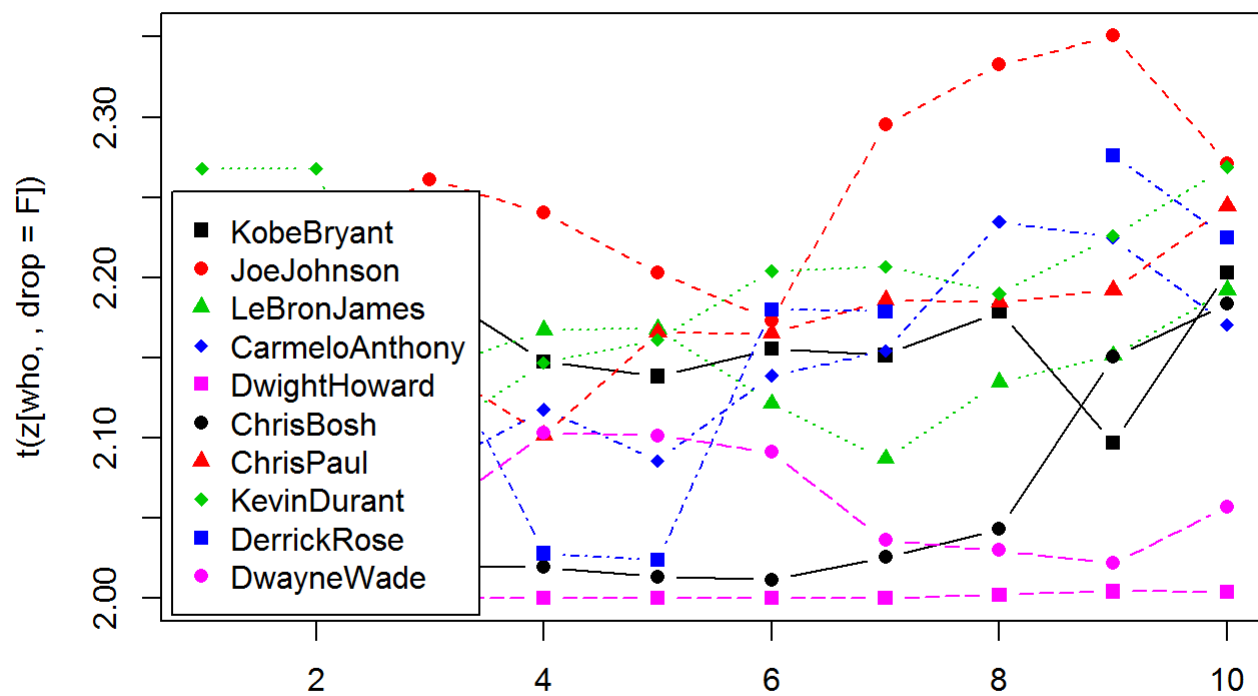
Basketball Players Analysis

```
# We can see from the graph tgar Chris paul has the highest accuracy in free throws but he gets
 very less number of free throws attempts
# And also we can see Dwight Howard has very very low accuracy when it comes to free throws

# Player Style Patterns Excluding Free Throws
(Points - FreeThrows)/FieldGoals
```

```
##                    2005     2006     2007     2008     2009     2010
## KobeBryant     2.184049 2.168512 2.193548 2.147500 2.138268 2.155405
## JoeJohnson     2.202532 2.222015 2.261206 2.240323 2.203150 2.173152
## LeBronJames    2.145143 2.128238 2.142317 2.167300 2.167969 2.121372
## CarmeloAnthony 2.048942 2.057887 2.079670 2.117757 2.085756 2.138889
## DwightHoward   2.000000 2.001901 2.000000 2.000000 2.000000 2.000000
## ChrisBosh      2.000000 2.022099 2.019724 2.019512 2.013333 2.011450
## ChrisPaul      2.122850 2.131234 2.146032 2.101426 2.165605 2.165116
## KevinDurant    2.267974 2.267974 2.100511 2.146747 2.161209 2.203938
## DerrickRose    2.168269 2.168269 2.168269 2.027875 2.023810 2.180028
## DwayneWade     2.018598 2.044492 2.050114 2.103044 2.101530 2.091040
##                    2011     2012     2013     2014
## KobeBryant     2.151568 2.178862 2.096774 2.203008
## JoeJohnson     2.295508 2.332584 2.350649 2.271300
## LeBronJames    2.086957 2.134641 2.151239 2.192308
## CarmeloAnthony 2.154195 2.234679 2.224764 2.170391
## DwightHoward   2.000000 2.002128 2.004228 2.003984
## ChrisBosh      2.025445 2.043299 2.150407 2.183673
## ChrisPaul      2.185882 2.184466 2.192118 2.244718
## KevinDurant    2.206843 2.190150 2.226148 2.268908
## DerrickRose    2.178808      NaN 2.275862 2.224852
## DwayneWade     2.036058 2.029877 2.021687 2.056974
```

```
myplot((Points - FreeThrows)/FieldGoals)
```

Basketball Players Analysis


```
# From the graph we can say that in the recent year most players were aiming for 3 pointers.
```