Final Project Part 3

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Introduction

The use of data science is ubiquitous across all industries' decision making in one form or another, and nowhere can data driven decision-making be better seen than in professional sports. The National Football League (NFL) is a multi-billion dollar industry in which the lowest individual value of of the thirty-two NFL teams is an incredible $2.27 billion. The best way for a team to garner and sustain value is through winning, and naturally one would assume the greatest avenue to winning is by employing players that are the best at scoring points. With the exception of two teams, every team's individual record holder for career points scored is a placekicker. This begs an important question: is a kicker worth one of only seven precious draft picks a team gets each year? Successfully navigating the annual draft is critical for an NFL team's sustained success, thus the answer to this question is something in which all thirty-two teams should be interested. Using datasets containing draft data from 1977 through 2016 and kickers' career statistical performance, I will attempt to determine if a kicker is worth spending a draft pick upon.

Problem Statement

To determine whether a kicker is worth spending a draft pick upon the following factors must be considered: 1. What statistics reflect a kicker's value? 2. What number draft pick was used on each kicker? 3. What correlation is there between a kicker's career statistical performance and their draft pick?

Addressing the Problem Statement + (Code)

In the code below I have imported the datasets, removed non-relevant data, merged the data using player names, removed any players that were undrafted, and taken a cursory look into correlation between kicker statistical performance and draft position.

To examine the data more fully, weighted regression models and correlation tests must be performed, with draft picks being assigned a weighted value relative to their draft year and round.

```
library(tidyverse)
draft_df <- read.csv("data/draft.csv")
draft_df <- filter(draft_df, position == "K")
draft_df <- draft_df[c("draft","round","pick","nameFull")]
draft_df <- draft_df[order(draft_df$nameFull),]
head(draft_df)
```

```
##     draft round pick         nameFull
## 119  2016     2   59  Aguayo, Roberto
## 77   1993     8  224    Alcorn, Daron
## 27   1982     4   86 Andersen, Morten
```

```
## 28   1982     7  171   Anderson, Gary
## 45   1985    11  298  Anderson, Ricky
## 68   1991     6  151  Andrews, Richie
```

```
fieldGoal_df <- read.csv("data/field-goal-stats.csv")
fieldGoal_df <- filter(fieldGoal_df, Year >= 1977)
fieldGoal_df <- fieldGoal_df[c("Name","Year","Team","Games.Played","FGs.Made","FGs.Attempted","FG.Percen
fieldGoal_df <- fieldGoal_df %>% mutate_at(c("FGs.Made","FGs.Attempted","FG.Percentage"),as.integer)
fieldGoal_df <- aggregate(cbind(Games.Played,FGs.Made,FGs.Attempted) ~ Name, data = fieldGoal_df, sum)
fieldGoal_df$Career_FG_Percentage <- with(fieldGoal_df, (FGs.Made / FGs.Attempted) * 100)
colnames(fieldGoal_df)[1] <- "nameFull"
fieldGoal_df <- fieldGoal_df[order(fieldGoal_df$nameFull),]
head(fieldGoal_df)
```

```
##          nameFull Games.Played FGs.Made FGs.Attempted Career_FG_Percentage
## 1   Abbott, Vince           23       21            34             61.76471
## 2 Aguayo, Roberto           16       22            31             70.96774
## 3   Aguiar, Louie           16        1             2             50.00000
## 4    Akers, David          237      386           477             80.92243
## 5   Allegre, Raul           92      137           186             73.65591
## 6 Alvarez, Wilson            4        3             7             42.85714
```

```
kicker_df <- inner_join(fieldGoal_df, draft_df, by = "nameFull")
kicker_df
```

```
##                 nameFull Games.Played FGs.Made FGs.Attempted
## 1        Aguayo, Roberto           16       22            31
## 2       Andersen, Morten          382      565           709
## 3         Anderson, Gary          353      538           672
## 4            Ariri, Obed           18       22            31
## 5             Bahr, Matt          235      300           415
## 6         Bullock, Randy           48       83           102
## 7           Capece, Bill           37       43            70
## 8         Chandler, Jeff           13       19            27
## 9          Crosby, Mason          160      262           326
## 10           Davis, Greg          169      224           325
## 11         DeLine, Steve            8        9            15
## 12         Edinger, Paul           96      135           180
## 13           Elam, Jason          263      436           540
## 14       Epstein, Hayden            6        5             9
## 15            Folk, Nick          150      239           294
## 16            Ford, Cole           37       45            62
## 17        Franklin, Tony          140      177           264
## 18          Gallery, Jim           17       11            25
## 19         Garcia, Eddie            7        3             9
## 20         Garcia, Teddy           28       21            38
## 21   Gostkowski, Stephen          168      303           348
## 22      Haji-Sheikh, Ali           51       76           111
## 23            Hall, Jeff            3        4             5
## 24         Hanson, Jason          327      495           601
## 25        Hopkins, Dustin           31       59            70
## 26      Igwebuike, Donald           80      108           143
## 27           Jacke, Chris          147      202           265
```

```
## 28          Jacobs, Dave          12       12             26
## 29          Jaeger, Jeff         165      229            309
## 30 Janikowski, Sebastian         268      414            515
## 31        Johansson, Ove           2        1              4
## 32         Kaeding, Nate         114      181            210
## 33           Kasay, John         301      461            563
## 34        Lansford, Mike         124      158            217
## 35        Leavitt, Allan           8        5             10
## 36             Lee, John          11        8             13
## 37         Nelson, Chuck          63       63             93
## 38      O'Donoghue, Neil         110      112            189
## 39         Pelfrey, Doug         111      153            198
## 40        Peterson, Todd         159      235            296
## 41         Rackers, Neil         180      264            330
## 42          Rayner, Dave          57       65             90
## 43          Reveiz, Fuad         147      188            250
## 44          Scobee, Josh         172      241            301
## 45       Septien, Rafael         151      180            256
## 46        Sturgis, Caleb          61      108            134
## 47          Succop, Ryan         128      174            209
## 48      Vitiello, Sandro           2        0              2
## 49     von Schamann, Uwe          89      101            149
## 50          Walsh, Blair          73      133            158
## 51         Zendejas, Max          27       34             49
## 52        Zuerlein, Greg          78      112            141
##    Career_FG_Percentage draft round pick
## 1              70.96774  2016     2   59
## 2              79.68970  1982     4   86
## 3              80.05952  1982     7  171
## 4              70.96774  1981     7  178
## 5              72.28916  1979     6  165
## 6              81.37255  2012     5  161
## 7              61.42857  1981    12  324
## 8              70.37037  2002     4  102
## 9              80.36810  2007     6  193
## 10             68.92308  1987     9  246
## 11             60.00000  1987     7  189
## 12             75.00000  2000     6  174
## 13             80.74074  1993     3   70
## 14             55.55556  2002     7  247
## 15             81.29252  2007     6  178
## 16             72.58065  1995     7  247
## 17             67.04545  1979     3   74
## 18             44.00000  1984    10  254
## 19             33.33333  1982    10  264
## 20             55.26316  1988     4  100
## 21             87.06897  2006     4  118
## 22             68.46847  1983     9  237
## 23             80.00000  1999     6  181
## 24             82.36273  1992     2   56
## 25             84.28571  2013     6  177
## 26             75.52448  1985    10  260
## 27             76.22642  1989     6  142
## 28             46.15385  1979    12  325
```

```
## 29            74.11003  1987     3   82
## 30            80.38835  2000     1   17
## 31            25.00000  1977    12  316
## 32            86.19048  2004     3   65
## 33            81.88277  1991     4   98
## 34            72.81106  1980    12  312
## 35            50.00000  1977     4   89
## 36            61.53846  1986     2   32
## 37            67.74194  1983     4   87
## 38            59.25926  1977     5  127
## 39            77.27273  1993     8  202
## 40            79.39189  1993     7  177
## 41            80.00000  2000     6  169
## 42            72.22222  2005     6  202
## 43            75.20000  1985     7  195
## 44            80.06645  2004     5  137
## 45            70.31250  1977    10  258
## 46            80.59701  2013     5  166
## 47            83.25359  2009     7  256
## 48             0.00000  1980    10  252
## 49            67.78523  1979     7  189
## 50            84.17722  2012     6  175
## 51            69.38776  1986     4  100
## 52            79.43262  2012     6  171
```

```
summary(kicker_df)
```

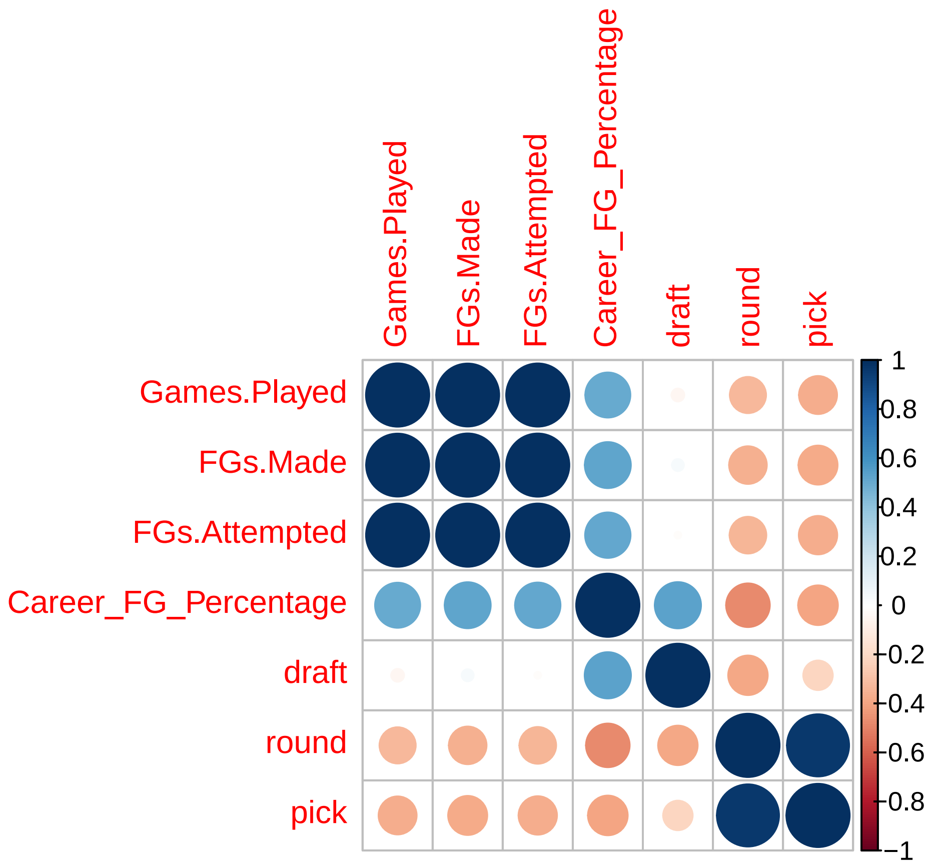
```
##    nameFull          Games.Played       FGs.Made      FGs.Attempted
##  Length:52          Min.   :  2.00   Min.   :  0.0   Min.   :  2.00
##  Class :character   1st Qu.: 24.75   1st Qu.: 22.0   1st Qu.: 36.25
##  Mode  :character   Median : 84.50   Median :112.0   Median :153.50
##                     Mean   :107.75   Mean   :154.6   Mean   :199.98
##                     3rd Qu.:159.25   3rd Qu.:230.5   3rd Qu.:297.25
##                     Max.   :382.00   Max.   :565.0   Max.   :709.00
##  Career_FG_Percentage     draft          round             pick
##  Min.   : 0.00        Min.   :1977   Min.   : 1.000   Min.   : 17.0
##  1st Qu.:67.57        1st Qu.:1982   1st Qu.: 4.000   1st Qu.:100.0
##  Median :73.46        Median :1988   Median : 6.000   Median :174.5
##  Mean   :69.60        Mean   :1992   Mean   : 6.231   Mean   :170.2
##  3rd Qu.:80.14        3rd Qu.:2002   3rd Qu.: 7.000   3rd Qu.:239.2
##  Max.   :87.07        Max.   :2016   Max.   :12.000   Max.   :325.0
```

```
cor_df <- cor(kicker_df[sapply(kicker_df, is.numeric)])
cor_df
```

```
##                      Games.Played    FGs.Made FGs.Attempted
## Games.Played           1.00000000  0.99093514     0.9966439
## FGs.Made               0.99093514  1.00000000     0.9967767
## FGs.Attempted          0.99664394  0.99677669     1.0000000
## Career_FG_Percentage   0.50632575  0.52796337     0.5143671
## draft                 -0.04007157  0.03495371    -0.0109467
## round                 -0.32616544 -0.35304613    -0.3359135
## pick                  -0.36000405 -0.37995705    -0.3679589
```

```
##                         Career_FG_Percentage       draft      round       pick
## Games.Played                       0.5063257 -0.04007157 -0.3261654 -0.3600041
## FGs.Made                           0.5279634  0.03495371 -0.3530461 -0.3799571
## FGs.Attempted                      0.5143671 -0.01094670 -0.3359135 -0.3679589
## Career_FG_Percentage               1.0000000  0.53325321 -0.4745624 -0.3923629
## draft                              0.5332532  1.00000000 -0.3885474 -0.2164457
## round                             -0.4745624 -0.38854740  1.0000000  0.9650050
## pick                              -0.3923629 -0.21644573  0.9650050  1.0000000
```

```r
library(corrplot)
corrplot(cor_df)
```




```r
kicker_lm <- lm(pick ~ FGs.Made + Games.Played + FGs.Attempted, data = kicker_df)
summary(kicker_lm)
```

```
##
## Call:
## lm(formula = pick ~ FGs.Made + Games.Played + FGs.Attempted,
##     data = kicker_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -163.214  -35.582   -2.697   52.523  132.351
##
## Coefficients:
```

```
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)   193.7800    16.2953  11.892 6.48e-16 ***
## FGs.Made       -1.0109     0.9275  -1.090    0.281
## Games.Played    0.2238     1.3929   0.161    0.873
## FGs.Attempted   0.5430     1.2331   0.440    0.662
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 73.99 on 48 degrees of freedom
## Multiple R-squared:  0.1629, Adjusted R-squared:  0.1105
## F-statistic: 3.112 on 3 and 48 DF,  p-value: 0.03481
```

Analysis

Based solely upon the above results, there appears to be little evidence that a kicker is worth spending a draft pick upon. Neither the number of points scored by a kicker (FGs.Made) nor their career length (Games.Played) show any statistically significant correlation with their draft pick. If using a properly weighted multiple regression model or correlation test the results may differ, however there is such a low correlation shown that even if the results differ, the variables could remain statistically insignificant.

Implications

The lack of statistically significant evidence implies that not only is a kicker not worth using a high value draft pick upon, it is unlikely that a kicker will ever perform well enough to justify using any draft pick on them. Instead, the above results indicate that teams would receive better value by waiting until after the yearly draft to offer employment to kickers that went undrafted.

Limitations

The most impactful limitation on this project is my own lack of knowledge regarding weighted regression models and correlation tests. With that knowledge one could more fully examine the data as the value of draft picks changes both over time and by round. Another limitation is the availability of data on team specific values. Each NFL team applies a different strategy in their pursuit of winning, and as such each team has different valuation for different positions. Without insight into each team's closely guarded valuation of the kicker position, whether or not their valuation is accurate, we are limited to only examining a kickers value against a draft pick on an objective scale, while the true value of each is skewed by teams' subjective valuation.

Concluding Remarks

While the true valuation of a kicker vs draft pick is reliant upon a team's subjective valuation, the results shown above do indicate that the best value at the kicker position can be found in the pool of undrafted players post-draft. As draft pick position shows little implication that a kickers performance or career length can be expected to be any better or worse, one can then conclude (without weighted pick values) that where a kicker is drafted will rarely impact a team's success.