Predicting UFC Fight Results

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Introduction

The UFC began as a professional mixed martial arts organization in 1993 serving as an alternative hand-to-hand combat sport that combined traditional boxing with wrestling, karate, kickboxing, and jiu-jistu fighting techniques. The entity was acquired by a group led by Dana White in 2001, who has served as the President for over two decades. Since estabilshing control, Dana White has exponentially grown the reach of UFC's product while also creating more structure and sanction to the sport of MMA. UFC currently has over 60 global broadcasting partners and is able to be accessed in over 165 different countries. With a traveling, tour-like model, the UFC has been able to sell-out many arenas across the world as equally become a highly-touted event to attend similar to boxing matches with well-known participants involved.

In many other North-american based sports, organizations have invested and founded their own analytics departments. These departments are responsible for using data to acquire and develop the right talent that will lead to on-field success and improve the team's product. Since the UFC's participants are individual fighters that often follow their own training regiment, there is a smaller focus on analytics within the sport.

The purpose of our project is two-fold. We want to evaluate fighters' historical data to determine fight styles that may posses a stronger correlation to sucess within the octagon. Identifying important factors will allow UFC fighters and their hired trainers to optimize their training regime, and will also benefit commentators in pointing out facets of the match the audience should keep in mind while spectating.

Additionally, we want to create a model that maximizes predictive accuracy for the purposes of assisting sports bettors in finding potential opportunities for value not seen by the public. Dana White and the UFC have fully embraced the recent popularity of sports betting, forming sponsorships with companies such as bet365 in the UK, DraftKings in the US, as well as many others located worldwide. There is an established market for sports betting in the UFC, and we hope to create a model that provides an estimation of a winner between two fighters along with some form of uncertainty that allows a sports-better to determine if the predicted odds over or under-estimate a fighter's chance of winning compared to the sportsbook odds given to the public.

Our data is each UFC fight from 1994-2021, containing each fighter's names, physical information (age, height, weight), the amount of wins and losses in their UFC history, and various fighting data. The fighting data includes the average amount of attempted and landed attacks over their UFC career, as well as the amount of different types of attacks they have faced from their previous opponents. We plan to initially fit an elastic net model that incorporates the standardization of a ridge regression model, and the variable selection of a lasso regression model, to determine which predictors in our dataset are most influential. Our response variable will be the winner in each fight, with that value randomized dependent on the color of the corner assigned during the fight (red or blue). The elastic net model will be best served for UFC commentators and trainers interested in how prior fighting strategies can lead to success in the future. The estimated probability values can be compared against the moneyline odds to determine value, and the significant coefficients can be used by trainers and coaches to adjust their fighter's strategies.

Data Description and EDA

The dataset used for modeling was initially sourced from ufcstats.com, where the data was processed and published on kaggle.com. The dataset contains roughly 6,012 unique fights over a 27 year span, with each

row containing data on fighters in the red and blue corner, a universal classification system used throughout all rows. The corner classification is the differentiating factor in providing each fighter's historical statistics. Since a given fighter could be in the red corner for one fight and in the blue corner for another, we don't place any value in the classification.

```
##
## Blue Draw  Red
## 1923  110 3979
```
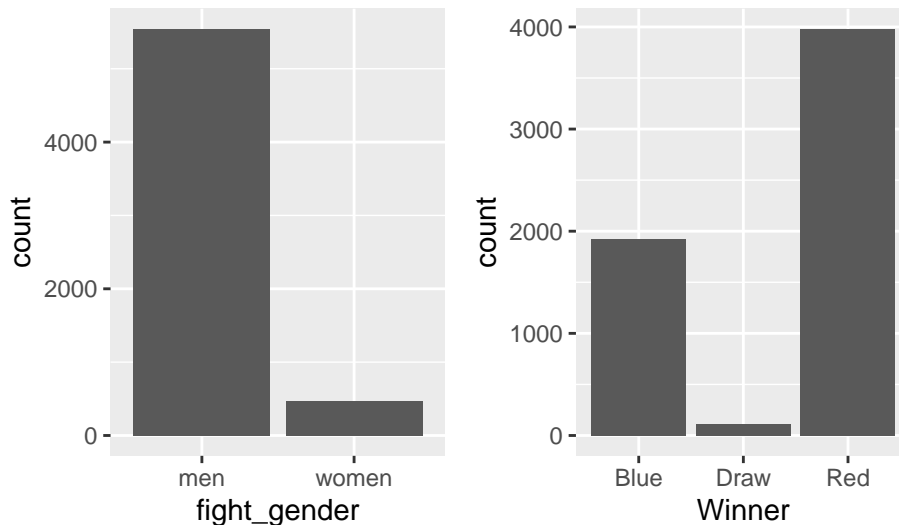

The plots above provide a better idea on the breakdown of the amount of male and female fights in UFC's history, as well as the results based on which corner was victorious. Similar to men's and women's lacrosse or men's and women's soccer, we believe that men's and women's UFC fights should be considered different sports given the difference in fighting style. Men's MMA is centered around wrestling, while women's MMA is centered around jiu-jitsu and judo with a strong preference for striking than grappling seen more commonly on the men's side. Since roughly 92% of the data are men's UFC fights, we will remove the observations in which the two fighters are female. The right plot above reveals that about 2/3 of fights with a winner are assigned to the red corner. Since the corners are simply a classifier and we are conerned that our models will be biased towards the red corner, we will randomize the fighters within each fight and reassign their corresponding statistics if necessary.

Calculating Instances of a Fighter's 1st Fight
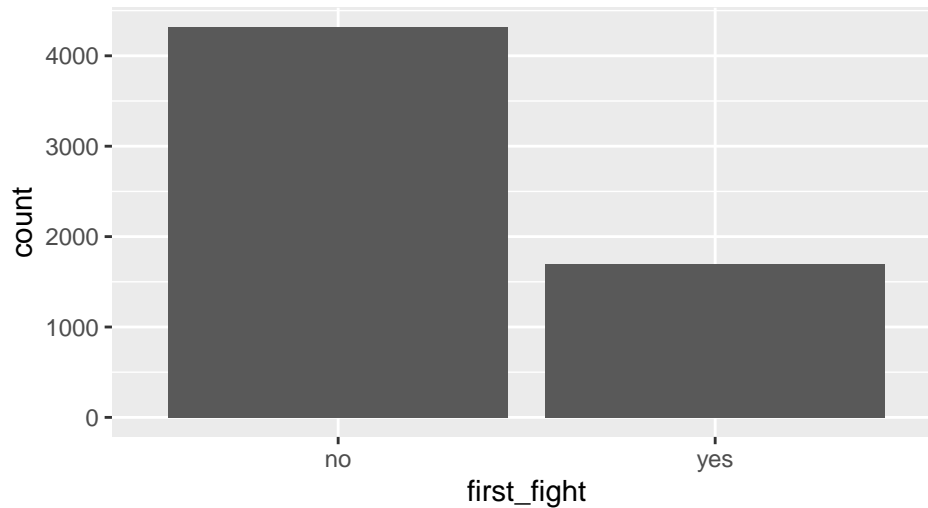
Another limitation within our data is that for a fighter's first career UFC fight, they have no historical data and thus their respective columns are N/A in our dataset. Since our modeling techniques require clean data without missing data, we will need to remove instances of a fighter's first fight.

New Distribution of Blue & Red Winners
After Randomization of Classification
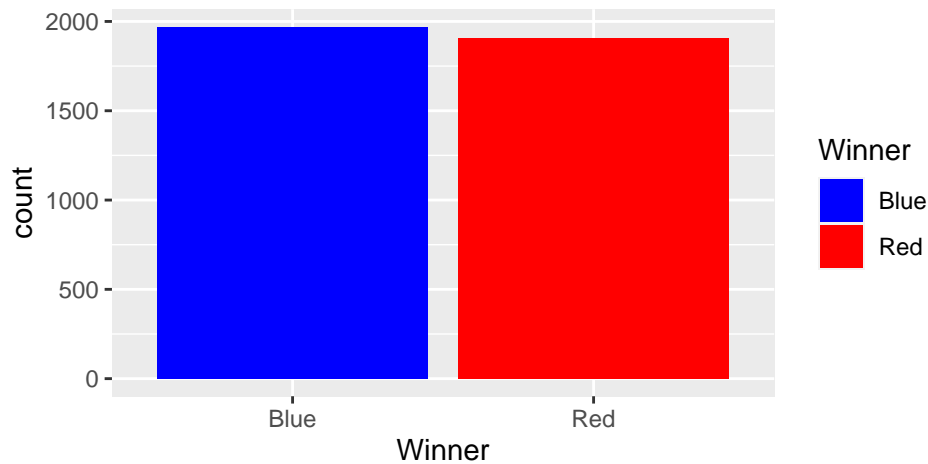
After shuffling the data, we see a much more even distribution of fight winners between the red and blue corner. Similar to comparing the difference between men's and women's MMA, we believe the fighting styles begin to differ as fighters increase in weight class. Therefore, rather than creating nine different models for each class, we will group weight classes together as seen below:

Table 1: Frequency of Weight Class Fights

new_class	weight_class	max_weight	count
Class 1	Flyweight	125	173
Class 1	Bantamweight	135	331
Class 1	Featherweight	145	401
Class 2	Lightweight	155	782
Class 2	Welterweight	170	783
Class 3	Middleweight	185	582
Class 3	LightHeavyweight	205	416
Class 4	Heavyweight	265	381
Class 4	OpenWeight	300	29

Table 2: Avg Attempt of Different Style Attacks

new_class	Rmean_head	Rmean_body	Rmean_leg	Rmean_clinch	Rmean_ground	Rmean_ctrltime
Class 1	73.7	12.0	8.0	7.5	8.5	143.6
Class 2	62.8	10.0	6.9	7.8	8.3	150.5
Class 3	51.9	7.8	6.0	8.0	9.1	138.7
Class 4	43.5	6.3	4.8	6.6	8.9	105.7

Frequency Distribution of New Weight Classes
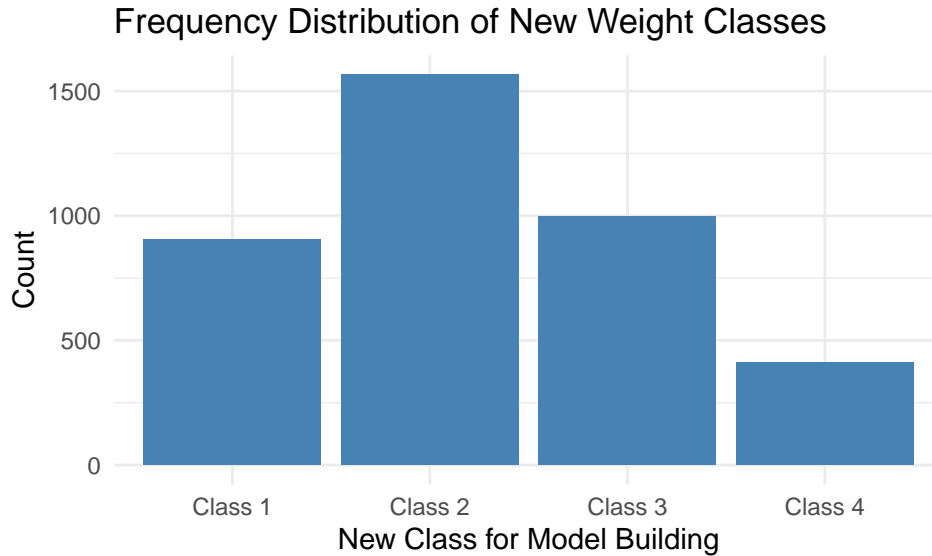
The plot above displays the new distribution of observations by the new weight classes. While we were unable to create a completely even split of observations, we believe we have enough fights within each new segmentation to proceed in fitting four models. The table below shows the average attempts of different types of strikes for one classification of the fighters. We see that numbers tend to decrease for standing strikes such as the head, body, and leg as the weight class increases. This could be because heavier fighters prefer to spend more of the fight wrestling on the floor, or heavier fights typically lasting less time, with such cases not mutually exclusive.

Inference EDA/make model

Removing Columns that will provide no meaning to our models

```
## # A tibble: 1 x 2
##   R_draw count
##    <dbl> <int>
## 1      0  3878
```

```
## # A tibble: 1 x 2
##   B_draw count
##    <dbl> <int>
## 1      0  3878
```

No draws. Going to remove this as well.

checking for NA values

```
## [1] TRUE
```

```
## [1] 500
```

```
##                       Winner                    title_bout
##                            0                             0
##                    B_avg_KD                  B_avg_opp_KD
##                            0                             0
##           B_avg_SIG_STR_pct         B_avg_opp_SIG_STR_pct
##                            0                             0
##               B_avg_TD_pct              B_avg_opp_TD_pct
##                            0                             0
##              B_avg_SUB_ATT             B_avg_opp_SUB_ATT
##                            0                             0
##                  B_avg_REV                 B_avg_opp_REV
##                            0                             0
##           B_avg_SIG_STR_att          B_avg_SIG_STR_landed
##                            0                             0
##       B_avg_opp_SIG_STR_att      B_avg_opp_SIG_STR_landed
##                            0                             0
##         B_avg_TOTAL_STR_att        B_avg_TOTAL_STR_landed
##                            0                             0
##     B_avg_opp_TOTAL_STR_att    B_avg_opp_TOTAL_STR_landed
##                            0                             0
##                B_avg_TD_att               B_avg_TD_landed
##                            0                             0
##            B_avg_opp_TD_att           B_avg_opp_TD_landed
##                            0                             0
##              B_avg_HEAD_att             B_avg_HEAD_landed
##                            0                             0
##          B_avg_opp_HEAD_att         B_avg_opp_HEAD_landed
##                            0                             0
##              B_avg_BODY_att             B_avg_BODY_landed
```

```
##                                  0                               0
##              B_avg_opp_BODY_att             B_avg_opp_BODY_landed
##                                  0                               0
##                     B_avg_LEG_att                  B_avg_LEG_landed
##                                  0                               0
##                 B_avg_opp_LEG_att             B_avg_opp_LEG_landed
##                                  0                               0
##                B_avg_DISTANCE_att            B_avg_DISTANCE_landed
##                                  0                               0
##            B_avg_opp_DISTANCE_att        B_avg_opp_DISTANCE_landed
##                                  0                               0
##                  B_avg_CLINCH_att              B_avg_CLINCH_landed
##                                  0                               0
##              B_avg_opp_CLINCH_att          B_avg_opp_CLINCH_landed
##                                  0                               0
##                  B_avg_GROUND_att              B_avg_GROUND_landed
##                                  0                               0
##              B_avg_opp_GROUND_att          B_avg_opp_GROUND_landed
##                                  0                               0
##          B_avg_CTRL_time.seconds.  B_avg_opp_CTRL_time.seconds.
##                                  0                               0
## B_total_time_fought.seconds.           B_total_rounds_fought
##                                  0                               0
##               B_total_title_bouts            B_current_win_streak
##                                  0                               0
##             B_current_lose_streak             B_longest_win_streak
##                                  0                               0
##                            B_wins                         B_losses
##                                  0                               0
##       B_win_by_Decision_Majority        B_win_by_Decision_Split
##                                  0                               0
##     B_win_by_Decision_Unanimous               B_win_by_KO.TKO
##                                  0                               0
##            B_win_by_Submission B_win_by_TKO_Doctor_Stoppage
##                                  0                               0
##                          B_Stance                      B_Height_cms
##                                  6                               1
##                       B_Reach_cms                    B_Weight_lbs
##                               211                               0
##                          R_avg_KD                     R_avg_opp_KD
##                                  0                               0
##               R_avg_SIG_STR_pct        R_avg_opp_SIG_STR_pct
##                                  0                               0
##                     R_avg_TD_pct              R_avg_opp_TD_pct
##                                  0                               0
##                    R_avg_SUB_ATT            R_avg_opp_SUB_ATT
##                                  0                               0
##                         R_avg_REV                 R_avg_opp_REV
##                                  0                               0
##               R_avg_SIG_STR_att        R_avg_SIG_STR_landed
##                                  0                               0
##           R_avg_opp_SIG_STR_att    R_avg_opp_SIG_STR_landed
##                                  0                               0
##             R_avg_TOTAL_STR_att        R_avg_TOTAL_STR_landed
```

```
##                               0                                 0
##       R_avg_opp_TOTAL_STR_att         R_avg_opp_TOTAL_STR_landed
##                               0                                 0
##                    R_avg_TD_att                    R_avg_TD_landed
##                               0                                 0
##                R_avg_opp_TD_att                R_avg_opp_TD_landed
##                               0                                 0
##                  R_avg_HEAD_att                  R_avg_HEAD_landed
##                               0                                 0
##              R_avg_opp_HEAD_att              R_avg_opp_HEAD_landed
##                               0                                 0
##                  R_avg_BODY_att                  R_avg_BODY_landed
##                               0                                 0
##              R_avg_opp_BODY_att              R_avg_opp_BODY_landed
##                               0                                 0
##                   R_avg_LEG_att                   R_avg_LEG_landed
##                               0                                 0
##               R_avg_opp_LEG_att               R_avg_opp_LEG_landed
##                               0                                 0
##              R_avg_DISTANCE_att              R_avg_DISTANCE_landed
##                               0                                 0
##          R_avg_opp_DISTANCE_att          R_avg_opp_DISTANCE_landed
##                               0                                 0
##                 R_avg_CLINCH_att                 R_avg_CLINCH_landed
##                               0                                 0
##             R_avg_opp_CLINCH_att             R_avg_opp_CLINCH_landed
##                               0                                 0
##                 R_avg_GROUND_att                 R_avg_GROUND_landed
##                               0                                 0
##             R_avg_opp_GROUND_att             R_avg_opp_GROUND_landed
##                               0                                 0
##        R_avg_CTRL_time.seconds.  R_avg_opp_CTRL_time.seconds.
##                               0                                 0
## R_total_time_fought.seconds.          R_total_rounds_fought
##                               0                                 0
##              R_total_title_bouts              R_current_win_streak
##                               0                                 0
##            R_current_lose_streak              R_longest_win_streak
##                               0                                 0
##                          R_wins                          R_losses
##                               0                                 0
##     R_win_by_Decision_Majority       R_win_by_Decision_Split
##                               0                                 0
##    R_win_by_Decision_Unanimous              R_win_by_KO.TKO
##                               0                                 0
##           R_win_by_Submission R_win_by_TKO_Doctor_Stoppage
##                               0                                 0
##                        R_Stance                    R_Height_cms
##                               7                                 0
##                     R_Reach_cms                    R_Weight_lbs
##                             219                                 0
##                           B_age                             R_age
##                              32                                24
##                       new_class
```

```
##                       0
```

removing all rows with NA values

```
## [1] 3878
```

```
## [1] 3511
```

```
## [1] 367
```

creating 4 different dataframes, dividing up by our weight class division

```
## [1] 859
```

```
## [1] 1430
```

```
## [1] 911
```

```
## [1] 311
```

#check multicollinearity

```
##                      Var1                       Var2 Correlation
## 1          B_avg_SIG_STR_att       B_avg_SIG_STR_landed   0.9144420
## 2          B_avg_SIG_STR_att     B_avg_opp_SIG_STR_att   0.8027941
## 3          B_avg_SIG_STR_att       B_avg_TOTAL_STR_att   0.9222030
## 4          B_avg_SIG_STR_att   B_avg_opp_TOTAL_STR_att   0.7173703
## 5          B_avg_SIG_STR_att           B_avg_HEAD_att   0.9776199
## 6          B_avg_SIG_STR_att        B_avg_HEAD_landed   0.8584251
## 7          B_avg_SIG_STR_att       B_avg_opp_HEAD_att   0.7784147
## 8          B_avg_SIG_STR_att           B_avg_BODY_att   0.7164013
## 9          B_avg_SIG_STR_att       B_avg_DISTANCE_att   0.9697865
## 10         B_avg_SIG_STR_att    B_avg_DISTANCE_landed   0.9030834
## 11         B_avg_SIG_STR_att   B_avg_opp_DISTANCE_att   0.8268501
## 12         B_avg_SIG_STR_att B_avg_opp_DISTANCE_landed   0.7784253
## 13      B_avg_SIG_STR_landed     B_avg_opp_SIG_STR_att   0.7156805
## 14      B_avg_SIG_STR_landed       B_avg_TOTAL_STR_att   0.8767102
## 15      B_avg_SIG_STR_landed    B_avg_TOTAL_STR_landed   0.7890043
## 16      B_avg_SIG_STR_landed           B_avg_HEAD_att   0.8671858
## 17      B_avg_SIG_STR_landed        B_avg_HEAD_landed   0.9318126
## 18      B_avg_SIG_STR_landed           B_avg_BODY_att   0.7547978
## 19      B_avg_SIG_STR_landed        B_avg_BODY_landed   0.7665473
## 20      B_avg_SIG_STR_landed       B_avg_DISTANCE_att   0.8430993
## 21      B_avg_SIG_STR_landed    B_avg_DISTANCE_landed   0.9152477
## 22      B_avg_SIG_STR_landed   B_avg_opp_DISTANCE_att   0.7391462
## 23     B_avg_opp_SIG_STR_att  B_avg_opp_SIG_STR_landed   0.8968200
## 24     B_avg_opp_SIG_STR_att       B_avg_TOTAL_STR_att   0.7008243
## 25     B_avg_opp_SIG_STR_att   B_avg_opp_TOTAL_STR_att   0.9476280
```

```
## 26            B_avg_opp_SIG_STR_att              B_avg_HEAD_att 0.7912030
## 27            B_avg_opp_SIG_STR_att          B_avg_opp_HEAD_att 0.9821888
## 28            B_avg_opp_SIG_STR_att       B_avg_opp_HEAD_landed 0.8314416
## 29            B_avg_opp_SIG_STR_att           B_avg_opp_BODY_att 0.7185923
## 30            B_avg_opp_SIG_STR_att          B_avg_DISTANCE_att 0.8228050
## 31            B_avg_opp_SIG_STR_att       B_avg_DISTANCE_landed 0.7810305
## 32            B_avg_opp_SIG_STR_att       B_avg_opp_DISTANCE_att 0.9733084
## 33            B_avg_opp_SIG_STR_att    B_avg_opp_DISTANCE_landed 0.9077650
## 34         B_avg_opp_SIG_STR_landed     B_avg_opp_TOTAL_STR_att 0.8890956
## 35         B_avg_opp_SIG_STR_landed  B_avg_opp_TOTAL_STR_landed 0.8353020
## 36         B_avg_opp_SIG_STR_landed          B_avg_opp_HEAD_att 0.8572718
## 37         B_avg_opp_SIG_STR_landed       B_avg_opp_HEAD_landed 0.9339982
## 38         B_avg_opp_SIG_STR_landed           B_avg_opp_BODY_att 0.7263449
## 39         B_avg_opp_SIG_STR_landed        B_avg_opp_BODY_landed 0.7284428
## 40         B_avg_opp_SIG_STR_landed          B_avg_DISTANCE_att 0.7108849
## 41         B_avg_opp_SIG_STR_landed       B_avg_opp_DISTANCE_att 0.8191182
## 42         B_avg_opp_SIG_STR_landed    B_avg_opp_DISTANCE_landed 0.9154303
## 43             B_avg_TOTAL_STR_att         B_avg_TOTAL_STR_landed 0.8837696
## 44             B_avg_TOTAL_STR_att              B_avg_HEAD_att 0.9012868
## 45             B_avg_TOTAL_STR_att           B_avg_HEAD_landed 0.8300806
## 46             B_avg_TOTAL_STR_att          B_avg_DISTANCE_att 0.8441816
## 47             B_avg_TOTAL_STR_att       B_avg_DISTANCE_landed 0.7794928
## 48             B_avg_TOTAL_STR_att       B_avg_opp_DISTANCE_att 0.7137192
## 49             B_avg_TOTAL_STR_att B_total_time_fought.seconds. 0.7104827
## 50          B_avg_TOTAL_STR_landed           B_avg_HEAD_landed 0.7460407
## 51         B_avg_opp_TOTAL_STR_att  B_avg_opp_TOTAL_STR_landed 0.8571355
## 52         B_avg_opp_TOTAL_STR_att              B_avg_HEAD_att 0.7061917
## 53         B_avg_opp_TOTAL_STR_att          B_avg_opp_HEAD_att 0.9284677
## 54         B_avg_opp_TOTAL_STR_att       B_avg_opp_HEAD_landed 0.8308053
## 55         B_avg_opp_TOTAL_STR_att           B_avg_opp_BODY_att 0.7042508
## 56         B_avg_opp_TOTAL_STR_att          B_avg_DISTANCE_att 0.7282958
## 57         B_avg_opp_TOTAL_STR_att       B_avg_opp_DISTANCE_att 0.8833734
## 58         B_avg_opp_TOTAL_STR_att    B_avg_opp_DISTANCE_landed 0.8277233
## 59         B_avg_opp_TOTAL_STR_att B_total_time_fought.seconds. 0.7107317
## 60      B_avg_opp_TOTAL_STR_landed       B_avg_opp_HEAD_landed 0.7888042
## 61                 B_avg_TD_att               B_avg_TD_landed 0.8219788
## 62              B_avg_TD_landed     B_avg_CTRL_time.seconds. 0.7336974
## 63             B_avg_opp_TD_att           B_avg_opp_TD_landed 0.7326514
## 64              B_avg_HEAD_att             B_avg_HEAD_landed 0.8832804
## 65              B_avg_HEAD_att          B_avg_opp_HEAD_att 0.7755593
## 66              B_avg_HEAD_att          B_avg_DISTANCE_att 0.9514359
## 67              B_avg_HEAD_att       B_avg_DISTANCE_landed 0.8618987
## 68              B_avg_HEAD_att       B_avg_opp_DISTANCE_att 0.8191417
## 69              B_avg_HEAD_att    B_avg_opp_DISTANCE_landed 0.7658196
## 70            B_avg_HEAD_landed          B_avg_DISTANCE_att 0.7862313
## 71            B_avg_HEAD_landed       B_avg_DISTANCE_landed 0.8446951
## 72            B_avg_HEAD_landed       B_avg_opp_DISTANCE_att 0.7065600
## 73           B_avg_opp_HEAD_att       B_avg_opp_HEAD_landed 0.8536456
## 74           B_avg_opp_HEAD_att          B_avg_DISTANCE_att 0.7996934
## 75           B_avg_opp_HEAD_att       B_avg_DISTANCE_landed 0.7549583
## 76           B_avg_opp_HEAD_att       B_avg_opp_DISTANCE_att 0.9592315
## 77           B_avg_opp_HEAD_att    B_avg_opp_DISTANCE_landed 0.8740603
## 78        B_avg_opp_HEAD_landed       B_avg_opp_DISTANCE_att 0.7515932
## 79        B_avg_opp_HEAD_landed    B_avg_opp_DISTANCE_landed 0.8426272
```

```
## 80         B_avg_BODY_att          B_avg_BODY_landed 0.9566996
## 81         B_avg_BODY_att          B_avg_DISTANCE_landed 0.7067096
## 82         B_avg_opp_BODY_att      B_avg_opp_BODY_landed 0.9437856
## 83         B_avg_LEG_att           B_avg_LEG_landed 0.9690741
## 84         B_avg_opp_LEG_att       B_avg_opp_LEG_landed 0.9665108
## 85         B_avg_DISTANCE_att      B_avg_DISTANCE_landed 0.9294292
## 86         B_avg_DISTANCE_att      B_avg_opp_DISTANCE_att 0.8538736
## 87         B_avg_DISTANCE_att      B_avg_opp_DISTANCE_landed 0.8102665
## 88         B_avg_DISTANCE_landed   B_avg_opp_DISTANCE_att 0.8166205
## 89         B_avg_DISTANCE_landed   B_avg_opp_DISTANCE_landed 0.7727396
## 90         B_avg_opp_DISTANCE_att  B_avg_opp_DISTANCE_landed 0.9212232
## 91         B_avg_CLINCH_att        B_avg_CLINCH_landed 0.9641752
## 92         B_avg_opp_CLINCH_att    B_avg_opp_CLINCH_landed 0.9643909
## 93         B_avg_GROUND_att        B_avg_GROUND_landed 0.9708085
## 94         B_avg_opp_GROUND_att    B_avg_opp_GROUND_landed 0.9734192
## 95         B_total_rounds_fought                   B_wins 0.9320144
## 96         B_total_rounds_fought                 B_losses 0.8136857
## 97         B_total_rounds_fought B_win_by_Decision_Unanimous 0.7917175
## 98         B_longest_win_streak                    B_wins 0.8029149
## 99                        B_wins B_win_by_Decision_Unanimous 0.8105147
## 100                       B_wins          B_win_by_KO.TKO 0.7182274
## 101                  B_Height_cms             B_Reach_cms 0.7595662
## 102                  B_Weight_lbs            R_Weight_lbs 0.7372873
## 103             R_avg_SIG_STR_att       R_avg_SIG_STR_landed 0.9043743
## 104             R_avg_SIG_STR_att     R_avg_opp_SIG_STR_att 0.8053286
## 105             R_avg_SIG_STR_att   R_avg_opp_SIG_STR_landed 0.7094494
## 106             R_avg_SIG_STR_att       R_avg_TOTAL_STR_att 0.9368059
## 107             R_avg_SIG_STR_att   R_avg_opp_TOTAL_STR_att 0.7402675
## 108             R_avg_SIG_STR_att            R_avg_HEAD_att 0.9769091
## 109             R_avg_SIG_STR_att         R_avg_HEAD_landed 0.8463740
## 110             R_avg_SIG_STR_att        R_avg_opp_HEAD_att 0.7897987
## 111             R_avg_SIG_STR_att        R_avg_DISTANCE_att 0.9722080
## 112             R_avg_SIG_STR_att     R_avg_DISTANCE_landed 0.9121465
## 113             R_avg_SIG_STR_att    R_avg_opp_DISTANCE_att 0.8227067
## 114             R_avg_SIG_STR_att R_avg_opp_DISTANCE_landed 0.7722750
## 115          R_avg_SIG_STR_landed       R_avg_TOTAL_STR_att 0.8808484
## 116          R_avg_SIG_STR_landed     R_avg_TOTAL_STR_landed 0.8080185
## 117          R_avg_SIG_STR_landed            R_avg_HEAD_att 0.8475478
## 118          R_avg_SIG_STR_landed         R_avg_HEAD_landed 0.9203950
## 119          R_avg_SIG_STR_landed            R_avg_BODY_att 0.7305852
## 120          R_avg_SIG_STR_landed         R_avg_BODY_landed 0.7342817
## 121          R_avg_SIG_STR_landed        R_avg_DISTANCE_att 0.8273869
## 122          R_avg_SIG_STR_landed     R_avg_DISTANCE_landed 0.9123370
## 123          R_avg_SIG_STR_landed    R_avg_opp_DISTANCE_att 0.7035357
## 124         R_avg_opp_SIG_STR_att   R_avg_opp_SIG_STR_landed 0.9176499
## 125         R_avg_opp_SIG_STR_att       R_avg_TOTAL_STR_att 0.7065810
## 126         R_avg_opp_SIG_STR_att   R_avg_opp_TOTAL_STR_att 0.9517534
## 127         R_avg_opp_SIG_STR_att R_avg_opp_TOTAL_STR_landed 0.7458657
## 128         R_avg_opp_SIG_STR_att            R_avg_HEAD_att 0.7971591
## 129         R_avg_opp_SIG_STR_att        R_avg_opp_HEAD_att 0.9827113
## 130         R_avg_opp_SIG_STR_att     R_avg_opp_HEAD_landed 0.8667495
## 131         R_avg_opp_SIG_STR_att        R_avg_opp_BODY_att 0.7266636
## 132         R_avg_opp_SIG_STR_att        R_avg_DISTANCE_att 0.8353437
## 133         R_avg_opp_SIG_STR_att     R_avg_DISTANCE_landed 0.7851266
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## 134        R_avg_opp_SIG_STR_att      R_avg_opp_DISTANCE_att  0.9778736
## 135        R_avg_opp_SIG_STR_att   R_avg_opp_DISTANCE_landed  0.9199047
## 136     R_avg_opp_SIG_STR_landed      R_avg_opp_TOTAL_STR_att  0.9017488
## 137     R_avg_opp_SIG_STR_landed   R_avg_opp_TOTAL_STR_landed  0.8571825
## 138     R_avg_opp_SIG_STR_landed          R_avg_opp_HEAD_att  0.8810986
## 139     R_avg_opp_SIG_STR_landed       R_avg_opp_HEAD_landed  0.9385979
## 140     R_avg_opp_SIG_STR_landed          R_avg_opp_BODY_att  0.7498930
## 141     R_avg_opp_SIG_STR_landed       R_avg_opp_BODY_landed  0.7299729
## 142     R_avg_opp_SIG_STR_landed          R_avg_DISTANCE_att  0.7319447
## 143     R_avg_opp_SIG_STR_landed      R_avg_opp_DISTANCE_att  0.8573067
## 144     R_avg_opp_SIG_STR_landed   R_avg_opp_DISTANCE_landed  0.9362604
## 145          R_avg_TOTAL_STR_att       R_avg_TOTAL_STR_landed  0.8663934
## 146          R_avg_TOTAL_STR_att              R_avg_HEAD_att  0.9138069
## 147          R_avg_TOTAL_STR_att           R_avg_HEAD_landed  0.8310961
## 148          R_avg_TOTAL_STR_att          R_avg_DISTANCE_att  0.8679943
## 149          R_avg_TOTAL_STR_att       R_avg_DISTANCE_landed  0.8100051
## 150          R_avg_TOTAL_STR_att      R_avg_opp_DISTANCE_att  0.7137369
## 151          R_avg_TOTAL_STR_att R_total_time_fought.seconds.  0.7244121
## 152       R_avg_TOTAL_STR_landed           R_avg_HEAD_landed  0.7540863
## 153      R_avg_opp_TOTAL_STR_att   R_avg_opp_TOTAL_STR_landed  0.8904219
## 154      R_avg_opp_TOTAL_STR_att              R_avg_HEAD_att  0.7347063
## 155      R_avg_opp_TOTAL_STR_att          R_avg_opp_HEAD_att  0.9349465
## 156      R_avg_opp_TOTAL_STR_att       R_avg_opp_HEAD_landed  0.8575654
## 157      R_avg_opp_TOTAL_STR_att          R_avg_opp_BODY_att  0.7089072
## 158      R_avg_opp_TOTAL_STR_att          R_avg_DISTANCE_att  0.7577053
## 159      R_avg_opp_TOTAL_STR_att       R_avg_DISTANCE_landed  0.7076524
## 160      R_avg_opp_TOTAL_STR_att      R_avg_opp_DISTANCE_att  0.8966841
## 161      R_avg_opp_TOTAL_STR_att   R_avg_opp_DISTANCE_landed  0.8437609
## 162 R_avg_opp_TOTAL_STR_landed          R_avg_opp_HEAD_att  0.7156642
## 163 R_avg_opp_TOTAL_STR_landed       R_avg_opp_HEAD_landed  0.8142964
## 164 R_avg_opp_TOTAL_STR_landed   R_avg_opp_DISTANCE_landed  0.7041342
## 165               R_avg_TD_att               R_avg_TD_landed  0.8132454
## 166            R_avg_TD_landed     R_avg_CTRL_time.seconds.  0.7318312
## 167           R_avg_opp_TD_att           R_avg_opp_TD_landed  0.7456735
## 168        R_avg_opp_TD_landed R_avg_opp_CTRL_time.seconds.  0.7059867
## 169             R_avg_HEAD_att             R_avg_HEAD_landed  0.8687382
## 170             R_avg_HEAD_att          R_avg_opp_HEAD_att  0.7932968
## 171             R_avg_HEAD_att          R_avg_DISTANCE_att  0.9561058
## 172             R_avg_HEAD_att       R_avg_DISTANCE_landed  0.8682706
## 173             R_avg_HEAD_att      R_avg_opp_DISTANCE_att  0.8160472
## 174             R_avg_HEAD_att   R_avg_opp_DISTANCE_landed  0.7613807
## 175          R_avg_HEAD_landed          R_avg_DISTANCE_att  0.7705656
## 176          R_avg_HEAD_landed       R_avg_DISTANCE_landed  0.8357102
## 177         R_avg_opp_HEAD_att       R_avg_opp_HEAD_landed  0.8911846
## 178         R_avg_opp_HEAD_att          R_avg_DISTANCE_att  0.8200917
## 179         R_avg_opp_HEAD_att       R_avg_DISTANCE_landed  0.7634922
## 180         R_avg_opp_HEAD_att      R_avg_opp_DISTANCE_att  0.9625529
## 181         R_avg_opp_HEAD_att   R_avg_opp_DISTANCE_landed  0.8864419
## 182      R_avg_opp_HEAD_landed      R_avg_opp_DISTANCE_att  0.8031642
## 183      R_avg_opp_HEAD_landed   R_avg_opp_DISTANCE_landed  0.8696988
## 184             R_avg_BODY_att             R_avg_BODY_landed  0.9531166
## 185         R_avg_opp_BODY_att       R_avg_opp_BODY_landed  0.9482364
## 186         R_avg_opp_BODY_att   R_avg_opp_DISTANCE_landed  0.7045862
## 187              R_avg_LEG_att               R_avg_LEG_landed  0.9792124
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## 188       R_avg_opp_LEG_att       R_avg_opp_LEG_landed 0.9772406
## 189       R_avg_DISTANCE_att       R_avg_DISTANCE_landed 0.9302356
## 190       R_avg_DISTANCE_att     R_avg_opp_DISTANCE_att 0.8606069
## 191       R_avg_DISTANCE_att    R_avg_opp_DISTANCE_landed 0.8085918
## 192     R_avg_DISTANCE_landed     R_avg_opp_DISTANCE_att 0.8151163
## 193     R_avg_DISTANCE_landed    R_avg_opp_DISTANCE_landed 0.7701946
## 194    R_avg_opp_DISTANCE_att    R_avg_opp_DISTANCE_landed 0.9316523
## 195       R_avg_CLINCH_att       R_avg_CLINCH_landed 0.9694010
## 196     R_avg_opp_CLINCH_att     R_avg_opp_CLINCH_landed 0.9598072
## 197       R_avg_GROUND_att       R_avg_GROUND_landed 0.9751036
## 198     R_avg_opp_GROUND_att     R_avg_opp_GROUND_landed 0.9706941
## 199   R_total_rounds_fought                     R_wins 0.9311501
## 200   R_total_rounds_fought                   R_losses 0.8105799
## 201   R_total_rounds_fought R_win_by_Decision_Unanimous 0.8322683
## 202   R_longest_win_streak                     R_wins 0.8154992
## 203                  R_wins R_win_by_Decision_Unanimous 0.8470893
## 204                  R_wins           R_win_by_KO.TKO 0.7077040
## 205           R_Height_cms               R_Reach_cms 0.7215413


##                      Var1                     Var2 Correlation
## 1           B_avg_SIG_STR_att       B_avg_SIG_STR_landed 0.9143492
## 2           B_avg_SIG_STR_att     B_avg_opp_SIG_STR_att 0.7925128
## 3           B_avg_SIG_STR_att       B_avg_TOTAL_STR_att 0.9157888
## 4           B_avg_SIG_STR_att     B_avg_opp_TOTAL_STR_att 0.7024520
## 5           B_avg_SIG_STR_att             B_avg_HEAD_att 0.9754681
## 6           B_avg_SIG_STR_att           B_avg_HEAD_landed 0.8422348
## 7           B_avg_SIG_STR_att         B_avg_opp_HEAD_att 0.7728747
## 8           B_avg_SIG_STR_att         B_avg_DISTANCE_att 0.9610712
## 9           B_avg_SIG_STR_att       B_avg_DISTANCE_landed 0.8983882
## 10          B_avg_SIG_STR_att     B_avg_opp_DISTANCE_att 0.8131356
## 11          B_avg_SIG_STR_att    B_avg_opp_DISTANCE_landed 0.7686485
## 12        B_avg_SIG_STR_landed       B_avg_TOTAL_STR_att 0.8821178
## 13        B_avg_SIG_STR_landed     B_avg_TOTAL_STR_landed 0.7888788
## 14        B_avg_SIG_STR_landed             B_avg_HEAD_att 0.8627591
## 15        B_avg_SIG_STR_landed           B_avg_HEAD_landed 0.9178178
## 16        B_avg_SIG_STR_landed             B_avg_BODY_att 0.7264463
## 17        B_avg_SIG_STR_landed           B_avg_BODY_landed 0.7231335
## 18        B_avg_SIG_STR_landed         B_avg_DISTANCE_att 0.8274141
## 19        B_avg_SIG_STR_landed       B_avg_DISTANCE_landed 0.8993264
## 20        B_avg_SIG_STR_landed     B_avg_opp_DISTANCE_att 0.7066738
## 21      B_avg_opp_SIG_STR_att     B_avg_opp_SIG_STR_landed 0.9055164
## 22      B_avg_opp_SIG_STR_att     B_avg_opp_TOTAL_STR_att 0.9310837
## 23      B_avg_opp_SIG_STR_att             B_avg_HEAD_att 0.7766087
## 24      B_avg_opp_SIG_STR_att         B_avg_opp_HEAD_att 0.9826437
## 25      B_avg_opp_SIG_STR_att       B_avg_opp_HEAD_landed 0.8374686
## 26      B_avg_opp_SIG_STR_att         B_avg_opp_BODY_att 0.7438404
## 27      B_avg_opp_SIG_STR_att         B_avg_DISTANCE_att 0.8261820
## 28      B_avg_opp_SIG_STR_att       B_avg_DISTANCE_landed 0.7839889
## 29      B_avg_opp_SIG_STR_att     B_avg_opp_DISTANCE_att 0.9697257
## 30      B_avg_opp_SIG_STR_att    B_avg_opp_DISTANCE_landed 0.9073489
## 31    B_avg_opp_SIG_STR_landed     B_avg_opp_TOTAL_STR_att 0.8700991
## 32    B_avg_opp_SIG_STR_landed   B_avg_opp_TOTAL_STR_landed 0.7868369
## 33    B_avg_opp_SIG_STR_landed         B_avg_opp_HEAD_att 0.8695749
## 34    B_avg_opp_SIG_STR_landed       B_avg_opp_HEAD_landed 0.9354774
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## 35     B_avg_opp_SIG_STR_landed          B_avg_opp_BODY_att 0.7556976
## 36     B_avg_opp_SIG_STR_landed       B_avg_opp_BODY_landed 0.7620676
## 37     B_avg_opp_SIG_STR_landed          B_avg_DISTANCE_att 0.7237603
## 38     B_avg_opp_SIG_STR_landed       B_avg_DISTANCE_landed 0.7046922
## 39     B_avg_opp_SIG_STR_landed      B_avg_opp_DISTANCE_att 0.8270996
## 40     B_avg_opp_SIG_STR_landed   B_avg_opp_DISTANCE_landed 0.9152108
## 41           B_avg_TOTAL_STR_att         B_avg_TOTAL_STR_landed 0.8890515
## 42           B_avg_TOTAL_STR_att              B_avg_HEAD_att 0.8896775
## 43           B_avg_TOTAL_STR_att           B_avg_HEAD_landed 0.8150329
## 44           B_avg_TOTAL_STR_att          B_avg_DISTANCE_att 0.8145068
## 45           B_avg_TOTAL_STR_att       B_avg_DISTANCE_landed 0.7619508
## 46           B_avg_TOTAL_STR_att B_total_time_fought.seconds. 0.7417441
## 47        B_avg_TOTAL_STR_landed           B_avg_HEAD_landed 0.7262126
## 48       B_avg_opp_TOTAL_STR_att     B_avg_opp_TOTAL_STR_landed 0.8714003
## 49       B_avg_opp_TOTAL_STR_att          B_avg_opp_HEAD_att 0.9168587
## 50       B_avg_opp_TOTAL_STR_att       B_avg_opp_HEAD_landed 0.8134297
## 51       B_avg_opp_TOTAL_STR_att          B_avg_DISTANCE_att 0.7093868
## 52       B_avg_opp_TOTAL_STR_att      B_avg_opp_DISTANCE_att 0.8539701
## 53       B_avg_opp_TOTAL_STR_att   B_avg_opp_DISTANCE_landed 0.7903985
## 54       B_avg_opp_TOTAL_STR_att B_total_time_fought.seconds. 0.7214106
## 55    B_avg_opp_TOTAL_STR_landed       B_avg_opp_HEAD_landed 0.7482019
## 56                B_avg_TD_att                B_avg_TD_landed 0.7891920
## 57             B_avg_TD_landed    B_avg_CTRL_time.seconds. 0.7918108
## 58         B_avg_opp_TD_landed B_avg_opp_CTRL_time.seconds. 0.7580895
## 59              B_avg_HEAD_att           B_avg_HEAD_landed 0.8738385
## 60              B_avg_HEAD_att          B_avg_opp_HEAD_att 0.7629568
## 61              B_avg_HEAD_att          B_avg_DISTANCE_att 0.9371935
## 62              B_avg_HEAD_att       B_avg_DISTANCE_landed 0.8485865
## 63              B_avg_HEAD_att      B_avg_opp_DISTANCE_att 0.7984131
## 64              B_avg_HEAD_att   B_avg_opp_DISTANCE_landed 0.7518684
## 65           B_avg_HEAD_landed          B_avg_DISTANCE_att 0.7488087
## 66           B_avg_HEAD_landed       B_avg_DISTANCE_landed 0.8068470
## 67          B_avg_opp_HEAD_att       B_avg_opp_HEAD_landed 0.8625363
## 68          B_avg_opp_HEAD_att          B_avg_DISTANCE_att 0.8051418
## 69          B_avg_opp_HEAD_att       B_avg_DISTANCE_landed 0.7569585
## 70          B_avg_opp_HEAD_att      B_avg_opp_DISTANCE_att 0.9505855
## 71          B_avg_opp_HEAD_att   B_avg_opp_DISTANCE_landed 0.8695815
## 72       B_avg_opp_HEAD_landed      B_avg_opp_DISTANCE_att 0.7462785
## 73       B_avg_opp_HEAD_landed   B_avg_opp_DISTANCE_landed 0.8301938
## 74              B_avg_BODY_att           B_avg_BODY_landed 0.9544961
## 75          B_avg_opp_BODY_att       B_avg_opp_BODY_landed 0.9451332
## 76          B_avg_opp_BODY_att      B_avg_opp_DISTANCE_att 0.7121730
## 77          B_avg_opp_BODY_att   B_avg_opp_DISTANCE_landed 0.7325367
## 78               B_avg_LEG_att            B_avg_LEG_landed 0.9806243
## 79           B_avg_opp_LEG_att        B_avg_opp_LEG_landed 0.9739077
## 80          B_avg_DISTANCE_att       B_avg_DISTANCE_landed 0.9321247
## 81          B_avg_DISTANCE_att      B_avg_opp_DISTANCE_att 0.8588292
## 82          B_avg_DISTANCE_att   B_avg_opp_DISTANCE_landed 0.8228732
## 83       B_avg_DISTANCE_landed      B_avg_opp_DISTANCE_att 0.8160645
## 84       B_avg_DISTANCE_landed   B_avg_opp_DISTANCE_landed 0.7988454
## 85      B_avg_opp_DISTANCE_att   B_avg_opp_DISTANCE_landed 0.9258966
## 86             B_avg_CLINCH_att          B_avg_CLINCH_landed 0.9668683
## 87         B_avg_opp_CLINCH_att      B_avg_opp_CLINCH_landed 0.9598881
## 88             B_avg_GROUND_att          B_avg_GROUND_landed 0.9704378
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## 89              B_avg_opp_GROUND_att         B_avg_opp_GROUND_landed   0.9722015
## 90             B_total_rounds_fought          B_longest_win_streak     0.7068645
## 91             B_total_rounds_fought                         B_wins     0.9349517
## 92             B_total_rounds_fought                       B_losses     0.8433440
## 93             B_total_rounds_fought   B_win_by_Decision_Unanimous     0.7999276
## 94              B_longest_win_streak                         B_wins     0.8267300
## 95                            B_wins   B_win_by_Decision_Unanimous     0.7903970
## 96                            B_wins               B_win_by_KO.TKO     0.7208398
## 97                       B_Height_cms                   B_Reach_cms     0.7000220
## 98                  R_avg_SIG_STR_att             R_avg_SIG_STR_landed   0.9243669
## 99                  R_avg_SIG_STR_att             R_avg_opp_SIG_STR_att 0.8001668
## 100                 R_avg_SIG_STR_att          R_avg_opp_SIG_STR_landed 0.7194823
## 101                 R_avg_SIG_STR_att             R_avg_TOTAL_STR_att   0.9284102
## 102                 R_avg_SIG_STR_att            R_avg_TOTAL_STR_landed 0.7008565
## 103                 R_avg_SIG_STR_att          R_avg_opp_TOTAL_STR_att  0.7034561
## 104                 R_avg_SIG_STR_att                   R_avg_HEAD_att   0.9801963
## 105                 R_avg_SIG_STR_att                R_avg_HEAD_landed   0.8563531
## 106                 R_avg_SIG_STR_att             R_avg_opp_HEAD_att    0.7887096
## 107                 R_avg_SIG_STR_att                   R_avg_BODY_att   0.7303261
## 108                 R_avg_SIG_STR_att               R_avg_DISTANCE_att  0.9719546
## 109                 R_avg_SIG_STR_att            R_avg_DISTANCE_landed  0.9151493
## 110                 R_avg_SIG_STR_att         R_avg_opp_DISTANCE_att    0.8205181
## 111                 R_avg_SIG_STR_att        R_avg_opp_DISTANCE_landed  0.7761758
## 112              R_avg_SIG_STR_landed          R_avg_opp_SIG_STR_att    0.7485666
## 113              R_avg_SIG_STR_landed             R_avg_TOTAL_STR_att   0.8852651
## 114              R_avg_SIG_STR_landed            R_avg_TOTAL_STR_landed 0.7985427
## 115              R_avg_SIG_STR_landed                   R_avg_HEAD_att  0.8867078
## 116              R_avg_SIG_STR_landed                R_avg_HEAD_landed  0.9311218
## 117              R_avg_SIG_STR_landed             R_avg_opp_HEAD_att    0.7356904
## 118              R_avg_SIG_STR_landed                   R_avg_BODY_att  0.7324245
## 119              R_avg_SIG_STR_landed                R_avg_BODY_landed  0.7398470
## 120              R_avg_SIG_STR_landed               R_avg_DISTANCE_att 0.8593205
## 121              R_avg_SIG_STR_landed            R_avg_DISTANCE_landed 0.9238372
## 122              R_avg_SIG_STR_landed         R_avg_opp_DISTANCE_att   0.7674647
## 123              R_avg_SIG_STR_landed        R_avg_opp_DISTANCE_landed 0.7380190
## 124          R_avg_opp_SIG_STR_att         R_avg_opp_SIG_STR_landed   0.9216880
## 125          R_avg_opp_SIG_STR_att             R_avg_TOTAL_STR_att     0.7051987
## 126          R_avg_opp_SIG_STR_att          R_avg_opp_TOTAL_STR_att   0.9339666
## 127          R_avg_opp_SIG_STR_att                   R_avg_HEAD_att   0.7785781
## 128          R_avg_opp_SIG_STR_att             R_avg_opp_HEAD_att     0.9814099
## 129          R_avg_opp_SIG_STR_att          R_avg_opp_HEAD_landed    0.8547824
## 130          R_avg_opp_SIG_STR_att             R_avg_opp_BODY_att     0.7622264
## 131          R_avg_opp_SIG_STR_att          R_avg_opp_BODY_landed    0.7129924
## 132          R_avg_opp_SIG_STR_att               R_avg_DISTANCE_att  0.8207233
## 133          R_avg_opp_SIG_STR_att            R_avg_DISTANCE_landed  0.8104700
## 134          R_avg_opp_SIG_STR_att         R_avg_opp_DISTANCE_att    0.9740427
## 135          R_avg_opp_SIG_STR_att        R_avg_opp_DISTANCE_landed  0.9135800
## 136       R_avg_opp_SIG_STR_landed       R_avg_opp_TOTAL_STR_att     0.8904634
## 137       R_avg_opp_SIG_STR_landed    R_avg_opp_TOTAL_STR_landed     0.8030488
## 138       R_avg_opp_SIG_STR_landed             R_avg_opp_HEAD_att    0.8829509
## 139       R_avg_opp_SIG_STR_landed          R_avg_opp_HEAD_landed   0.9361684
## 140       R_avg_opp_SIG_STR_landed             R_avg_opp_BODY_att    0.7749254
## 141       R_avg_opp_SIG_STR_landed          R_avg_opp_BODY_landed   0.7820505
## 142       R_avg_opp_SIG_STR_landed               R_avg_DISTANCE_att 0.7404208
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## 143       R_avg_opp_SIG_STR_landed         R_avg_DISTANCE_landed 0.7428179
## 144       R_avg_opp_SIG_STR_landed       R_avg_opp_DISTANCE_att 0.8636868
## 145       R_avg_opp_SIG_STR_landed     R_avg_opp_DISTANCE_landed 0.9359944
## 146            R_avg_TOTAL_STR_att         R_avg_TOTAL_STR_landed 0.8938762
## 147            R_avg_TOTAL_STR_att                 R_avg_HEAD_att 0.9116158
## 148            R_avg_TOTAL_STR_att              R_avg_HEAD_landed 0.8293939
## 149            R_avg_TOTAL_STR_att             R_avg_DISTANCE_att 0.8552787
## 150            R_avg_TOTAL_STR_att          R_avg_DISTANCE_landed 0.8003391
## 151            R_avg_TOTAL_STR_att        R_avg_opp_DISTANCE_att 0.7072518
## 152            R_avg_TOTAL_STR_att R_total_time_fought.seconds. 0.7408673
## 153         R_avg_TOTAL_STR_landed              R_avg_HEAD_landed 0.7572592
## 154         R_avg_TOTAL_STR_landed R_total_time_fought.seconds. 0.7007889
## 155        R_avg_opp_TOTAL_STR_att     R_avg_opp_TOTAL_STR_landed 0.8802815
## 156        R_avg_opp_TOTAL_STR_att             R_avg_opp_HEAD_att 0.9148592
## 157        R_avg_opp_TOTAL_STR_att          R_avg_opp_HEAD_landed 0.8289642
## 158        R_avg_opp_TOTAL_STR_att            R_avg_opp_BODY_att 0.7284565
## 159        R_avg_opp_TOTAL_STR_att          R_avg_opp_BODY_landed 0.7063983
## 160        R_avg_opp_TOTAL_STR_att             R_avg_DISTANCE_att 0.7067880
## 161        R_avg_opp_TOTAL_STR_att        R_avg_opp_DISTANCE_att 0.8620021
## 162        R_avg_opp_TOTAL_STR_att     R_avg_opp_DISTANCE_landed 0.8089473
## 163        R_avg_opp_TOTAL_STR_att R_total_time_fought.seconds. 0.7153311
## 164 R_avg_opp_TOTAL_STR_landed          R_avg_opp_HEAD_landed 0.7557644
## 165                  R_avg_TD_att                 R_avg_TD_landed 0.7854805
## 166               R_avg_TD_landed     R_avg_CTRL_time.seconds. 0.7816690
## 167              R_avg_opp_TD_att             R_avg_opp_TD_landed 0.7241694
## 168           R_avg_opp_TD_landed R_avg_opp_CTRL_time.seconds. 0.7517924
## 169                R_avg_HEAD_att                R_avg_HEAD_landed 0.8871980
## 170                R_avg_HEAD_att             R_avg_opp_HEAD_att 0.7702111
## 171                R_avg_HEAD_att            R_avg_DISTANCE_att 0.9509603
## 172                R_avg_HEAD_att          R_avg_DISTANCE_landed 0.8764212
## 173                R_avg_HEAD_att        R_avg_opp_DISTANCE_att 0.8001721
## 174                R_avg_HEAD_att     R_avg_opp_DISTANCE_landed 0.7533207
## 175             R_avg_HEAD_landed            R_avg_DISTANCE_att 0.7831232
## 176             R_avg_HEAD_landed          R_avg_DISTANCE_landed 0.8416924
## 177             R_avg_HEAD_landed        R_avg_opp_DISTANCE_att 0.7030211
## 178            R_avg_opp_HEAD_att          R_avg_opp_HEAD_landed 0.8783261
## 179            R_avg_opp_HEAD_att            R_avg_DISTANCE_att 0.8079495
## 180            R_avg_opp_HEAD_att          R_avg_DISTANCE_landed 0.7964956
## 181            R_avg_opp_HEAD_att        R_avg_opp_DISTANCE_att 0.9570363
## 182            R_avg_opp_HEAD_att     R_avg_opp_DISTANCE_landed 0.8783584
## 183         R_avg_opp_HEAD_landed        R_avg_opp_DISTANCE_att 0.7933409
## 184         R_avg_opp_HEAD_landed     R_avg_opp_DISTANCE_landed 0.8671617
## 185                R_avg_BODY_att                R_avg_BODY_landed 0.9543110
## 186            R_avg_opp_BODY_att          R_avg_opp_BODY_landed 0.9542727
## 187            R_avg_opp_BODY_att        R_avg_opp_DISTANCE_att 0.7229897
## 188            R_avg_opp_BODY_att     R_avg_opp_DISTANCE_landed 0.7294488
## 189         R_avg_opp_BODY_landed     R_avg_opp_DISTANCE_landed 0.7047508
## 190                 R_avg_LEG_att                 R_avg_LEG_landed 0.9802785
## 191             R_avg_opp_LEG_att           R_avg_opp_LEG_landed 0.9808604
## 192            R_avg_DISTANCE_att          R_avg_DISTANCE_landed 0.9388924
## 193            R_avg_DISTANCE_att        R_avg_opp_DISTANCE_att 0.8504474
## 194            R_avg_DISTANCE_att     R_avg_opp_DISTANCE_landed 0.8109810
## 195         R_avg_DISTANCE_landed        R_avg_opp_DISTANCE_att 0.8442854
## 196         R_avg_DISTANCE_landed     R_avg_opp_DISTANCE_landed 0.8202149
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## 197       R_avg_opp_DISTANCE_att       R_avg_opp_DISTANCE_landed   0.9335455
## 198             R_avg_CLINCH_att             R_avg_CLINCH_landed   0.9663859
## 199         R_avg_opp_CLINCH_att         R_avg_opp_CLINCH_landed   0.9693263
## 200             R_avg_GROUND_att             R_avg_GROUND_landed   0.9662308
## 201         R_avg_opp_GROUND_att         R_avg_opp_GROUND_landed   0.9580675
## 202        R_total_rounds_fought             R_longest_win_streak   0.7022782
## 203        R_total_rounds_fought                          R_wins   0.9409881
## 204        R_total_rounds_fought                        R_losses   0.8650970
## 205        R_total_rounds_fought R_win_by_Decision_Unanimous       0.7989617
## 206         R_longest_win_streak                          R_wins   0.8196516
## 207                       R_wins                        R_losses   0.7208830
## 208                       R_wins R_win_by_Decision_Unanimous       0.7967301
## 209                       R_wins                 R_win_by_KO.TKO   0.7060158
## 210                  R_Height_cms                     R_Reach_cms   0.7222877


##                          Var1                          Var2 Correlation
## 1            B_avg_SIG_STR_att            B_avg_SIG_STR_landed   0.9134500
## 2            B_avg_SIG_STR_att         B_avg_opp_SIG_STR_att   0.7849717
## 3            B_avg_SIG_STR_att           B_avg_TOTAL_STR_att   0.9118560
## 4            B_avg_SIG_STR_att                 B_avg_HEAD_att   0.9730621
## 5            B_avg_SIG_STR_att               B_avg_HEAD_landed   0.8586245
## 6            B_avg_SIG_STR_att             B_avg_opp_HEAD_att   0.7599433
## 7            B_avg_SIG_STR_att             B_avg_DISTANCE_att   0.9588438
## 8            B_avg_SIG_STR_att          B_avg_DISTANCE_landed   0.9031225
## 9            B_avg_SIG_STR_att         B_avg_opp_DISTANCE_att   0.8074255
## 10           B_avg_SIG_STR_att      B_avg_opp_DISTANCE_landed   0.7561362
## 11        B_avg_SIG_STR_landed           B_avg_TOTAL_STR_att   0.8768196
## 12        B_avg_SIG_STR_landed        B_avg_TOTAL_STR_landed   0.7901891
## 13        B_avg_SIG_STR_landed                 B_avg_HEAD_att   0.8485220
## 14        B_avg_SIG_STR_landed               B_avg_HEAD_landed   0.9125061
## 15        B_avg_SIG_STR_landed                 B_avg_BODY_att   0.7459568
## 16        B_avg_SIG_STR_landed               B_avg_BODY_landed   0.7321399
## 17        B_avg_SIG_STR_landed             B_avg_DISTANCE_att   0.8160869
## 18        B_avg_SIG_STR_landed          B_avg_DISTANCE_landed   0.8901176
## 19        B_avg_SIG_STR_landed         B_avg_opp_DISTANCE_att   0.7040648
## 20       B_avg_opp_SIG_STR_att       B_avg_opp_SIG_STR_landed   0.9223212
## 21       B_avg_opp_SIG_STR_att       B_avg_opp_TOTAL_STR_att   0.9349471
## 22       B_avg_opp_SIG_STR_att    B_avg_opp_TOTAL_STR_landed   0.7161057
## 23       B_avg_opp_SIG_STR_att                 B_avg_HEAD_att   0.7635519
## 24       B_avg_opp_SIG_STR_att             B_avg_opp_HEAD_att   0.9800355
## 25       B_avg_opp_SIG_STR_att          B_avg_opp_HEAD_landed   0.8567197
## 26       B_avg_opp_SIG_STR_att             B_avg_opp_BODY_att   0.7634517
## 27       B_avg_opp_SIG_STR_att          B_avg_opp_BODY_landed   0.7005033
## 28       B_avg_opp_SIG_STR_att             B_avg_DISTANCE_att   0.8122065
## 29       B_avg_opp_SIG_STR_att          B_avg_DISTANCE_landed   0.7780405
## 30       B_avg_opp_SIG_STR_att         B_avg_opp_DISTANCE_att   0.9646667
## 31       B_avg_opp_SIG_STR_att      B_avg_opp_DISTANCE_landed   0.9192453
## 32       B_avg_opp_SIG_STR_att B_total_time_fought.seconds.   0.7030929
## 33    B_avg_opp_SIG_STR_landed       B_avg_opp_TOTAL_STR_att   0.9070269
## 34    B_avg_opp_SIG_STR_landed    B_avg_opp_TOTAL_STR_landed   0.8344124
## 35    B_avg_opp_SIG_STR_landed             B_avg_opp_HEAD_att   0.8832466
## 36    B_avg_opp_SIG_STR_landed          B_avg_opp_HEAD_landed   0.9324728
## 37    B_avg_opp_SIG_STR_landed             B_avg_opp_BODY_att   0.7727451
## 38    B_avg_opp_SIG_STR_landed          B_avg_opp_BODY_landed   0.7762859
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## 39     B_avg_opp_SIG_STR_landed         B_avg_opp_DISTANCE_att  0.8359990
## 40     B_avg_opp_SIG_STR_landed      B_avg_opp_DISTANCE_landed  0.9098150
## 41          B_avg_TOTAL_STR_att          B_avg_TOTAL_STR_landed  0.8975863
## 42          B_avg_TOTAL_STR_att                  B_avg_HEAD_att  0.8764961
## 43          B_avg_TOTAL_STR_att               B_avg_HEAD_landed  0.8128275
## 44          B_avg_TOTAL_STR_att              B_avg_DISTANCE_att  0.8104410
## 45          B_avg_TOTAL_STR_att           B_avg_DISTANCE_landed  0.7593176
## 46          B_avg_TOTAL_STR_att    B_total_time_fought.seconds.  0.7436424
## 47       B_avg_TOTAL_STR_landed               B_avg_HEAD_landed  0.7062783
## 48      B_avg_opp_TOTAL_STR_att      B_avg_opp_TOTAL_STR_landed  0.8997047
## 49      B_avg_opp_TOTAL_STR_att              B_avg_opp_HEAD_att  0.9127847
## 50      B_avg_opp_TOTAL_STR_att           B_avg_opp_HEAD_landed  0.8454833
## 51      B_avg_opp_TOTAL_STR_att             B_avg_opp_BODY_att  0.7281362
## 52      B_avg_opp_TOTAL_STR_att          B_avg_opp_DISTANCE_att  0.8483259
## 53      B_avg_opp_TOTAL_STR_att       B_avg_opp_DISTANCE_landed  0.8144964
## 54      B_avg_opp_TOTAL_STR_att    B_total_time_fought.seconds.  0.7487514
## 55   B_avg_opp_TOTAL_STR_landed           B_avg_opp_HEAD_landed  0.7808720
## 56                 B_avg_TD_att                   B_avg_TD_landed  0.8161642
## 57              B_avg_TD_landed      B_avg_CTRL_time.seconds.  0.7449875
## 58          B_avg_opp_TD_landed  B_avg_opp_CTRL_time.seconds.  0.7239254
## 59                B_avg_HEAD_att               B_avg_HEAD_landed  0.8845024
## 60                B_avg_HEAD_att              B_avg_opp_HEAD_att  0.7465544
## 61                B_avg_HEAD_att              B_avg_DISTANCE_att  0.9410095
## 62                B_avg_HEAD_att           B_avg_DISTANCE_landed  0.8539972
## 63                B_avg_HEAD_att          B_avg_opp_DISTANCE_att  0.7892653
## 64                B_avg_HEAD_att       B_avg_opp_DISTANCE_landed  0.7441188
## 65             B_avg_HEAD_landed              B_avg_DISTANCE_att  0.7641369
## 66             B_avg_HEAD_landed           B_avg_DISTANCE_landed  0.8097168
## 67            B_avg_opp_HEAD_att           B_avg_opp_HEAD_landed  0.8848650
## 68            B_avg_opp_HEAD_att              B_avg_DISTANCE_att  0.7893316
## 69            B_avg_opp_HEAD_att           B_avg_DISTANCE_landed  0.7497830
## 70            B_avg_opp_HEAD_att          B_avg_opp_DISTANCE_att  0.9480385
## 71            B_avg_opp_HEAD_att       B_avg_opp_DISTANCE_landed  0.8860757
## 72         B_avg_opp_HEAD_landed          B_avg_opp_DISTANCE_att  0.7675160
## 73         B_avg_opp_HEAD_landed       B_avg_opp_DISTANCE_landed  0.8377582
## 74                B_avg_BODY_att               B_avg_BODY_landed  0.9523034
## 75            B_avg_opp_BODY_att           B_avg_opp_BODY_landed  0.9464861
## 76            B_avg_opp_BODY_att          B_avg_opp_DISTANCE_att  0.7135838
## 77            B_avg_opp_BODY_att       B_avg_opp_DISTANCE_landed  0.7257777
## 78                 B_avg_LEG_att                B_avg_LEG_landed  0.9850965
## 79             B_avg_opp_LEG_att            B_avg_opp_LEG_landed  0.9780579
## 80            B_avg_DISTANCE_att           B_avg_DISTANCE_landed  0.9354347
## 81            B_avg_DISTANCE_att          B_avg_opp_DISTANCE_att  0.8473952
## 82            B_avg_DISTANCE_att       B_avg_opp_DISTANCE_landed  0.7986186
## 83         B_avg_DISTANCE_landed          B_avg_opp_DISTANCE_att  0.8160021
## 84         B_avg_DISTANCE_landed       B_avg_opp_DISTANCE_landed  0.7653938
## 85        B_avg_opp_DISTANCE_att       B_avg_opp_DISTANCE_landed  0.9409028
## 86              B_avg_CLINCH_att              B_avg_CLINCH_landed  0.9676804
## 87          B_avg_opp_CLINCH_att          B_avg_opp_CLINCH_landed  0.9619889
## 88              B_avg_GROUND_att              B_avg_GROUND_landed  0.9722635
## 89          B_avg_opp_GROUND_att          B_avg_opp_GROUND_landed  0.9678696
## 90        B_total_rounds_fought                          B_wins  0.9280156
## 91        B_total_rounds_fought                        B_losses  0.7697570
## 92        B_total_rounds_fought   B_win_by_Decision_Unanimous  0.7305606
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## 93           B_current_win_streak        B_longest_win_streak 0.7084615
## 94           B_longest_win_streak                      B_wins 0.8069918
## 95                         B_wins B_win_by_Decision_Unanimous 0.7260675
## 96                         B_wins             B_win_by_KO.TKO 0.7992708
## 97              R_avg_SIG_STR_att         R_avg_SIG_STR_landed 0.9188075
## 98              R_avg_SIG_STR_att         R_avg_opp_SIG_STR_att 0.7718282
## 99              R_avg_SIG_STR_att           R_avg_TOTAL_STR_att 0.9193354
## 100             R_avg_SIG_STR_att                R_avg_HEAD_att 0.9763668
## 101             R_avg_SIG_STR_att             R_avg_HEAD_landed 0.8539745
## 102             R_avg_SIG_STR_att            R_avg_opp_HEAD_att 0.7598340
## 103             R_avg_SIG_STR_att            R_avg_DISTANCE_att 0.9550817
## 104             R_avg_SIG_STR_att         R_avg_DISTANCE_landed 0.9035856
## 105             R_avg_SIG_STR_att        R_avg_opp_DISTANCE_att 0.8035939
## 106             R_avg_SIG_STR_att     R_avg_opp_DISTANCE_landed 0.7455361
## 107          R_avg_SIG_STR_landed           R_avg_TOTAL_STR_att 0.8826412
## 108          R_avg_SIG_STR_landed        R_avg_TOTAL_STR_landed 0.8004948
## 109          R_avg_SIG_STR_landed                R_avg_HEAD_att 0.8722283
## 110          R_avg_SIG_STR_landed             R_avg_HEAD_landed 0.9232100
## 111          R_avg_SIG_STR_landed            R_avg_DISTANCE_att 0.8159129
## 112          R_avg_SIG_STR_landed         R_avg_DISTANCE_landed 0.8824761
## 113         R_avg_opp_SIG_STR_att     R_avg_opp_SIG_STR_landed 0.9237160
## 114         R_avg_opp_SIG_STR_att       R_avg_opp_TOTAL_STR_att 0.9206678
## 115         R_avg_opp_SIG_STR_att                R_avg_HEAD_att 0.7587902
## 116         R_avg_opp_SIG_STR_att            R_avg_opp_HEAD_att 0.9742898
## 117         R_avg_opp_SIG_STR_att         R_avg_opp_HEAD_landed 0.8550628
## 118         R_avg_opp_SIG_STR_att            R_avg_DISTANCE_att 0.7966260
## 119         R_avg_opp_SIG_STR_att         R_avg_DISTANCE_landed 0.7587205
## 120         R_avg_opp_SIG_STR_att        R_avg_opp_DISTANCE_att 0.9569185
## 121         R_avg_opp_SIG_STR_att     R_avg_opp_DISTANCE_landed 0.9080439
## 122      R_avg_opp_SIG_STR_landed       R_avg_opp_TOTAL_STR_att 0.8920054
## 123      R_avg_opp_SIG_STR_landed    R_avg_opp_TOTAL_STR_landed 0.8079602
## 124      R_avg_opp_SIG_STR_landed            R_avg_opp_HEAD_att 0.8735671
## 125      R_avg_opp_SIG_STR_landed         R_avg_opp_HEAD_landed 0.9197394
## 126      R_avg_opp_SIG_STR_landed            R_avg_opp_BODY_att 0.7317657
## 127      R_avg_opp_SIG_STR_landed         R_avg_opp_BODY_landed 0.7348878
## 128      R_avg_opp_SIG_STR_landed        R_avg_opp_DISTANCE_att 0.8273744
## 129      R_avg_opp_SIG_STR_landed     R_avg_opp_DISTANCE_landed 0.8956727
## 130            R_avg_TOTAL_STR_att        R_avg_TOTAL_STR_landed 0.9006147
## 131            R_avg_TOTAL_STR_att                R_avg_HEAD_att 0.8964209
## 132            R_avg_TOTAL_STR_att             R_avg_HEAD_landed 0.8263262
## 133            R_avg_TOTAL_STR_att            R_avg_DISTANCE_att 0.8156577
## 134            R_avg_TOTAL_STR_att         R_avg_DISTANCE_landed 0.7631472
## 135            R_avg_TOTAL_STR_att R_total_time_fought.seconds. 0.7535339
## 136         R_avg_TOTAL_STR_landed             R_avg_HEAD_landed 0.7462398
## 137        R_avg_opp_TOTAL_STR_att    R_avg_opp_TOTAL_STR_landed 0.9026439
## 138        R_avg_opp_TOTAL_STR_att            R_avg_opp_HEAD_att 0.8952957
## 139        R_avg_opp_TOTAL_STR_att         R_avg_opp_HEAD_landed 0.8324912
## 140        R_avg_opp_TOTAL_STR_att        R_avg_opp_DISTANCE_att 0.8229907
## 141        R_avg_opp_TOTAL_STR_att     R_avg_opp_DISTANCE_landed 0.7830161
## 142        R_avg_opp_TOTAL_STR_att R_total_time_fought.seconds. 0.7629180
## 143     R_avg_opp_TOTAL_STR_landed         R_avg_opp_HEAD_landed 0.7537124
## 144                  R_avg_TD_att                R_avg_TD_landed 0.8059683
## 145               R_avg_TD_landed      R_avg_CTRL_time.seconds. 0.7523306
## 146             R_avg_opp_TD_att            R_avg_opp_TD_landed 0.7581813
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## 147      R_avg_opp_TD_landed R_avg_opp_CTRL_time.seconds.  0.7074494
## 148            R_avg_HEAD_att           R_avg_HEAD_landed  0.8866035
## 149            R_avg_HEAD_att          R_avg_opp_HEAD_att  0.7594173
## 150            R_avg_HEAD_att          R_avg_DISTANCE_att  0.9345134
## 151            R_avg_HEAD_att        R_avg_DISTANCE_landed  0.8642905
## 152            R_avg_HEAD_att      R_avg_opp_DISTANCE_att  0.7964766
## 153            R_avg_HEAD_att   R_avg_opp_DISTANCE_landed  0.7324434
## 154         R_avg_HEAD_landed          R_avg_DISTANCE_att  0.7448120
## 155         R_avg_HEAD_landed        R_avg_DISTANCE_landed  0.7988317
## 156        R_avg_opp_HEAD_att       R_avg_opp_HEAD_landed  0.8898803
## 157        R_avg_opp_HEAD_att          R_avg_DISTANCE_att  0.7868875
## 158        R_avg_opp_HEAD_att        R_avg_DISTANCE_landed  0.7414895
## 159        R_avg_opp_HEAD_att      R_avg_opp_DISTANCE_att  0.9335128
## 160        R_avg_opp_HEAD_att   R_avg_opp_DISTANCE_landed  0.8606357
## 161     R_avg_opp_HEAD_landed      R_avg_opp_DISTANCE_att  0.7539227
## 162     R_avg_opp_HEAD_landed   R_avg_opp_DISTANCE_landed  0.8065049
## 163            R_avg_BODY_att           R_avg_BODY_landed  0.9451470
## 164        R_avg_opp_BODY_att       R_avg_opp_BODY_landed  0.9512305
## 165             R_avg_LEG_att            R_avg_LEG_landed  0.9793787
## 166         R_avg_opp_LEG_att        R_avg_opp_LEG_landed  0.9792892
## 167        R_avg_DISTANCE_att        R_avg_DISTANCE_landed  0.9412352
## 168        R_avg_DISTANCE_att      R_avg_opp_DISTANCE_att  0.8414795
## 169        R_avg_DISTANCE_att   R_avg_opp_DISTANCE_landed  0.7899062
## 170     R_avg_DISTANCE_landed      R_avg_opp_DISTANCE_att  0.8013537
## 171     R_avg_DISTANCE_landed   R_avg_opp_DISTANCE_landed  0.7601906
## 172    R_avg_opp_DISTANCE_att   R_avg_opp_DISTANCE_landed  0.9395032
## 173           R_avg_CLINCH_att          R_avg_CLINCH_landed  0.9695042
## 174       R_avg_opp_CLINCH_att      R_avg_opp_CLINCH_landed  0.9621602
## 175           R_avg_GROUND_att          R_avg_GROUND_landed  0.9757968
## 176       R_avg_opp_GROUND_att      R_avg_opp_GROUND_landed  0.9638686
## 177      R_total_rounds_fought                      R_wins  0.9204873
## 178      R_total_rounds_fought                    R_losses  0.7783437
## 179      R_total_rounds_fought  R_win_by_Decision_Unanimous  0.7347500
## 180      R_current_win_streak       R_longest_win_streak  0.7749474
## 181      R_longest_win_streak                      R_wins  0.7951772
## 182                    R_wins             R_win_by_KO.TKO  0.8147927


##                     Var1                      Var2 Correlation
## 1          B_avg_SIG_STR_att       B_avg_SIG_STR_landed  0.9205817
## 2          B_avg_SIG_STR_att      B_avg_opp_SIG_STR_att  0.7942455
## 3          B_avg_SIG_STR_att        B_avg_TOTAL_STR_att  0.9325557
## 4          B_avg_SIG_STR_att      B_avg_TOTAL_STR_landed  0.7602725
## 5          B_avg_SIG_STR_att     B_avg_opp_TOTAL_STR_att  0.7135583
## 6          B_avg_SIG_STR_att              B_avg_HEAD_att  0.9747062
## 7          B_avg_SIG_STR_att            B_avg_HEAD_landed  0.8726057
## 8          B_avg_SIG_STR_att          B_avg_opp_HEAD_att  0.7617002
## 9          B_avg_SIG_STR_att          B_avg_DISTANCE_att  0.9517316
## 10         B_avg_SIG_STR_att        B_avg_DISTANCE_landed  0.8881583
## 11         B_avg_SIG_STR_att      B_avg_opp_DISTANCE_att  0.8261615
## 12         B_avg_SIG_STR_att   B_avg_opp_DISTANCE_landed  0.7485029
## 13         B_avg_SIG_STR_att B_total_time_fought.seconds.  0.7640879
## 14      B_avg_SIG_STR_landed        B_avg_TOTAL_STR_att  0.8990280
## 15      B_avg_SIG_STR_landed      B_avg_TOTAL_STR_landed  0.8668021
## 16      B_avg_SIG_STR_landed              B_avg_HEAD_att  0.8577893
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## 17         B_avg_SIG_STR_landed          B_avg_HEAD_landed 0.9302264
## 18         B_avg_SIG_STR_landed            B_avg_BODY_att 0.7411099
## 19         B_avg_SIG_STR_landed          B_avg_BODY_landed 0.7500608
## 20         B_avg_SIG_STR_landed        B_avg_DISTANCE_att 0.8189211
## 21         B_avg_SIG_STR_landed     B_avg_DISTANCE_landed 0.8894161
## 22         B_avg_opp_SIG_STR_att     B_avg_opp_SIG_STR_landed 0.9255646
## 23         B_avg_opp_SIG_STR_att          B_avg_TOTAL_STR_att 0.7072422
## 24         B_avg_opp_SIG_STR_att      B_avg_opp_TOTAL_STR_att 0.9272549
## 25         B_avg_opp_SIG_STR_att   B_avg_opp_TOTAL_STR_landed 0.7258918
## 26         B_avg_opp_SIG_STR_att            B_avg_HEAD_att 0.7771772
## 27         B_avg_opp_SIG_STR_att        B_avg_opp_HEAD_att 0.9795920
## 28         B_avg_opp_SIG_STR_att     B_avg_opp_HEAD_landed 0.8696088
## 29         B_avg_opp_SIG_STR_att        B_avg_opp_BODY_att 0.7038301
## 30         B_avg_opp_SIG_STR_att          B_avg_DISTANCE_att 0.8406398
## 31         B_avg_opp_SIG_STR_att       B_avg_DISTANCE_landed 0.7583215
## 32         B_avg_opp_SIG_STR_att    B_avg_opp_DISTANCE_att 0.9501852
## 33         B_avg_opp_SIG_STR_att B_avg_opp_DISTANCE_landed 0.8928418
## 34         B_avg_opp_SIG_STR_att B_total_time_fought.seconds. 0.7698281
## 35      B_avg_opp_SIG_STR_landed   B_avg_opp_TOTAL_STR_att 0.9003007
## 36      B_avg_opp_SIG_STR_landed B_avg_opp_TOTAL_STR_landed 0.8366046
## 37      B_avg_opp_SIG_STR_landed        B_avg_opp_HEAD_att 0.8861846
## 38      B_avg_opp_SIG_STR_landed     B_avg_opp_HEAD_landed 0.9436213
## 39      B_avg_opp_SIG_STR_landed        B_avg_opp_BODY_att 0.7141697
## 40      B_avg_opp_SIG_STR_landed     B_avg_opp_BODY_landed 0.7384309
## 41      B_avg_opp_SIG_STR_landed        B_avg_DISTANCE_att 0.7376098
## 42      B_avg_opp_SIG_STR_landed    B_avg_opp_DISTANCE_att 0.8420837
## 43      B_avg_opp_SIG_STR_landed B_avg_opp_DISTANCE_landed 0.9133951
## 44            B_avg_TOTAL_STR_att       B_avg_TOTAL_STR_landed 0.9211898
## 45            B_avg_TOTAL_STR_att            B_avg_HEAD_att 0.9253458
## 46            B_avg_TOTAL_STR_att          B_avg_HEAD_landed 0.8919451
## 47            B_avg_TOTAL_STR_att        B_avg_DISTANCE_att 0.8220134
## 48            B_avg_TOTAL_STR_att     B_avg_DISTANCE_landed 0.7725180
## 49            B_avg_TOTAL_STR_att    B_avg_opp_DISTANCE_att 0.7216946
## 50            B_avg_TOTAL_STR_att B_total_time_fought.seconds. 0.7950166
## 51         B_avg_TOTAL_STR_landed            B_avg_HEAD_att 0.7348061
## 52         B_avg_TOTAL_STR_landed          B_avg_HEAD_landed 0.8630806
## 53      B_avg_opp_TOTAL_STR_att   B_avg_opp_TOTAL_STR_landed 0.9112097
## 54      B_avg_opp_TOTAL_STR_att        B_avg_opp_HEAD_att 0.9114933
## 55      B_avg_opp_TOTAL_STR_att     B_avg_opp_HEAD_landed 0.8604444
## 56      B_avg_opp_TOTAL_STR_att          B_avg_DISTANCE_att 0.7395661
## 57      B_avg_opp_TOTAL_STR_att    B_avg_opp_DISTANCE_att 0.8250962
## 58      B_avg_opp_TOTAL_STR_att B_avg_opp_DISTANCE_landed 0.7824696
## 59      B_avg_opp_TOTAL_STR_att B_total_time_fought.seconds. 0.8177533
## 60   B_avg_opp_TOTAL_STR_landed        B_avg_opp_HEAD_att 0.7003491
## 61   B_avg_opp_TOTAL_STR_landed     B_avg_opp_HEAD_landed 0.8088852
## 62   B_avg_opp_TOTAL_STR_landed B_total_time_fought.seconds. 0.7077755
## 63                 B_avg_TD_att            B_avg_TD_landed 0.8776953
## 64                 B_avg_TD_att    B_avg_CTRL_time.seconds. 0.7759489
## 65               B_avg_TD_landed    B_avg_CTRL_time.seconds. 0.8176615
## 66              B_avg_opp_TD_att            B_avg_opp_TD_landed 0.7671965
## 67              B_avg_opp_TD_att B_avg_opp_CTRL_time.seconds. 0.7411223
## 68           B_avg_opp_TD_landed B_avg_opp_CTRL_time.seconds. 0.8002859
## 69                B_avg_HEAD_att           B_avg_HEAD_landed 0.8855673
## 70                B_avg_HEAD_att         B_avg_opp_HEAD_att 0.7455274
```

```
## 71           B_avg_HEAD_att              B_avg_DISTANCE_att  0.9218500
## 72           B_avg_HEAD_att           B_avg_DISTANCE_landed  0.8178822
## 73           B_avg_HEAD_att          B_avg_opp_DISTANCE_att  0.8127721
## 74           B_avg_HEAD_att       B_avg_opp_DISTANCE_landed  0.7406912
## 75           B_avg_HEAD_att   B_total_time_fought.seconds.  0.7407164
## 76        B_avg_HEAD_landed              B_avg_DISTANCE_att  0.7468794
## 77        B_avg_HEAD_landed           B_avg_DISTANCE_landed  0.7861049
## 78        B_avg_opp_HEAD_att           B_avg_opp_HEAD_landed  0.8923317
## 79        B_avg_opp_HEAD_att              B_avg_DISTANCE_att  0.8060756
## 80        B_avg_opp_HEAD_att           B_avg_DISTANCE_landed  0.7381036
## 81        B_avg_opp_HEAD_att          B_avg_opp_DISTANCE_att  0.9192959
## 82        B_avg_opp_HEAD_att       B_avg_opp_DISTANCE_landed  0.8428459
## 83        B_avg_opp_HEAD_att   B_total_time_fought.seconds.  0.7271426
## 84     B_avg_opp_HEAD_landed          B_avg_opp_DISTANCE_att  0.7640193
## 85     B_avg_opp_HEAD_landed       B_avg_opp_DISTANCE_landed  0.8317147
## 86           B_avg_BODY_att               B_avg_BODY_landed  0.9655487
## 87           B_avg_BODY_att           B_avg_DISTANCE_landed  0.7180711
## 88        B_avg_opp_BODY_att           B_avg_opp_BODY_landed  0.9631181
## 89        B_avg_opp_BODY_att          B_avg_opp_DISTANCE_att  0.7074427
## 90        B_avg_opp_BODY_att       B_avg_opp_DISTANCE_landed  0.7360584
## 91     B_avg_opp_BODY_landed       B_avg_opp_DISTANCE_landed  0.7275248
## 92            B_avg_LEG_att                B_avg_LEG_landed  0.9873714
## 93         B_avg_opp_LEG_att            B_avg_opp_LEG_landed  0.9687279
## 94       B_avg_DISTANCE_att           B_avg_DISTANCE_landed  0.9292303
## 95       B_avg_DISTANCE_att          B_avg_opp_DISTANCE_att  0.8791529
## 96       B_avg_DISTANCE_att       B_avg_opp_DISTANCE_landed  0.8077295
## 97       B_avg_DISTANCE_att   B_total_time_fought.seconds.  0.7203262
## 98     B_avg_DISTANCE_landed          B_avg_opp_DISTANCE_att  0.7902125
## 99     B_avg_DISTANCE_landed       B_avg_opp_DISTANCE_landed  0.7083293
## 100   B_avg_opp_DISTANCE_att       B_avg_opp_DISTANCE_landed  0.9325804
## 101   B_avg_opp_DISTANCE_att   B_total_time_fought.seconds.  0.7219149
## 102         B_avg_CLINCH_att             B_avg_CLINCH_landed  0.9840615
## 103      B_avg_opp_CLINCH_att         B_avg_opp_CLINCH_landed  0.9815526
## 104         B_avg_GROUND_att             B_avg_GROUND_landed  0.9790788
## 105      B_avg_opp_GROUND_att         B_avg_opp_GROUND_landed  0.9325202
## 106   B_total_rounds_fought             B_longest_win_streak  0.7479680
## 107   B_total_rounds_fought                          B_wins  0.9250467
## 108   B_total_rounds_fought                        B_losses  0.8464769
## 109   B_total_rounds_fought   B_win_by_Decision_Unanimous  0.7334441
## 110   B_total_rounds_fought              B_win_by_KO.TKO  0.7959413
## 111   B_longest_win_streak                          B_wins  0.8473199
## 112   B_longest_win_streak              B_win_by_KO.TKO  0.8346312
## 113                  B_wins                        B_losses  0.7230789
## 114                  B_wins              B_win_by_KO.TKO  0.8646854
## 115           B_Height_cms                  B_Reach_cms  0.7393998
## 116        R_avg_SIG_STR_att           R_avg_SIG_STR_landed  0.9189356
## 117        R_avg_SIG_STR_att        R_avg_opp_SIG_STR_att  0.7298773
## 118        R_avg_SIG_STR_att           R_avg_TOTAL_STR_att  0.9148865
## 119        R_avg_SIG_STR_att        R_avg_TOTAL_STR_landed  0.7320127
## 120        R_avg_SIG_STR_att                  R_avg_HEAD_att  0.9764962
## 121        R_avg_SIG_STR_att               R_avg_HEAD_landed  0.8689835
## 122        R_avg_SIG_STR_att           R_avg_opp_HEAD_att  0.7152629
## 123        R_avg_SIG_STR_att           R_avg_DISTANCE_att  0.9317989
## 124        R_avg_SIG_STR_att        R_avg_DISTANCE_landed  0.8877290
```

```
## 125           R_avg_SIG_STR_att        R_avg_opp_DISTANCE_att 0.7790163
## 126           R_avg_SIG_STR_att     R_avg_opp_DISTANCE_landed 0.7244118
## 127           R_avg_SIG_STR_att R_total_time_fought.seconds. 0.7131231
## 128        R_avg_SIG_STR_landed           R_avg_TOTAL_STR_att 0.8796677
## 129        R_avg_SIG_STR_landed        R_avg_TOTAL_STR_landed 0.8343801
## 130        R_avg_SIG_STR_landed               R_avg_HEAD_att 0.8699022
## 131        R_avg_SIG_STR_landed             R_avg_HEAD_landed 0.9353214
## 132        R_avg_SIG_STR_landed             R_avg_BODY_landed 0.7082813
## 133        R_avg_SIG_STR_landed           R_avg_DISTANCE_att 0.7959966
## 134        R_avg_SIG_STR_landed        R_avg_DISTANCE_landed 0.8741949
## 135       R_avg_opp_SIG_STR_att     R_avg_opp_SIG_STR_landed 0.9056755
## 136       R_avg_opp_SIG_STR_att       R_avg_opp_TOTAL_STR_att 0.9241317
## 137       R_avg_opp_SIG_STR_att    R_avg_opp_TOTAL_STR_landed 0.7399366
## 138       R_avg_opp_SIG_STR_att               R_avg_HEAD_att 0.7191480
## 139       R_avg_opp_SIG_STR_att           R_avg_opp_HEAD_att 0.9722965
## 140       R_avg_opp_SIG_STR_att        R_avg_opp_HEAD_landed 0.8405675
## 141       R_avg_opp_SIG_STR_att           R_avg_DISTANCE_att 0.7722866
## 142       R_avg_opp_SIG_STR_att       R_avg_opp_DISTANCE_att 0.9538961
## 143       R_avg_opp_SIG_STR_att     R_avg_opp_DISTANCE_landed 0.8820648
## 144       R_avg_opp_SIG_STR_att R_total_time_fought.seconds. 0.7581405
## 145    R_avg_opp_SIG_STR_landed       R_avg_opp_TOTAL_STR_att 0.8741284
## 146    R_avg_opp_SIG_STR_landed    R_avg_opp_TOTAL_STR_landed 0.8510417
## 147    R_avg_opp_SIG_STR_landed           R_avg_opp_HEAD_att 0.8466671
## 148    R_avg_opp_SIG_STR_landed        R_avg_opp_HEAD_landed 0.9195677
## 149    R_avg_opp_SIG_STR_landed           R_avg_opp_BODY_att 0.7343911
## 150    R_avg_opp_SIG_STR_landed        R_avg_opp_BODY_landed 0.7314094
## 151    R_avg_opp_SIG_STR_landed       R_avg_opp_DISTANCE_att 0.8049692
## 152    R_avg_opp_SIG_STR_landed     R_avg_opp_DISTANCE_landed 0.8890754
## 153         R_avg_TOTAL_STR_att        R_avg_TOTAL_STR_landed 0.9220859
## 154         R_avg_TOTAL_STR_att               R_avg_HEAD_att 0.9012241
## 155         R_avg_TOTAL_STR_att             R_avg_HEAD_landed 0.8514982
## 156         R_avg_TOTAL_STR_att           R_avg_DISTANCE_att 0.7914201
## 157         R_avg_TOTAL_STR_att        R_avg_DISTANCE_landed 0.7562153
## 158         R_avg_TOTAL_STR_att R_total_time_fought.seconds. 0.7798689
## 159      R_avg_TOTAL_STR_landed               R_avg_HEAD_att 0.7058564
## 160      R_avg_TOTAL_STR_landed             R_avg_HEAD_landed 0.8073836
## 161     R_avg_opp_TOTAL_STR_att    R_avg_opp_TOTAL_STR_landed 0.9117909
## 162     R_avg_opp_TOTAL_STR_att           R_avg_opp_HEAD_att 0.9096599
## 163     R_avg_opp_TOTAL_STR_att        R_avg_opp_HEAD_landed 0.8398404
## 164     R_avg_opp_TOTAL_STR_att       R_avg_opp_DISTANCE_att 0.8189884
## 165     R_avg_opp_TOTAL_STR_att     R_avg_opp_DISTANCE_landed 0.7518263
## 166     R_avg_opp_TOTAL_STR_att R_total_time_fought.seconds. 0.8035572
## 167 R_avg_opp_TOTAL_STR_landed           R_avg_opp_HEAD_att 0.7101386
## 168 R_avg_opp_TOTAL_STR_landed        R_avg_opp_HEAD_landed 0.8229552
## 169 R_avg_opp_TOTAL_STR_landed R_total_time_fought.seconds. 0.7130743
## 170                 R_avg_TD_att                R_avg_TD_landed 0.8283321
## 171              R_avg_TD_landed    R_avg_CTRL_time.seconds. 0.7898072
## 172             R_avg_opp_TD_att            R_avg_opp_TD_landed 0.7309029
## 173          R_avg_opp_TD_landed R_avg_opp_CTRL_time.seconds. 0.7116297
## 174               R_avg_HEAD_att             R_avg_HEAD_landed 0.8932464
## 175               R_avg_HEAD_att           R_avg_opp_HEAD_att 0.7135826
## 176               R_avg_HEAD_att           R_avg_DISTANCE_att 0.9070702
## 177               R_avg_HEAD_att        R_avg_DISTANCE_landed 0.8416685
## 178               R_avg_HEAD_att       R_avg_opp_DISTANCE_att 0.7722401
```

```
## 179            R_avg_HEAD_att     R_avg_opp_DISTANCE_landed  0.7191866
## 180         R_avg_HEAD_landed           R_avg_DISTANCE_att  0.7378072
## 181         R_avg_HEAD_landed        R_avg_DISTANCE_landed  0.8035052
## 182        R_avg_opp_HEAD_att        R_avg_opp_HEAD_landed  0.8693576
## 183        R_avg_opp_HEAD_att           R_avg_DISTANCE_att  0.7578633
## 184        R_avg_opp_HEAD_att       R_avg_opp_DISTANCE_att  0.9239005
## 185        R_avg_opp_HEAD_att    R_avg_opp_DISTANCE_landed  0.8195156
## 186        R_avg_opp_HEAD_att R_total_time_fought.seconds.  0.7231312
## 187     R_avg_opp_HEAD_landed       R_avg_opp_DISTANCE_att  0.7254547
## 188     R_avg_opp_HEAD_landed    R_avg_opp_DISTANCE_landed  0.7864953
## 189            R_avg_BODY_att           R_avg_BODY_landed  0.9584876
## 190        R_avg_opp_BODY_att        R_avg_opp_BODY_landed  0.9556126
## 191             R_avg_LEG_att            R_avg_LEG_landed  0.9857106
## 192         R_avg_opp_LEG_att         R_avg_opp_LEG_landed  0.9826462
## 193        R_avg_DISTANCE_att        R_avg_DISTANCE_landed  0.9364292
## 194        R_avg_DISTANCE_att       R_avg_opp_DISTANCE_att  0.8378480
## 195        R_avg_DISTANCE_att    R_avg_opp_DISTANCE_landed  0.7771121
## 196     R_avg_DISTANCE_landed       R_avg_opp_DISTANCE_att  0.7621163
## 197     R_avg_DISTANCE_landed    R_avg_opp_DISTANCE_landed  0.7118459
## 198    R_avg_opp_DISTANCE_att    R_avg_opp_DISTANCE_landed  0.9192377
## 199          R_avg_CLINCH_att          R_avg_CLINCH_landed  0.9667693
## 200      R_avg_opp_CLINCH_att      R_avg_opp_CLINCH_landed  0.9718499
## 201          R_avg_GROUND_att          R_avg_GROUND_landed  0.9222969
## 202      R_avg_opp_GROUND_att      R_avg_opp_GROUND_landed  0.9755121
## 203     R_total_rounds_fought          R_longest_win_streak  0.7118595
## 204     R_total_rounds_fought                       R_wins  0.9142004
## 205     R_total_rounds_fought                     R_losses  0.8358545
## 206     R_total_rounds_fought             R_win_by_KO.TKO  0.7950043
## 207      R_longest_win_streak                       R_wins  0.8226895
## 208      R_longest_win_streak             R_win_by_KO.TKO  0.7940832
## 209                    R_wins                     R_losses  0.7128999
## 210                    R_wins             R_win_by_KO.TKO  0.8440467
## 211             R_Height_cms                  R_Reach_cms  0.7773429
```

There are so many predictor variables (over 100), we need to reduce that number. First, creating correlation matrix to identify variables that are highly correlated with each other. It would be much to visualize all combinations, so we will only extract high correlation combos (correlation > 0.7), for each class dataframe.

over 180 combinations in every class have high correlation. A lot.

Now need to deal with multicollinearity and perform variable selection. Will use ridge regression (to reduce multicollinearity) and lasso (to select varialbes). This is know as Elastic Net (linear regression model that includes both the L1 penalty of Lasso and the L2 penalty of Ridge regression). Elastic Net combines both L2 and L1 penalties of ridge regression and lasso. It controls the mixing of the two penalties through a parameter (lambda).

#scale numerical predictors

```
##    [1] "B_avg_KD"                "B_avg_opp_KD"
##    [3] "B_avg_SIG_STR_pct"       "B_avg_opp_SIG_STR_pct"
##    [5] "B_avg_TD_pct"            "B_avg_opp_TD_pct"
##    [7] "B_avg_SUB_ATT"           "B_avg_opp_SUB_ATT"
##    [9] "B_avg_REV"               "B_avg_opp_REV"
##   [11] "B_avg_SIG_STR_att"       "B_avg_SIG_STR_landed"
##   [13] "B_avg_opp_SIG_STR_att"   "B_avg_opp_SIG_STR_landed"
```

```
##   [15] "B_avg_TOTAL_STR_att"         "B_avg_TOTAL_STR_landed"
##   [17] "B_avg_opp_TOTAL_STR_att"     "B_avg_opp_TOTAL_STR_landed"
##   [19] "B_avg_TD_att"                "B_avg_TD_landed"
##   [21] "B_avg_opp_TD_att"            "B_avg_opp_TD_landed"
##   [23] "B_avg_HEAD_att"              "B_avg_HEAD_landed"
##   [25] "B_avg_opp_HEAD_att"          "B_avg_opp_HEAD_landed"
##   [27] "B_avg_BODY_att"              "B_avg_BODY_landed"
##   [29] "B_avg_opp_BODY_att"          "B_avg_opp_BODY_landed"
##   [31] "B_avg_LEG_att"               "B_avg_LEG_landed"
##   [33] "B_avg_opp_LEG_att"           "B_avg_opp_LEG_landed"
##   [35] "B_avg_DISTANCE_att"          "B_avg_DISTANCE_landed"
##   [37] "B_avg_opp_DISTANCE_att"      "B_avg_opp_DISTANCE_landed"
##   [39] "B_avg_CLINCH_att"            "B_avg_CLINCH_landed"
##   [41] "B_avg_opp_CLINCH_att"        "B_avg_opp_CLINCH_landed"
##   [43] "B_avg_GROUND_att"            "B_avg_GROUND_landed"
##   [45] "B_avg_opp_GROUND_att"        "B_avg_opp_GROUND_landed"
##   [47] "B_avg_CTRL_time.seconds."    "B_avg_opp_CTRL_time.seconds."
##   [49] "B_total_time_fought.seconds." "B_total_rounds_fought"
##   [51] "B_total_title_bouts"         "B_current_win_streak"
##   [53] "B_current_lose_streak"       "B_longest_win_streak"
##   [55] "B_wins"                      "B_losses"
##   [57] "B_win_by_Decision_Majority"  "B_win_by_Decision_Split"
##   [59] "B_win_by_Decision_Unanimous" "B_win_by_KO.TKO"
##   [61] "B_win_by_Submission"         "B_win_by_TKO_Doctor_Stoppage"
##   [63] "B_Height_cms"                "B_Reach_cms"
##   [65] "B_Weight_lbs"                "R_avg_KD"
##   [67] "R_avg_opp_KD"                "R_avg_SIG_STR_pct"
##   [69] "R_avg_opp_SIG_STR_pct"       "R_avg_TD_pct"
##   [71] "R_avg_opp_TD_pct"            "R_avg_SUB_ATT"
##   [73] "R_avg_opp_SUB_ATT"           "R_avg_REV"
##   [75] "R_avg_opp_REV"               "R_avg_SIG_STR_att"
##   [77] "R_avg_SIG_STR_landed"        "R_avg_opp_SIG_STR_att"
##   [79] "R_avg_opp_SIG_STR_landed"    "R_avg_TOTAL_STR_att"
##   [81] "R_avg_TOTAL_STR_landed"      "R_avg_opp_TOTAL_STR_att"
##   [83] "R_avg_opp_TOTAL_STR_landed"  "R_avg_TD_att"
##   [85] "R_avg_TD_landed"             "R_avg_opp_TD_att"
##   [87] "R_avg_opp_TD_landed"         "R_avg_HEAD_att"
##   [89] "R_avg_HEAD_landed"           "R_avg_opp_HEAD_att"
##   [91] "R_avg_opp_HEAD_landed"       "R_avg_BODY_att"
##   [93] "R_avg_BODY_landed"           "R_avg_opp_BODY_att"
##   [95] "R_avg_opp_BODY_landed"       "R_avg_LEG_att"
##   [97] "R_avg_LEG_landed"            "R_avg_opp_LEG_att"
##   [99] "R_avg_opp_LEG_landed"        "R_avg_DISTANCE_att"
## [101] "R_avg_DISTANCE_landed"        "R_avg_opp_DISTANCE_att"
## [103] "R_avg_opp_DISTANCE_landed"    "R_avg_CLINCH_att"
## [105] "R_avg_CLINCH_landed"          "R_avg_opp_CLINCH_att"
## [107] "R_avg_opp_CLINCH_landed"      "R_avg_GROUND_att"
## [109] "R_avg_GROUND_landed"          "R_avg_opp_GROUND_att"
## [111] "R_avg_opp_GROUND_landed"      "R_avg_CTRL_time.seconds."
## [113] "R_avg_opp_CTRL_time.seconds." "R_total_time_fought.seconds."
## [115] "R_total_rounds_fought"        "R_total_title_bouts"
## [117] "R_current_win_streak"         "R_current_lose_streak"
## [119] "R_longest_win_streak"         "R_wins"
## [121] "R_losses"                     "R_win_by_Decision_Majority"
```

```
## [123] "R_win_by_Decision_Split"       "R_win_by_Decision_Unanimous"
## [125] "R_win_by_KO.TKO"               "R_win_by_Submission"
## [127] "R_win_by_TKO_Doctor_Stoppage" "R_Height_cms"
## [129] "R_Reach_cms"                    "R_Weight_lbs"
## [131] "B_age"                          "R_age"
```

I scaled the numerical predictors for each dataset because these techniques are sensitive to scale.

#transform categorical predictors

I will transform the categorical variables (including our response variable) into numerical format so they can be used in Elastic Net. I will do this by using dummy variables. I am removing the additional dummy variable for the response, so it is only in the context of Red winning or losing (1 = Red win, 0 = Red lose).

#create test and train datasets

use 70% of dataset as training set and 30% as test set. separate the response variable from the predictor variables

final model (class 1)

Table 3: Class 1 Model Stats

	Values
Accuracy	0.539
Precision	0.512
Recall	0.525
F1	0.518

Table 4: Most Important Predictors for Class 1 Red Fighter

	s1		s1
B_age	0.216	B_StanceSwitch	-0.322
R_current_win_streak	0.141	R_age	-0.239
B_avg_opp_SIG_STR_pct	0.137	B_win_by_Decision_Unanimous	-0.186
B_win_by_Decision_Majority	0.136	R_avg_opp_SIG_STR_pct	-0.183
R_avg_BODY_landed	0.120	B_avg_CLINCH_att	-0.089
R_avg_SIG_STR_landed	0.098	B_avg_TD_att	-0.085
R_win_by_KO.TKO	0.077	R_avg_opp_CLINCH_att	-0.074
B_avg_KD	0.053	R_avg_opp_TD_pct	-0.062

Now moving to models, perform cross-validation to find best lambda value. Will use to find the optimal lambda and alpha parameters. Alpha is the mixing parameter between Lasso (alpha = 1) and Ridge (alpha = 0) regression. Run cross-validation for each alpha value to find the optimal lambda. Find the combination that gives the best performance (e.g., the lowest deviance). Fit the Elastic Net model using the optimal alpha and lambda values. Evaluate the model on test set to check its performance.

Accuracy: proportion of the total number of predictions that were correct. Precision: ratio of correctly predicted positive observations to the total predicted positives. Recall (Sensitivity): ratio of correctly predicted positive observations to all observations in the actual class. F1-Score: weighted average of Precision and Recall.

Repeat with classes 2-4

final model (class 2)

Table 5: Class 2 Model Stats

	Values
Accuracy	0.597
Precision	0.610
Recall	0.573
F1	0.591

Table 6: Most Important Predictors for Class 2 Red Fighter

	s1		s1
B_age	0.317	B_StanceSouthpaw	-0.199
B_avg_opp_SIG_STR_pct	0.114	R_win_by_Decision_Split	-0.196
R_current_win_streak	0.064	R_age	-0.164
R_win_by_Decision_Unanimous	0.062	B_avg_TD_landed	-0.133
B_avg_REV	0.051	R_avg_opp_CTRL_time.seconds.	-0.118
B_win_by_TKO_Doctor_Stoppage	0.046	R_avg_opp_CLINCH_att	-0.108
R_avg_SUB_ATT	0.045	B_win_by_Submission	-0.096
B_current_lose_streak	0.040	B_total_title_bouts	-0.080

Test explanation for class 2 models

final model (class 3)

[!h]

Table 7: Class 3 Model Stats

	Values
Accuracy	0.626
Precision	0.606
Recall	0.803
F1	0.691

Table 8: Most Important Predictors for Class 3 Red Fighter

	s1		s1
R_StanceOpen Stance	0.088	R_StanceSwitch	-0.320
B_StanceOrthodox	0.056	B_StanceOpen Stance	-0.319
R_StanceSouthpaw	0.055	(Intercept)	-0.178
B_avg_opp_TD_pct	0.053	R_age	-0.101
R_avg_KD	0.049	B_StanceSwitch	-0.098
B_avg_opp_TOTAL_STR_landed	0.048	B_Weight_lbs	-0.069
R_avg_opp_TD_att	0.044	B_Reach_cms	-0.049
B_avg_opp_SIG_STR_pct	0.042	R_losses	-0.049

test explanation for class 3 models

final model (class 4)

Table 9: Class 4 Model Stats

	Values
Accuracy	0.570
Precision	0.645
Recall	0.408
F1	0.500

Table 10: Most Important Predictors for Class 4 Red Fighter

	s1		s1
(Intercept)	0.213	B_Reach_cms	-0.136
B_avg_opp_SIG_STR_pct	0.138	R_avg_opp_GROUND_att	-0.080
R_win_by_TKO_Doctor_Stoppage	0.125	R_avg_opp_LEG_landed	-0.076
B_avg_opp_KD	0.108	R_avg_opp_LEG_att	-0.050
B_avg_opp_TD_pct	0.089	R_win_by_Decision_Majority	-0.044
B_win_by_Submission	0.062	B_StanceOrthodox	-0.031
B_win_by_Decision_Majority	0.055	R_avg_opp_GROUND_landed	-0.020
B_avg_opp_REV	0.038	B_avg_KD	0.000

test explanation for class 4 models

Focusing on Predictive Accuracy

The elastic net models ran above indicate the most important predictors in determining a fight's winner within our weight class segmentation. Below we will explore including nonlinear and interaction effects to attempt to improve predictive accuracy.