Statistical Investigation

The desired outcome of working with this data set was to find a linear model that could be used to predict the chance of a fighter winning a fight based on the fighter’s historical performance metrics and biometric attributes. The results of the visualizations did not paint an optimistic view of the predictive power of a model that could be developed so I proceeded to create a model for all metrics and then use the model summary to statistics to identify the best ones.

I first calculated the correlations of each metric to the win percent for each fighter. These were the results.

Current Lose Streak Correlation with Win Percent: -0.45444229961822463

Current Win Streak Correlation with Win Percent: 0.5935028985617277

Head Strikes Landed correlation with Win Percent: 0.2259392985933221

Knockdowns correlation with Win Percent: 0.2127045354102693

Significant Strikes Landed Correlation with Win Percent: 0.20255800847914524

Average Take Downs Correlation with Win Percent: 0.23771622131399475

Average Total Strikes Landed Correlation with Win Percent: 0.17737205092568312

Longest Winning Streak Correlation with Win Percent: 0.6463959923883718

Total Tile Bouts Correlation with Win Percent: 0.2612907181416824

Total Wins By Knockout Correlation with Win Percent: 0.286489944539576

Height Correlation with Win Percent: 0.06059615713029151

Reach Correlation with Win Percent: 0.12333530695772818

Weight Correlation with Win Percent: 0.05641010603308878

Age Correlation with Win Percent: -0.0882501053360032

Total Fights Correlation with Win Percent: 0.0354733049856339

The correlations between performance metrics and win percent ranged from 0.18 to 0.24. The correlations between biometric attributes and win percent ranged from -0.09 to 0.12. These correlations did not indicate a strong relationship between the potential of a fighter to win a fight and their historical performance or biometric attributes.

I used the Python Statsmodels package to create and best fit liner model for each metric using the ordinary least squares method. Unfortunately the strongest models that could be created still resulted in large residual values between the model predictions and the data and small R-squared values. The log-likelihoods were also very small. While the models predicted “conceivably realistic” win percentages, they did not closely reflect the actual data off which they were created.

Conclusions from statistical analysis

There correlations between the metrics observed and win percentages of the fighters was not strong. This was reflected in the predictive strength of the prediction models that resulted. The strongest correlations were found between win/loss metrics and win percent; however, this could be intuitively determined by most people. The real usefulness of a predictive model would be extracted from it’s ability to determine the probability of a fighter winning a fight based on historical performance metrics or physical characteristics rather than win/loss history. This statistical analysis demonstrated a need for greater complexity of measurement to improve the ability to confidently predict the eventual winner of a fight with accuracy.

My recommendations would be to focus more on the effectiveness of a fighter’s punch and accuracy of their landing. For example:

* Using sensor technology to measure impact forces of a fighter’s punch landing
* Measurement of the fighter’s accuracy in making impact at the primary body sites of greatest vulnerability
* Swing speed and avoidance reaction time

These types of measurement would better determine the effectiveness of a fighter outside of just general frequency. General frequency metrics could be considered poor predictors of a fighters potential to win a fight due to the fact that many ineffective punches will never deliver the same effective result as one strong, forceful, accurate, and impactful blow.

Effectiveness measurements such as the ones suggested above would also eliminate the need to measure general biometric data because, determination of effectiveness would always supersede biometric data in terms of importance in a predictive model. For example, and very small but effective fighter would make his size irrelevant.