
UFC
Fight Performance Analysis
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Introducing the Dataset

11 Years of Fight Data

Using stats scraped from the UFCstats.com website. This csv file is comprised of 11 years of Fight Data dating back to March 3rd 2010 up until February 6th 2021.

Goals of the Project

The goal of this project is to better understand what can happen in a fight based on the hundreds of variables that go into each bout, such as:

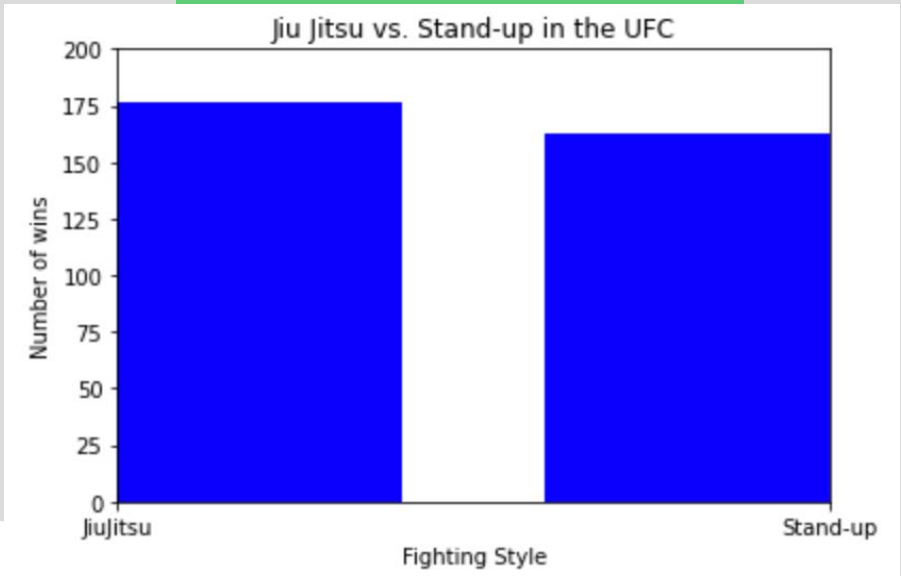
- Reach Advantage.
- Age.
- Impact of Empty Arena from COVID-19.
- Jiu-Jitsu vs. Stand-up Fights.
- Career Longevity.

Question #1

In a fight between the two styles, which is more effective Jiu-Jitsu or Stand-up (Muay Thai, Kickboxing)

Jiu-Jitsu vs. Stand-up

Visualization



Summary

This visualization is looking at all fights that were fought between Jiu-Jitsu fighters (1.5 or more Submission Attempts/Fight) and Stand-up fighters (.5 or less Submission Attempts/Fight). In the 339 fights between the two styles, Jiu-Jisu fighters have won 176 times and Stand-up fighters have won 163 times versus their adversary. When Jiu-Jitsu artists first entered the UFC, they were winning at a rapid rate because stand-up fighters had no Jiu-Jitsu experience. For example, Royce Gracie, one of the first Jiu-Jitsu specialist in the UFC won his first 9 fights in the UFC, including 8 by Jiu-Jitsu submission. This period is likely why there are more wins for the Jiu-Jitsu style. However, in recent history there have been an increasing number of stand-up fighters that understand how to defend Jiu-Jitsu. This is intriguing and is something to monitor as we try and understand the effectiveness of each fighting style moving forward.


Royce Gracie

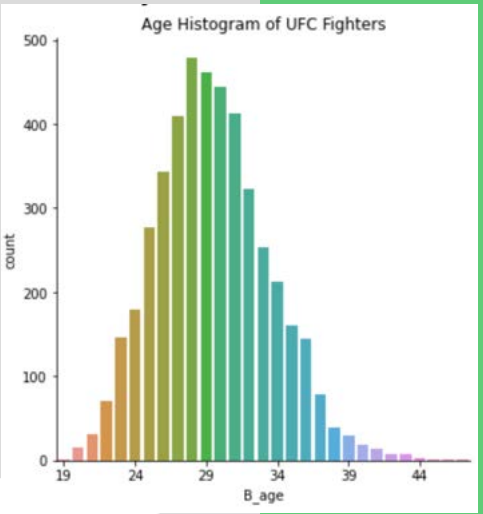
Question #2

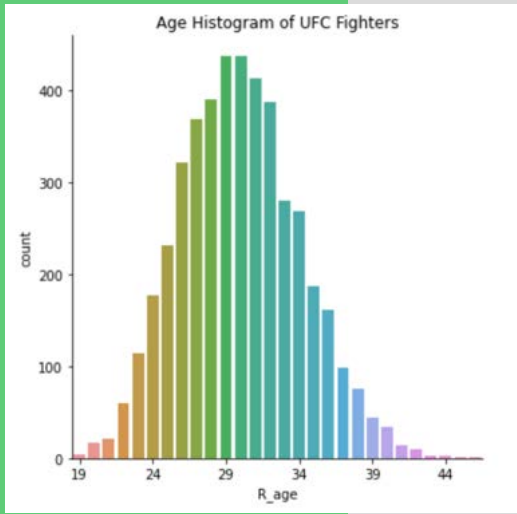
In what ways is age a factor in the UFC?

Jimmy Crute

Glover Tiexiera

Histogram of Ages in the UFC

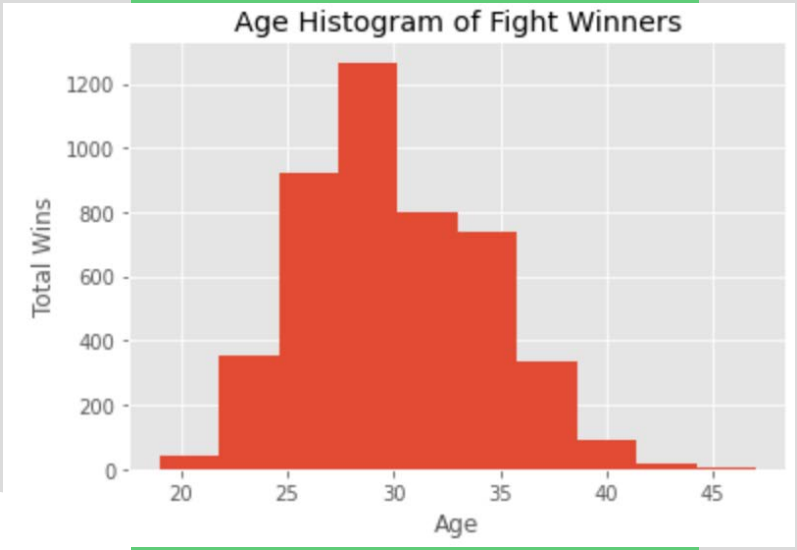




These visualizations show the distribution of age for all UFC fighters in the last 11 years. Most fighters are around 29-30 years old with a right skew that favorites the younger fighters. Next, we want to see how this compares to the ages of the winners of each fight. Will the distribution be similar or more skewed in one direction?

Age Histogram of Fight Winners

Visualization



Summary

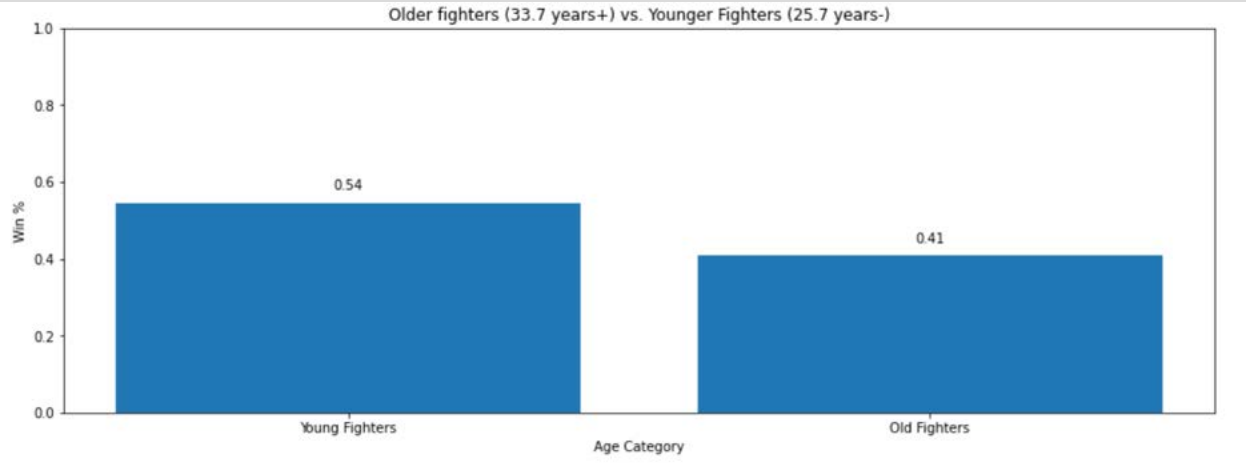
After comparing the histogram of age of all fighters to the histogram of age of winners, it's evident that there is a similar distribution. The right skew appears to be more drastic for winners which suggests that older fighters are not winning fights at the same rate once they hit a certain age. Now let's determine exactly how much the win rate differs for older fighters than younger fighters by defining a 'Young' and 'Old' age for a fighter, then showing how often those types of fighters have won.

Win % by Age

With this visualization, we measure the success of 'Young' fighters vs. 'Old' fighters. Clearly, younger fighters are more likely to have success at a 54% win rate while older fighters are only winning at a 41% rate.

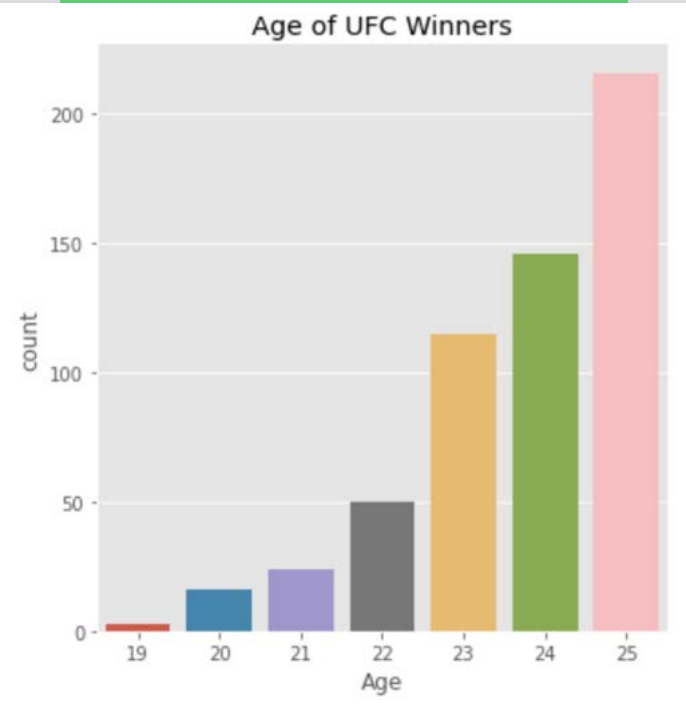
I have several hypothesis for why these results are happening. First, is that it's believed that the older fighters are less likely to be sufficient in multiple forms of martial arts as younger fighters are. This is a result of increased awareness for the sport of MMA, and young kids are now learning multiple foundations of martial arts more than ever before. On the other hand, most older fighters started with one foundation (Kickboxing, Boxing, Muay Thai, Jiu-Jitsu, etc.), and have had to learn bits and pieces of other martial arts foundations along the way.

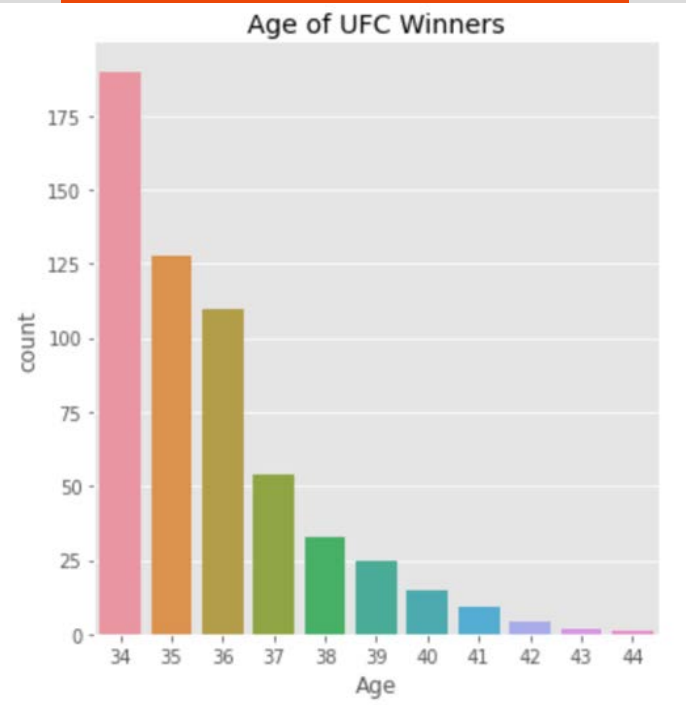
Another hypothesis is that chin strength diminishes as a career goes on. 'Chin Strength' can be defined as the ability to take a punch and many fighters have said to experienced this phenomenon.
Ultimately, increasing age is clearly a factor one way or another and its impact is even larger than I initially hypothesized. Next, lets look at a histogram of age for fighters who win in both the young and old categories.



Age of UFC Winners

As expected, the winning age for winning fighters decreases/increases exponentially as the age gets closer to the mean. Additionally, there is a higher count for the Age 25 than the Age 34 bins, which supports our hypothesis and earlier visualizations of diminishing performance.





Question #3

What is the impact of reach in the UFC?

Uriah Hall

Kevin Holland

Reach is a common topic in the UFC when comparing fighters in a matchup.

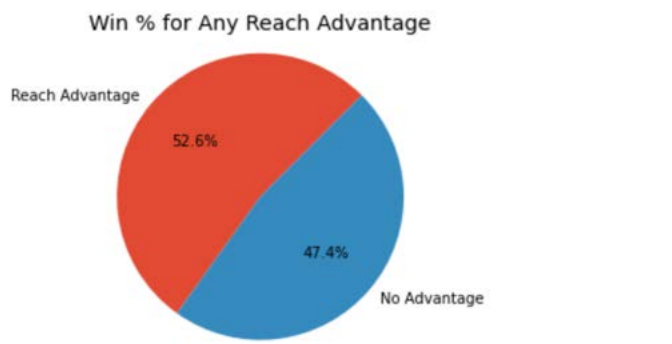
At base level, a longer reach makes it easier to hit your opponent before they hit you. As a result, many UFC fans and analysts talk about the importance of a reach advantage. To what extent does that exist? Is it significant? Does it increase exponentially as reach advantage increases?

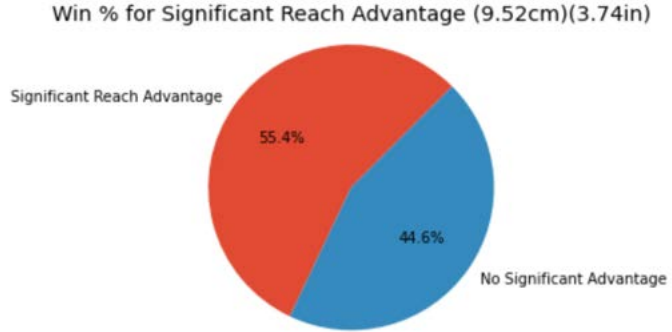
Weili Zhang

UFC

Reach

Visualization





Summary

Looking at the first pie chart, there is a 52.6% win percentage whenever a fighter has any reach advantage at all. This is a relatively insignificant difference in win%, but could foreshadow a larger relationship between reach and win%.

In the second pie chart, fighters are defined as having a significant reach advantage by taking the standard deviation of all reach differentials over the years. At 9.52cm (3.74in), fighters with a significant reach advantage won at a higher clip of 55.4% of the time.

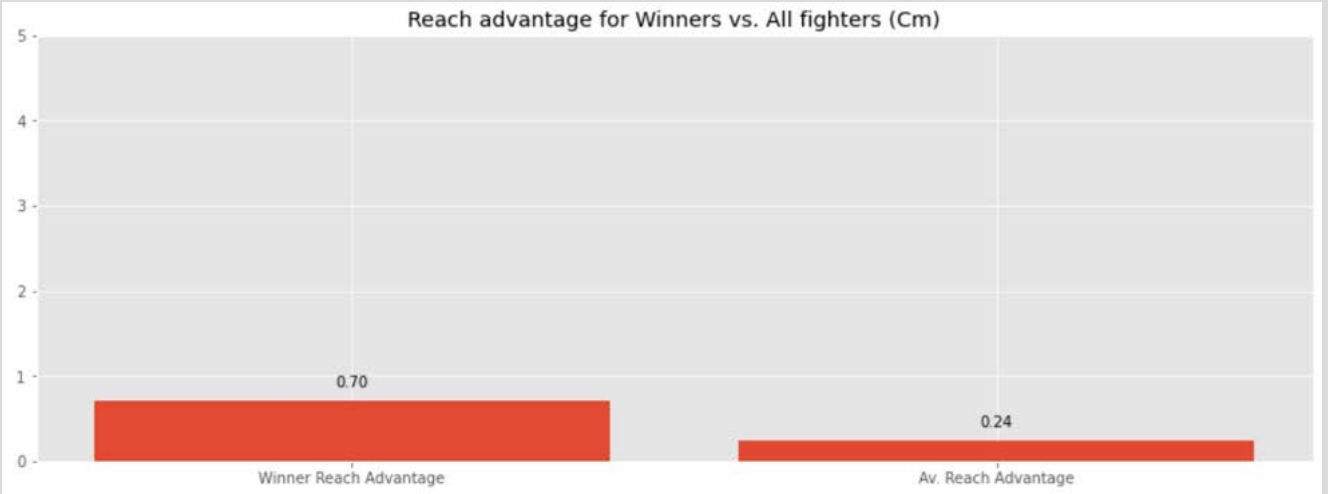
Overall, using these two charts, we can see that a reach advantage does help and likely continues to help as the reach advantage widens. However, having a reach advantage only tells apart of the story. It is apparent that even with a significant reach disadvantage, those fighters can still find other ways to defeat their opponent.

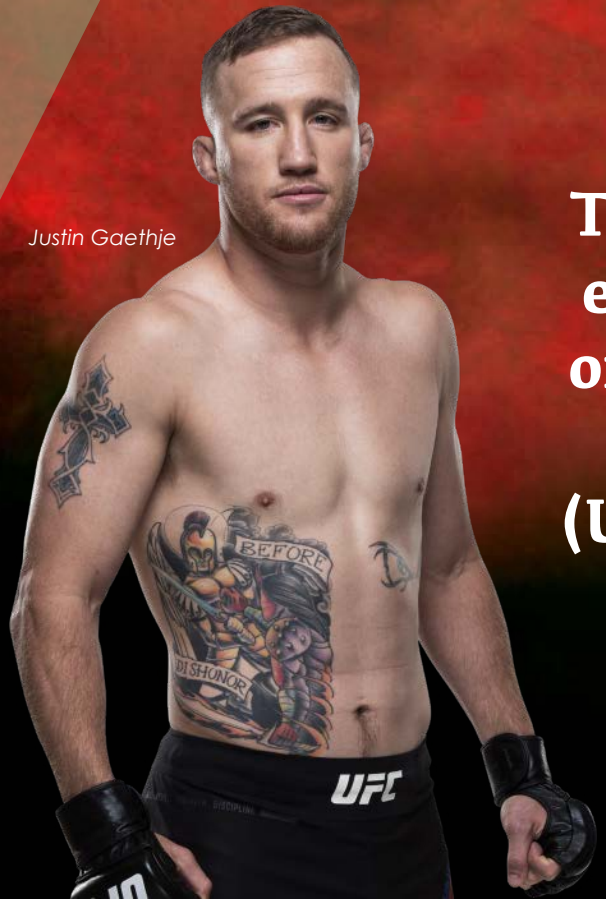
Reach

For all UFC fights, the average reach advantage is .24cm and the average reach advantage for winners is .7cm

After seeing the pie chart results above, this graph was a bit of a surprise. The difference between these values is insignificant and furthers the argument that fighters at a reach disadvantage can still find ways to win their fights at a respectable rate.

Overall, reach can play a factor in winning a UFC fight, but the extent is likely overexaggerated by the media and fans. Even with a significant reach advantage, the distribution of winners was still relatively close to even.





Justin Gaethje

Question #4

To what extent does the empty arena as a result of COVID-19 change the fight outcome? (Underdog Performance)

Khabib Nurmagomedov

As a result of COVID-19, the UFC began holding events without fans at UFC 249 on May 5th, 2020 and has continued to do so through March of 2021. Now we have roughly one year of data on fights that don't have fans.

When asked about fighting without fans, UFC Lightweight Champion Khabib Nurmagomedov said "Honestly, this energy I don't like." Many UFC fighters expect to feel and possibly perform slightly differently without the energy of the fans.

Lets take a brief look at how fight performance differed when there was an empty arena vs. an arena with fans. One way to measure this is to see if underdogs were more or less likely to win based on the arena.

Fan Impact on Fights

This analysis reveals that having fans hasn't had much of an impact on how the fighters perform.

When looking closer into the numbers there is a relationship that could exist and is worth monitoring moving forward. Without fans the underdogs won 29.25% of the time with average odds of +155, but with fans, the underdogs won at a slightly lower clip (27.63%) while still having a slight advantage in odds at +153. This means that without fans underdogs are winning at a slightly higher clip even with slightly worse expectancy to win from the odds.

However, the sample size is still rather small, as there is less than a year of data without fans and about 9 years of data with fans. Thus, this potential relationship certainly needs more data to be able to validate this assumption. Since the UFC is currently planning on having fans return in 2021, we may never get an answer to this question.

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Without Fans:
 With average odds of 155.27350427350427 underdogs won at a 0.2925 rate
With Fans:
 With average odds of 153.01563857515205 underdogs won at a 0.27628420547287563 rate
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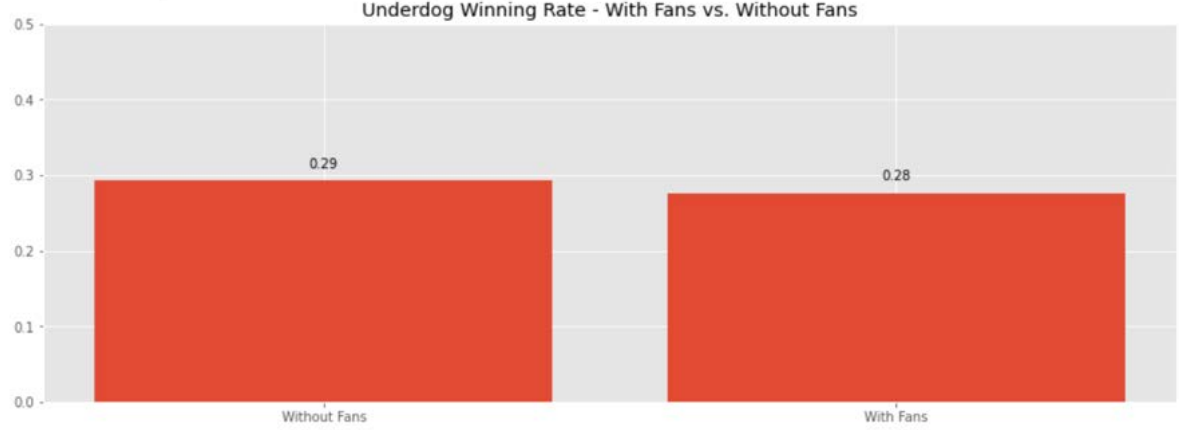


Question #5

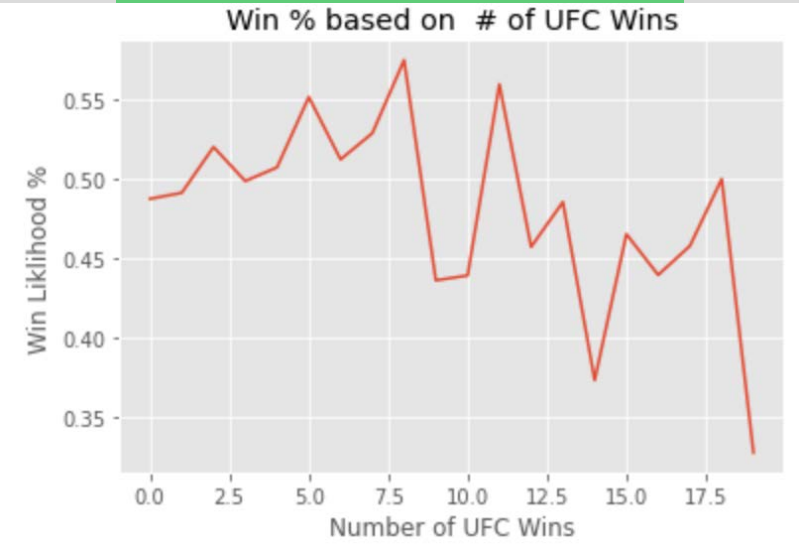
Fighter Longevity: Do wins in the UFC help you stay in the UFC? Do losses force you out of the UFC?

The final topic of analysis is fighter longevity. Earlier in the EDA, we saw that age was a factor in determining the fighters future win%, but now lets see if a relationship exists between total UFC wins or losses and future win%.

Since age is likely colinear to total wins or losses, we can expect there to be a point of diminishing returns. Where does that begin?

Win % Based on UFC Wins

Visualization

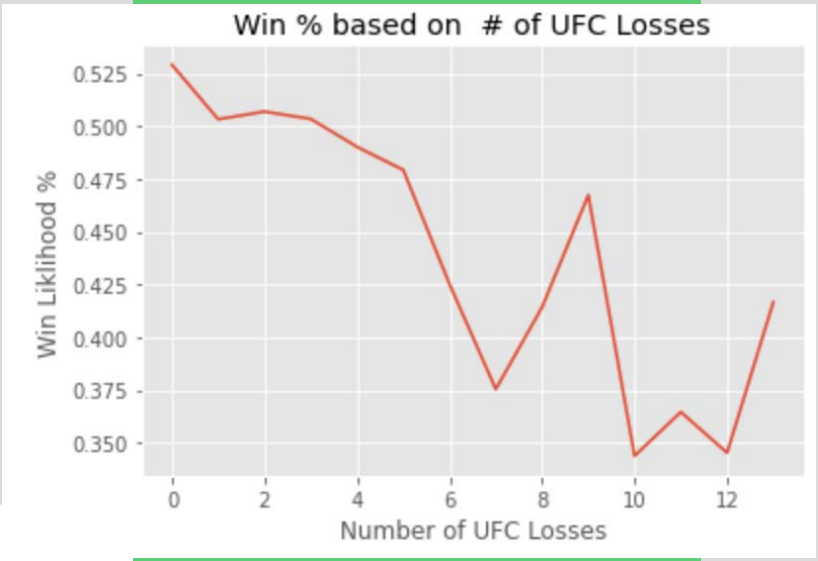


Summary

One way to analyze the performance of fighters based on their UFC record was by using a simple line chart. Here we are able to see that as fighters start to win in the UFC, they can expect to experience a higher win % up until roughly 8 UFC wins. Then after 8 wins, there is a point of diminishing returns as the slope of the line begins to become more negative. Now let's take a look at how losing correlates to UFC win %.

Win % Based on UFC Losses

Visualization



Summary

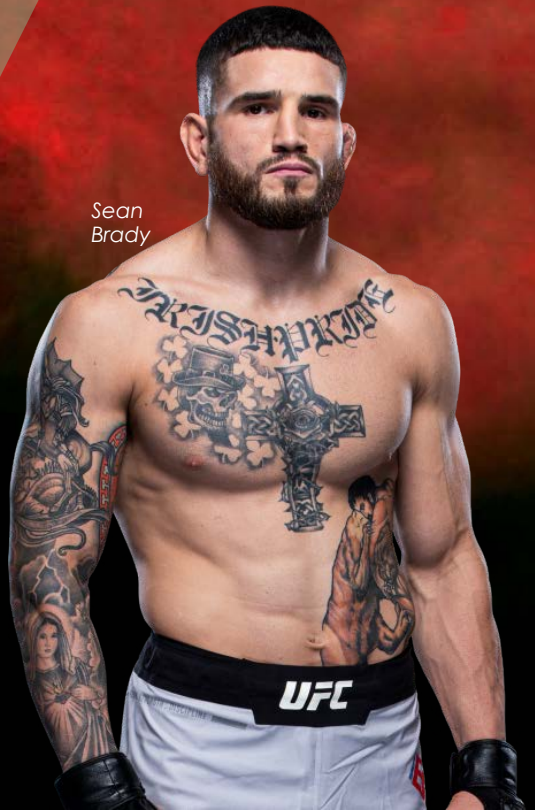
This line chart shows the impact of losing UFC fights on a fighter's future expected win %.

The key takeaways from the chart include:

- If a fighter still has 3 or less losses in the UFC, their future win% hardly changes at all and stays between 53% and 50%.
- Once a fighter losses for the 5th time, there is a severe drop in the slope for expected win % for the rest of the fighter's career.
- Lastly, once a fighter has lost 10 or more times, they are at a severe disadvantage when predicting their future win %.

Ultimately, this EDA provided insight on the performance of UFC fighters considering key varaibles that go into every fight such as age, reach, fans, wins, losses and more.

These insights can best be used for analysts of the game of MMA, fans of the UFC, as well as potential match-makers in fighting organizations around the world.



Sean Brady