

Final Report



Fighting Statistics in MMA

Mini Project 3: Python for Data Science

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Abstract

This study presents an exploratory data analysis of performance factors in mixed martial arts (MMA) using a comprehensive dataset. The analysis reveals intriguing insights into the dynamics of success in MMA competition.

Key findings include the impact of height and reach on striking accuracy, with taller fighters generally exhibiting higher accuracy, though exceptions exist. Surprisingly, height and reach do not strongly influence takedown accuracy, emphasizing the significance of grappling skills.

Analysis of fighter stances highlights that orthodox fighters tend to have a slight advantage in wins and striking accuracy. Wrestler-based fighters exhibit a slight advantage in win percentage compared to striker-based fighters.

Contrary to expectations, larger fighters do not necessarily absorb more significant strikes. Smaller fighters demonstrate higher striking efficiency, possibly due to their agility and speed.

The study explores the complex relationship between submission attempts, strikes landed, and winning percentage, revealing that high submission attempts do not guarantee victory.

Intriguingly, high takedown defense does not always correlate with victory, suggesting the importance of diverse skillsets.

This analysis underscores the multifaceted nature of performance in MMA, where individual skills, strategies, and fighting styles play a pivotal role in determining success.

Keywords: MMA, mixed martial arts, boxing, kickboxing, wrestling, judo, jiu jitsu, sambo

Contents

Introduction

Professional fighting is a popular and growing sport that requires hard work, strength, speed, grit, and determination, but what other factors go into it? What truly determines a fighter's success in such a brutal, dynamic, and unpredictable sport? Some people may think the taller person shall win. Some people favor the one who excels at wrestling, while others favor the boxer. There is an overwhelming amount of factors and situations that occur in MMA, and I want to dig deep to find out which ones determine success.

Research questions/hypotheses

There are 10 questions I'd like to pose in order to get a better understanding of advantages in MMA.

1. How much does height and reach affect striking accuracy?
2. Does it play a factor in takedown accuracy at all?
3. Is there an advantage to the stance a fighter takes?
4. Does the volume of submission attempts increase the chance of winning versus the volume of strikes being landed?
5. Weight does not necessarily play a factor in fighting due to the weight classes (unless we're talking about weight cutting which is not provided in the dataset.) But I would like to see if weight plays a factor in the striking realm. Do bigger fighters absorb more shots?
6. Do smaller fighters land more shots due to the smaller frame allowing their speed to potentially fighter than the heavier weight classes?
7. Who has a higher win percentage? More wrestler based fighters or striker based fighters?
8. How much does takedown defense contribute to a fighters winning percentage?
9. Who lands more strikes? Is it those with a higher takedown defense or higher takedown accuracy? Out of the two, who wins more matches?
10. Does a high striking accuracy always reflect a high striking defense?

My hypotheses is that I believe physical attributes can play a role in giving a fighter the advantage to a certain extent, but not as high as others may believe. We've seen it proven wrong in boxing with fighters like Mike Tyson, Manny Pacquiao, and Floyd Mayweather, and although MMA is a different sport, I feel like that same knowledge can apply. I also believe that in general, a fighter has the best success when they specialize in a certain are more-so than a balanced fighter. Although a complete and balanced fighter seems ideal, I believe that a fighter should stick to a style that fits their physical attributes and wherer they feel most comfortable at especially for the highest level.

Dataset

Dataset URL download: <https://www.kaggle.com/datasets/asaniczka/ufc-fighters-statistics>

The dataset contains 4109 rows and 18 columns with attributes including fighters' physical attributes like height, weight, and their statistical attributes like their takedown attempts, striking accuracy, strikes absorbed, etc. The data is meant to give scientists and fans of the sport a better understanding and a simplified way of making connections within the sport of MMA with all of its different areas.

Data Analysis

1. How much does height and reach affect striking accuracy?

Height and reach do have an impact on striking accuracy, but the relationship is not linear. Taller fighters with longer reaches tend to have a higher striking accuracy on average, but there are exceptions, with some shorter fighters achieving high striking accuracy as well.

2. Does it play a factor in takedown accuracy at all?

Interestingly, height and reach do not seem to be strong factors influencing takedown accuracy. Shorter fighters with average reach can have effective takedown accuracy, suggesting that other factors, such as grappling skills, play a more significant role.

3. Is there an advantage to the stance a fighter takes?

Fighters with an orthodox stance appear to have a slight advantage in terms of wins and striking accuracy, contrary to the common belief that southpaws have an advantage in boxing.

4. Does the volume of submission attempts increase the chance of winning versus the volume of strikes being landed?

High submission attempts do not necessarily correlate with a high winning percentage. Fighters with a higher volume of strikes landed do not consistently show a high winning percentage either.

5. Do bigger fighters absorb more shots?

Contrary to expectations, the data suggests that larger fighters do not necessarily absorb more significant strikes. The data even shows a slight decrease in strikes absorbed as weight increases.

6. Do smaller fighters land more shots due to the smaller frame allowing their speed to potentially fighter than the heavier weight classes?

Smaller fighters tend to have higher striking percentages, possibly due to their agility and speed. This suggests that their smaller frame allows them to land more shots efficiently.

7. Who has a higher win percentage? More wrestler-based fighters or striker-based fighters?

Wrestler-based fighters appear to have a slight advantage in terms of win percentage when compared to striker-based fighters. Victory in a bout can occur through submission, knockout (rendering an opponent unconscious), technical knockout (rendering an opponent unable to continue fighting), stoppage by the ringside doctor, or a decision by judges [1]

8. How much does takedown defense contribute to a fighter's winning percentage?

High takedown defense does not always guarantee victory. Some fighters with lower takedown defense percentages still achieve high win percentages, possibly indicating that they have other skills or strategies to compensate for their takedown defense.

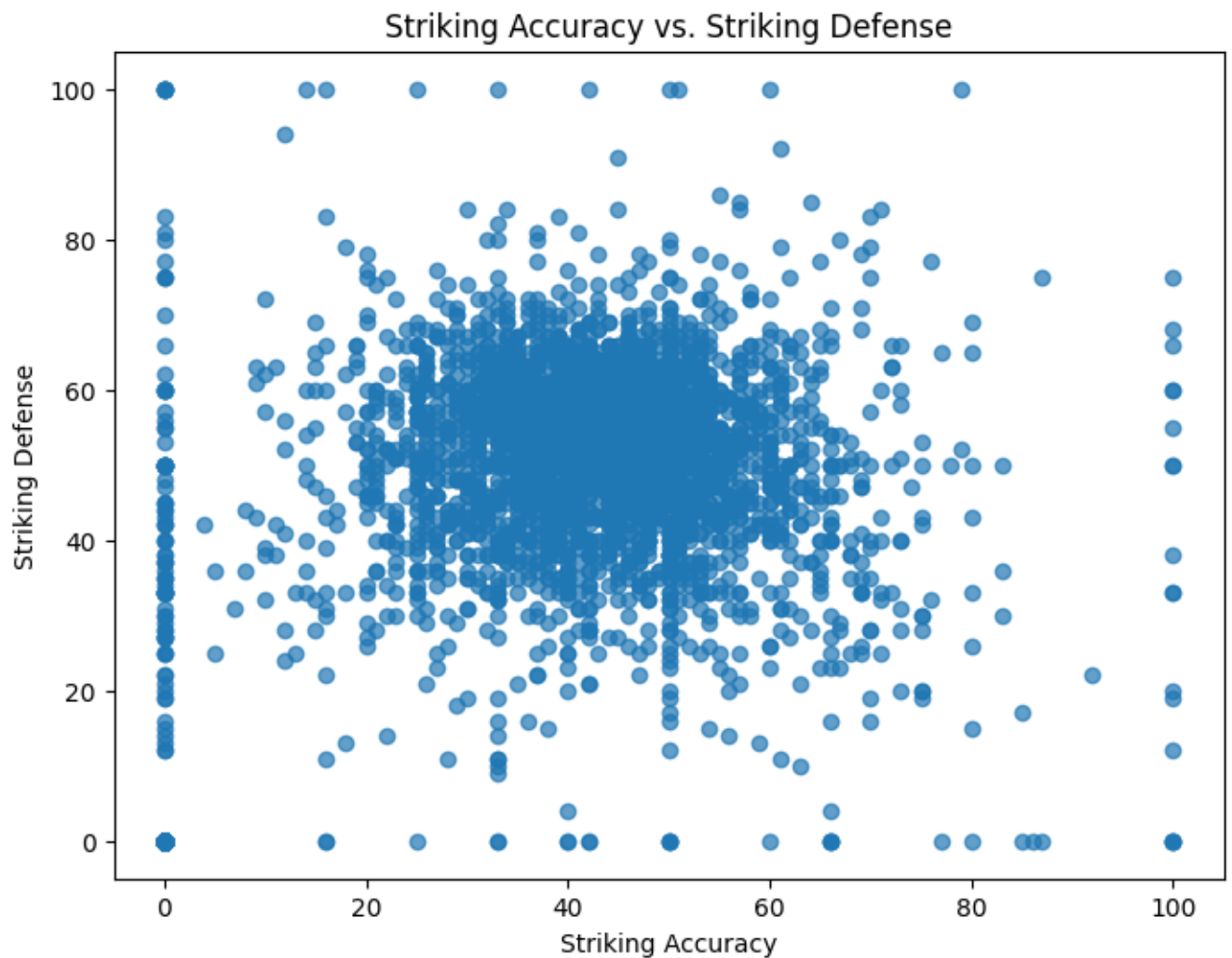
9. Who lands more strikes? Is it those with higher takedown defense or higher takedown accuracy? Out of the two, who wins more matches?

Fighters with higher takedown defense tend to land more strikes per minute compared to fighters with a focus on takedown accuracy. This suggests a potential trade-off between takedowns and striking in terms of strategy.

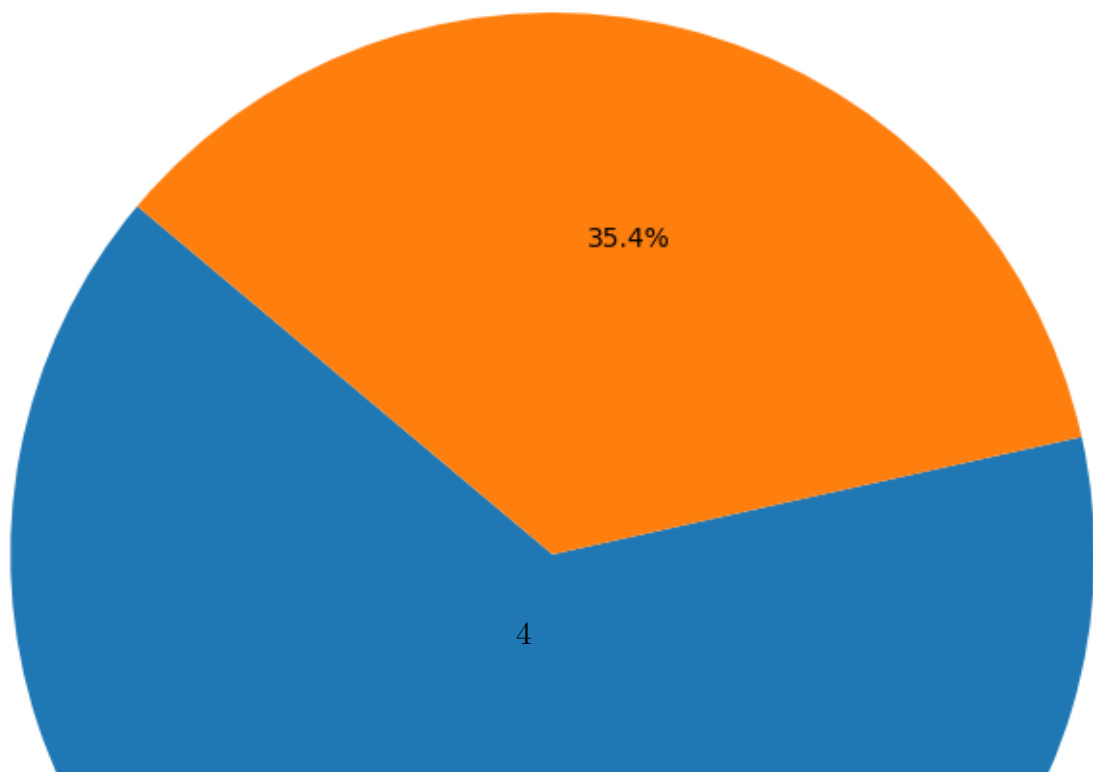
10. Does a high striking accuracy always reflect a high striking defense?

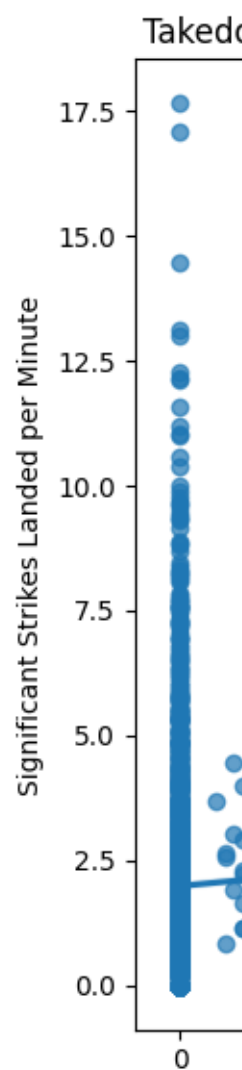
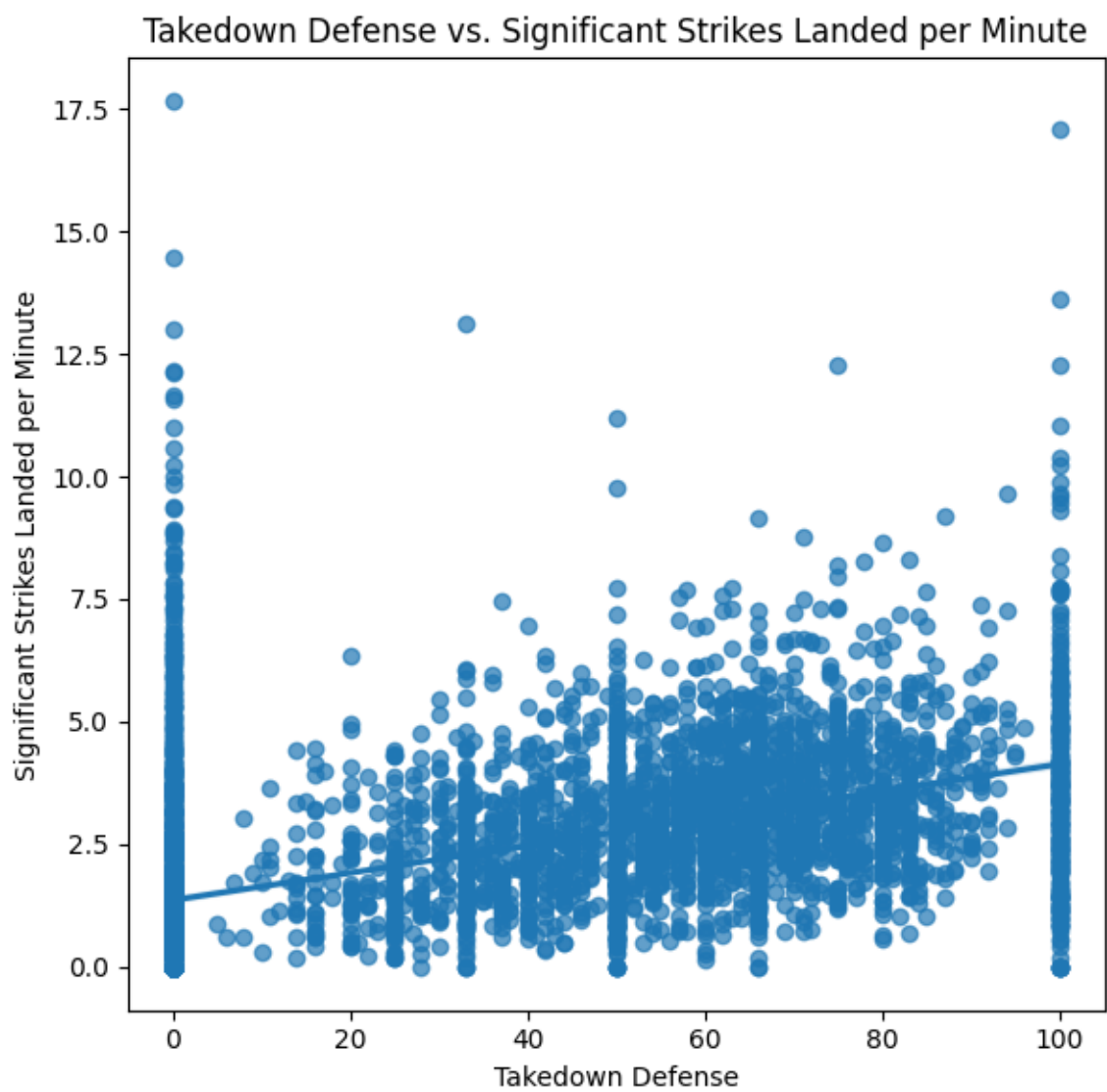
Striking accuracy and striking defense are distinct skillsets, and there is no direct linear relationship between the two. Some fighters exhibit high striking accuracy while maintaining high striking defense, but exceptions exist.

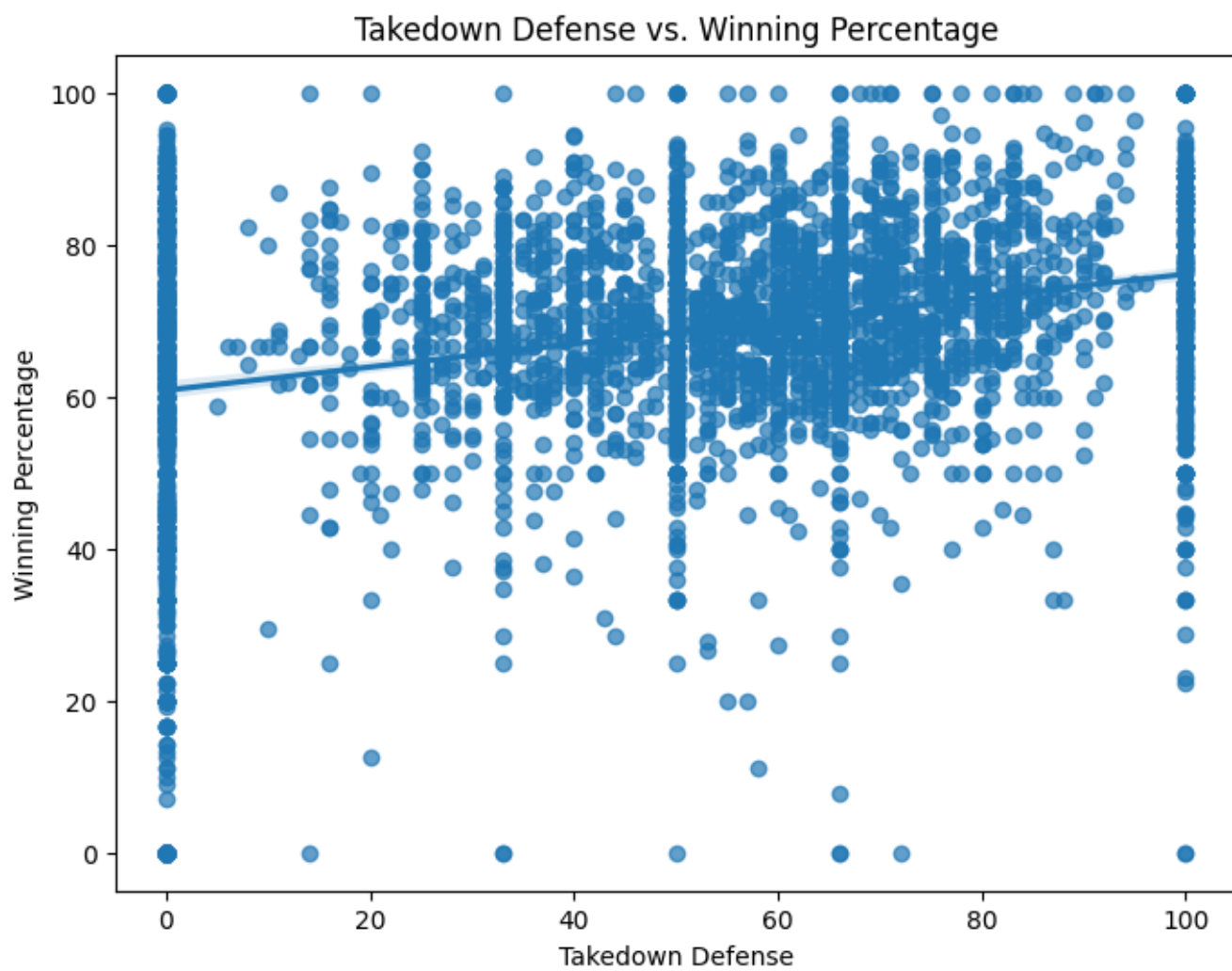
Data Visualization

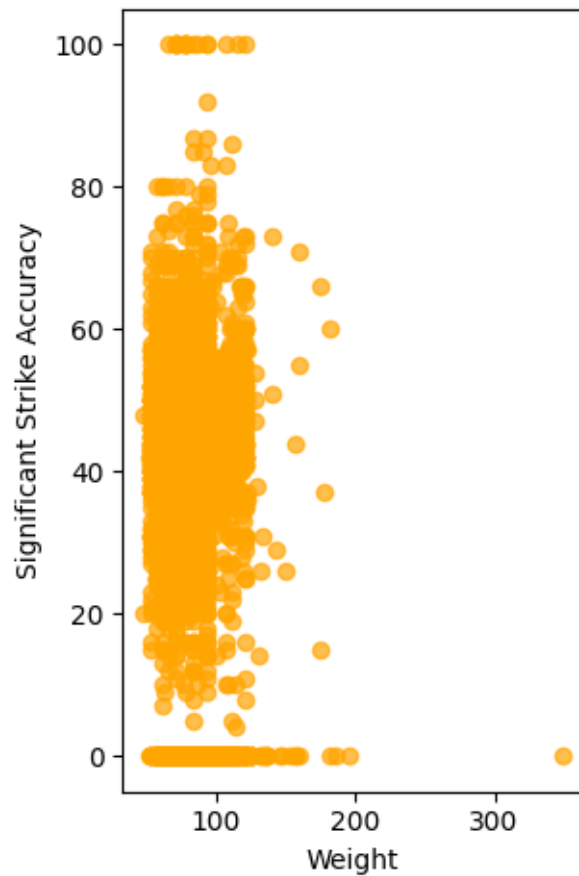
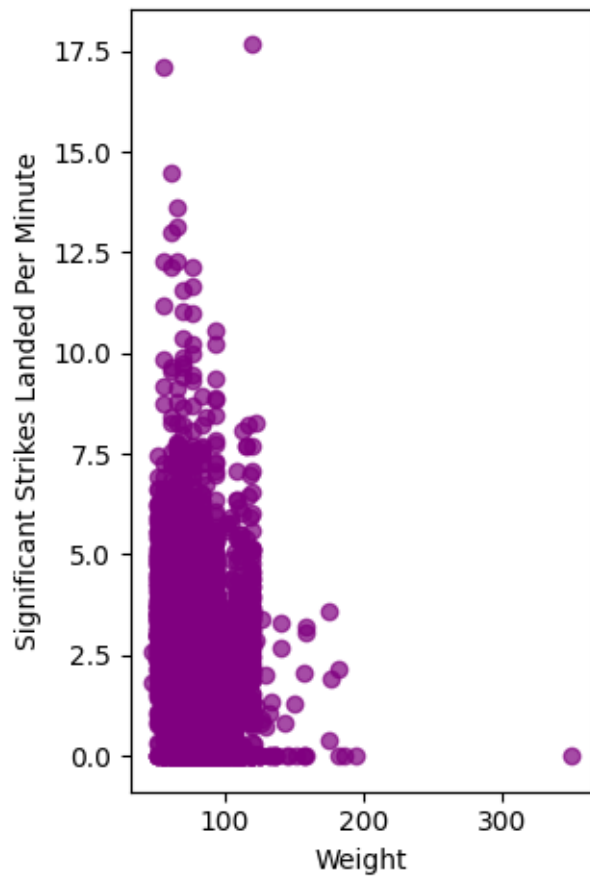
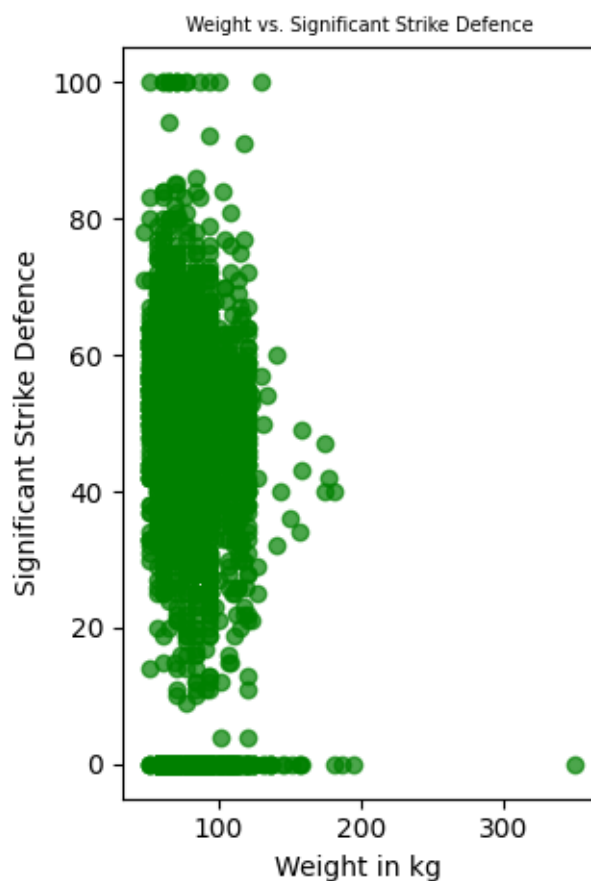
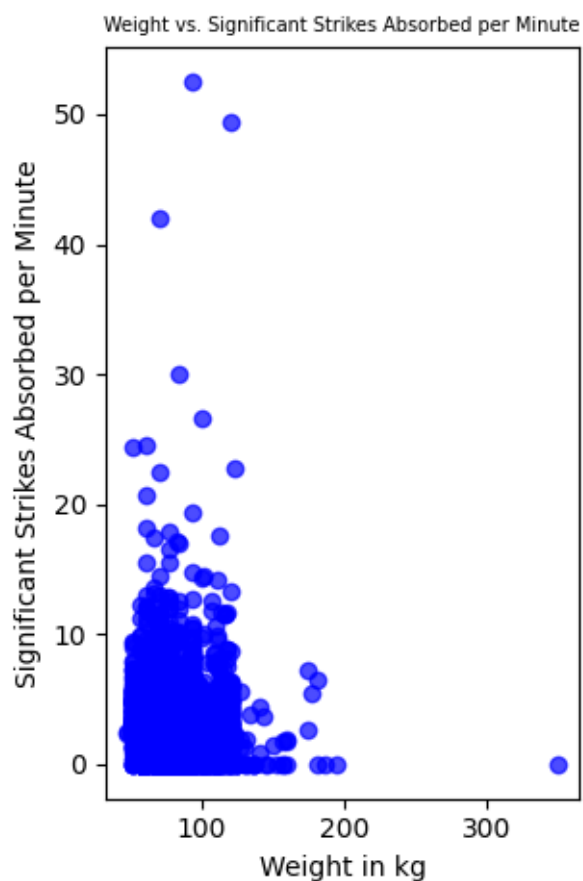


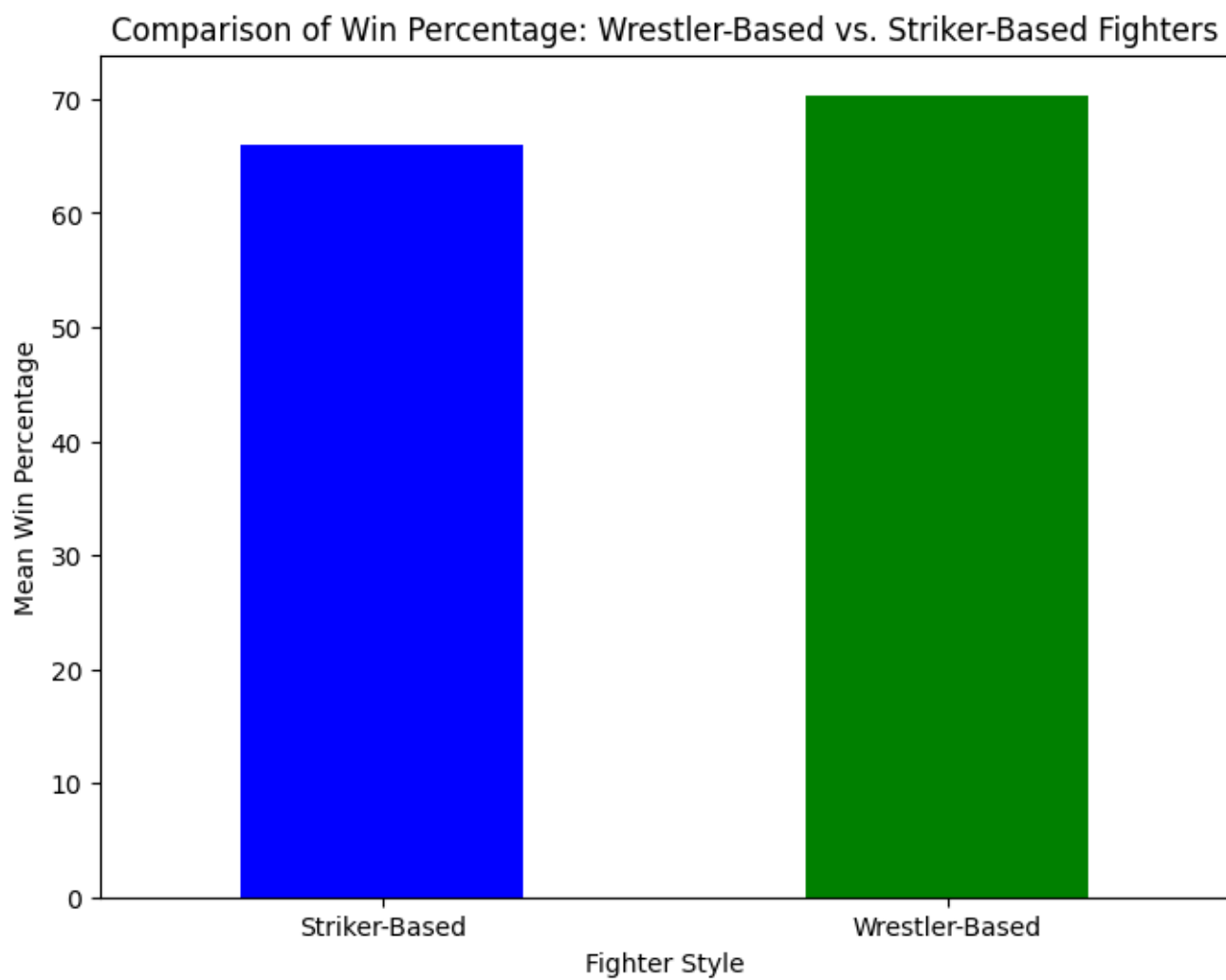
Fighters Categorized by Win %, Strikes, and Submissions
High Win % & High Submissions

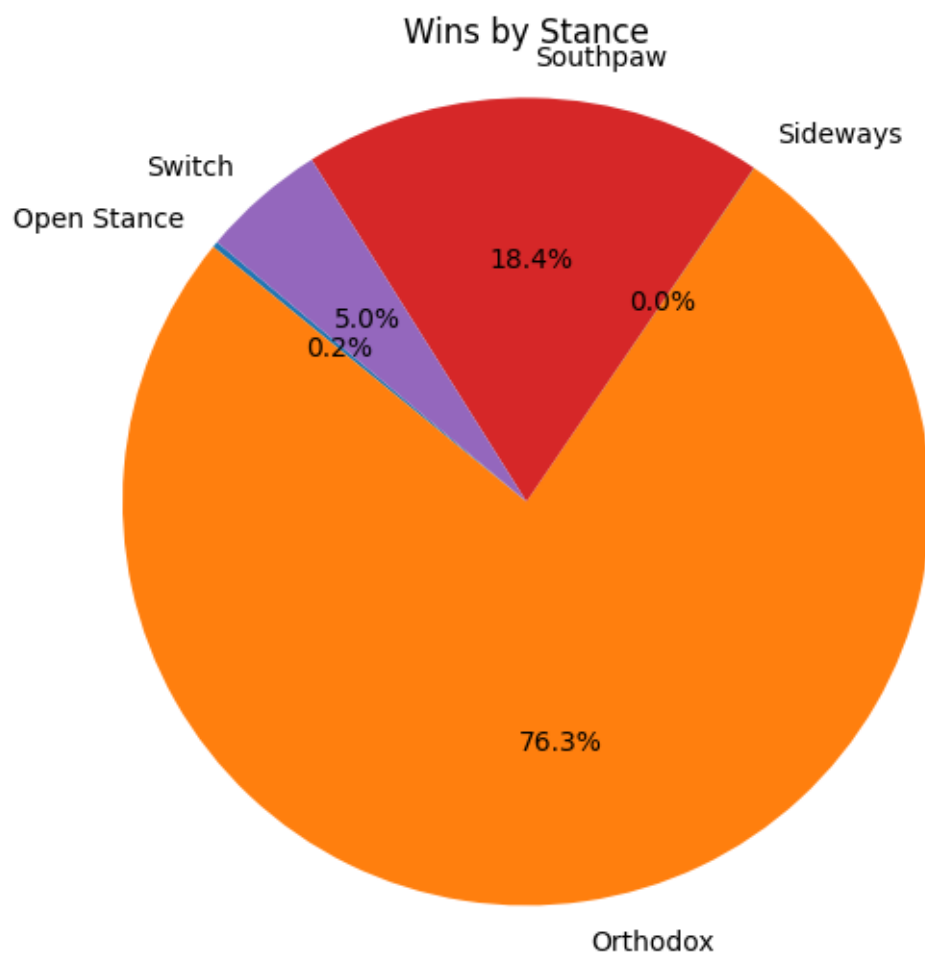












Conclusion

In conclusion, the world of combat sports is complex and multifaceted, with numerous factors influencing fighter performance and outcomes. While certain trends and correlations can be observed, it's important to recognize that individual fighter styles, strategies, and skills often outweigh physical attributes alone. Further research and analysis can delve deeper into these relationships and consider additional factors for a more comprehensive understanding of fighter performance in combat sports.

Bibliography

- [1] João C A Bueno and et al. Exploratory systematic review of mixed martial arts: An overview of performance of importance factors with over 20,000 athletes. *Sports (Basel, Switzerland)*, 10(6):80, May 2022. doi: 10.3390/sports10060080.