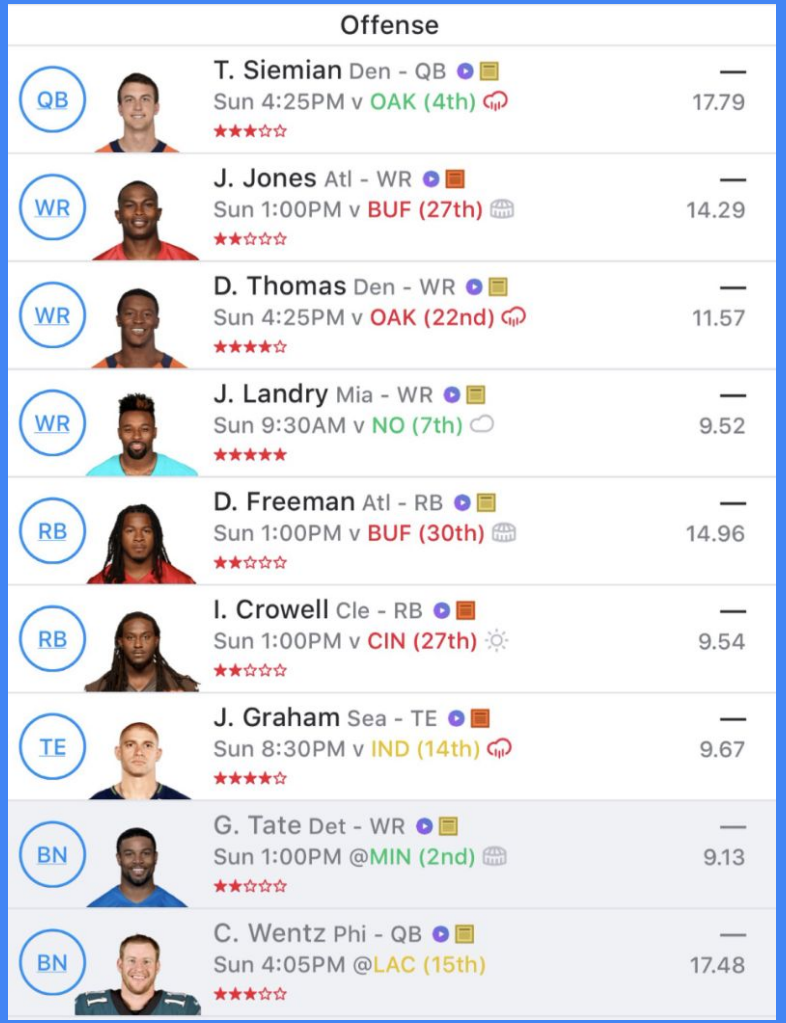
Bench or Bust?

Making more accurate decisions about player injuries

Fantasy Football

- 41 million people play fantasy football every year
- The Average Games Lost across all teams in 2019 was 75.6 (1)
- In 2018 there were 8,166 injuries recorded in the NFL, knee being the most common body part injured (2)

We've All Been There...



Current Prediction Models

- There are a few aggregate measurements out there like this figure (1) that give information regarding previous patterns but nothing predictive

- These measurement are so inaccurate that apps are beginning to phase out this verbiage, and have already phased out “Probable”

Player Participation Rates, 2016-2019		
Designation	Missed Game?	
	Starters	Reserves
Probable/Blank	2%	17%
Questionable	27%	47%
Doubtful	99%	99%
Out	99.9%	99.9%

The Dataset

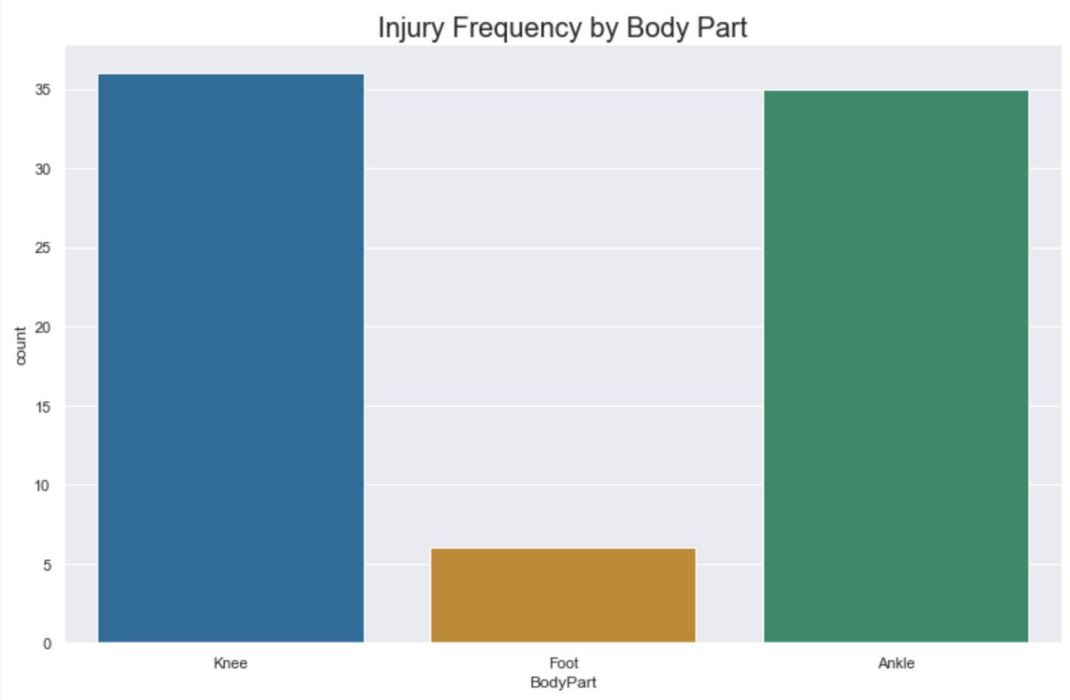
- Taken from Kaggle (3)
- Originally intended to analyze the relationship of field type (turf vs. synthetic) to game play
- 77 entries which included injuries
- Limitations:
  - Small dataset
  - Information not tailored specifically for predicting injury

Analysis

What Kinds of Injuries?

Conclusion:

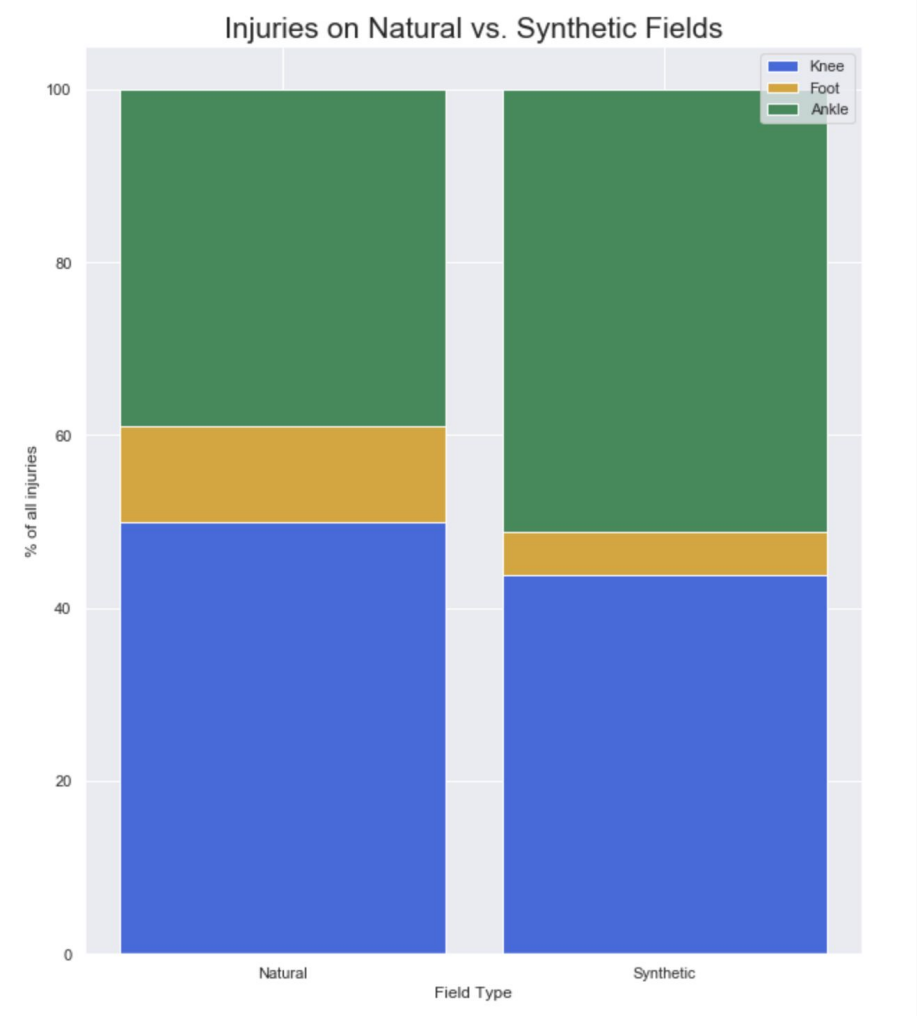
Knee and ankle injuries occur at very similar rates, foot injuries much less.



Turf vs. Grass?

Conclusion:

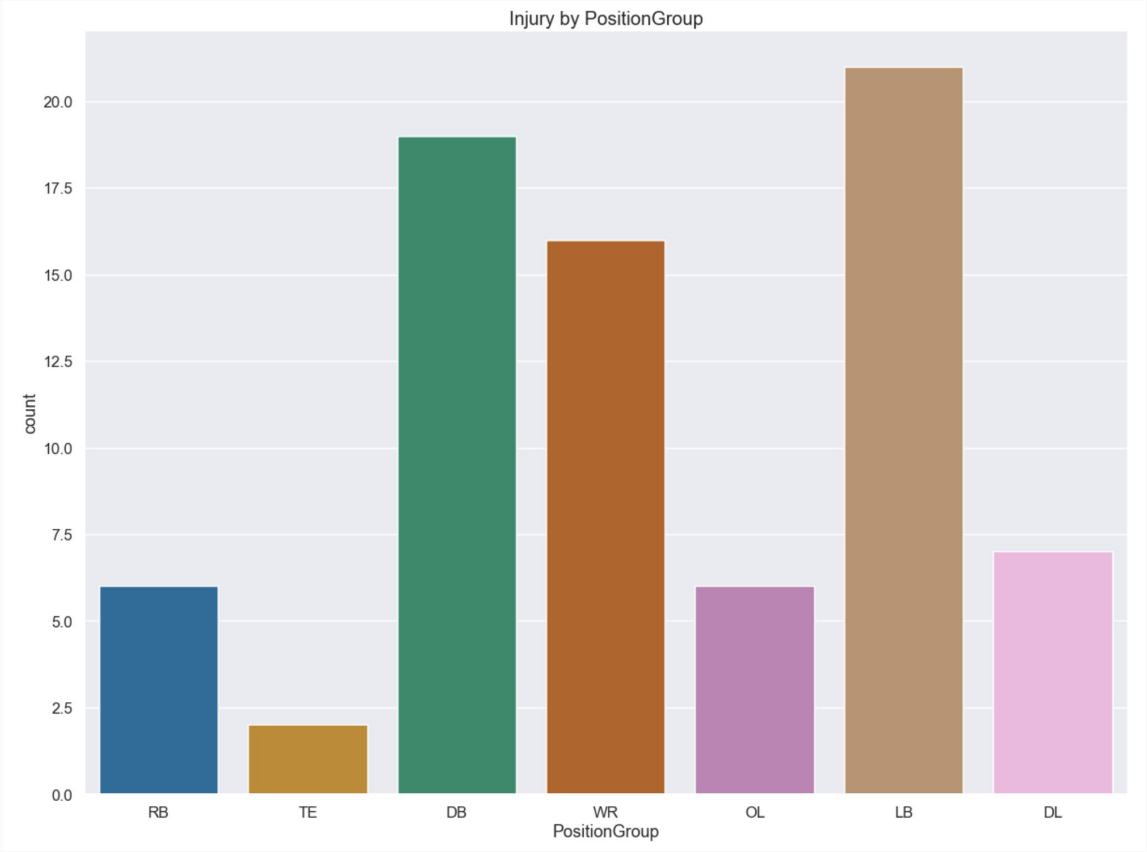
Injuries occur at similar rates on grass vs. turf fields. Foot and knee injuries seem to occur a little more on grass and ankle a little more on turf.



Does Position Matter?

Conclusion:

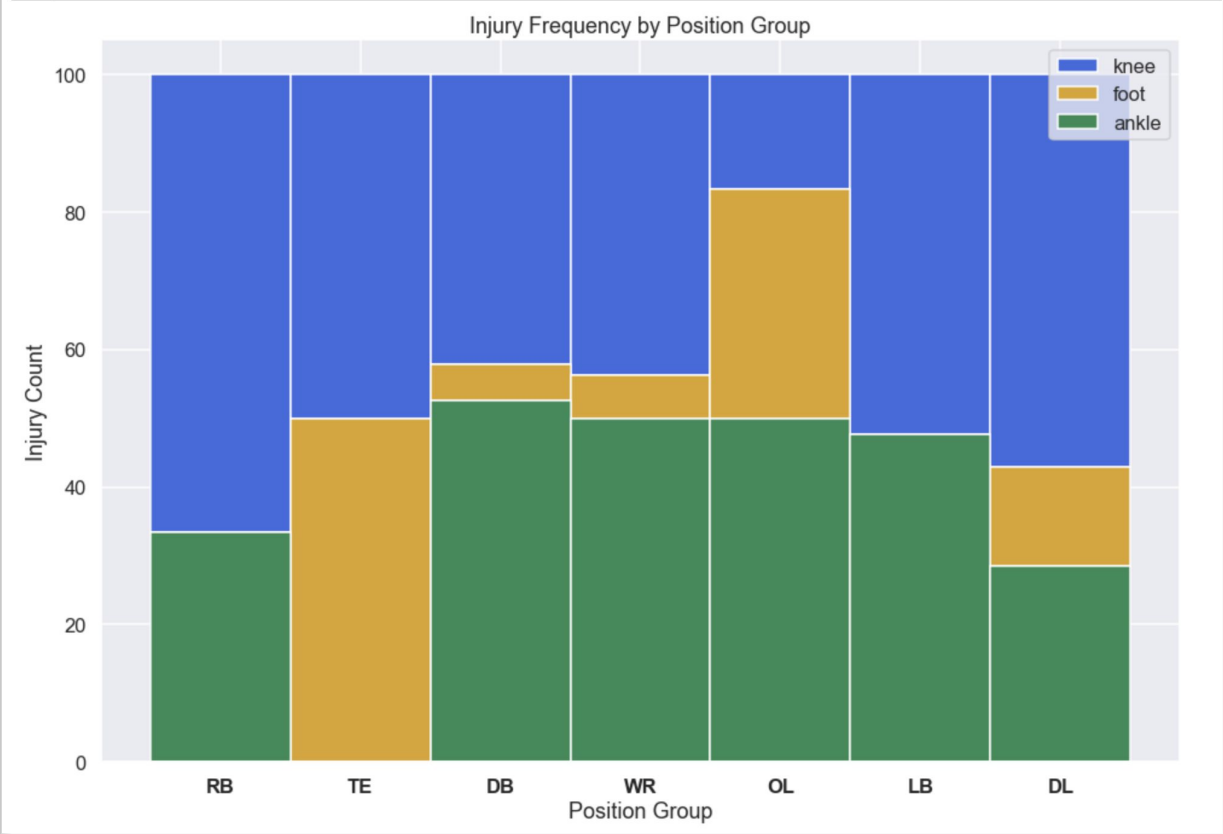
LB, DB, and WR are most frequently injured.



Does Position Matter?

Conclusion:

TE and OL have higher rates of foot injuries.



Does Body Part Affect Days Missed?

Conclusion:

Knee and Ankle injuries have a higher frequency of missing less than 3 weeks. Conversely, if you injure your foot your're looking at at least 2 months.

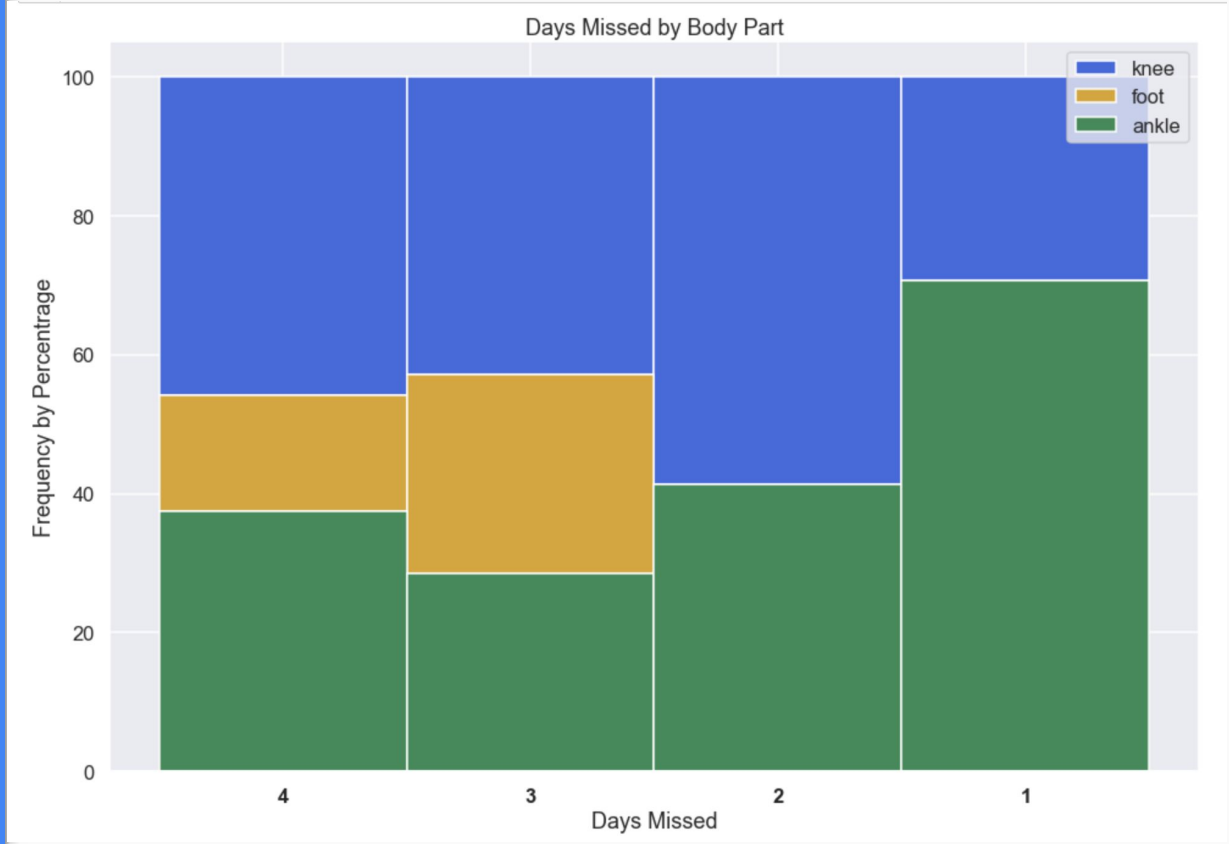
Note:

1 = up to one week missed

2 = up to 3 weeks missed

3 = up to 2 months missed

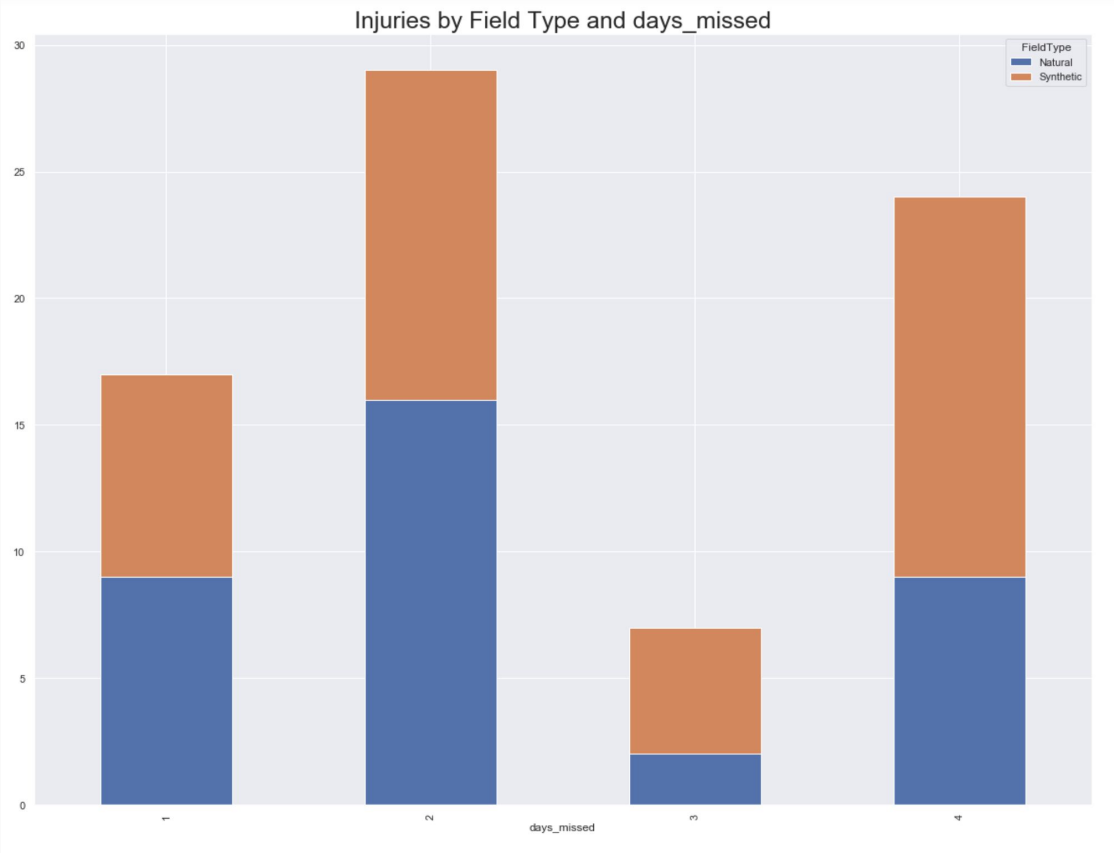
4 = 2 months or more missed



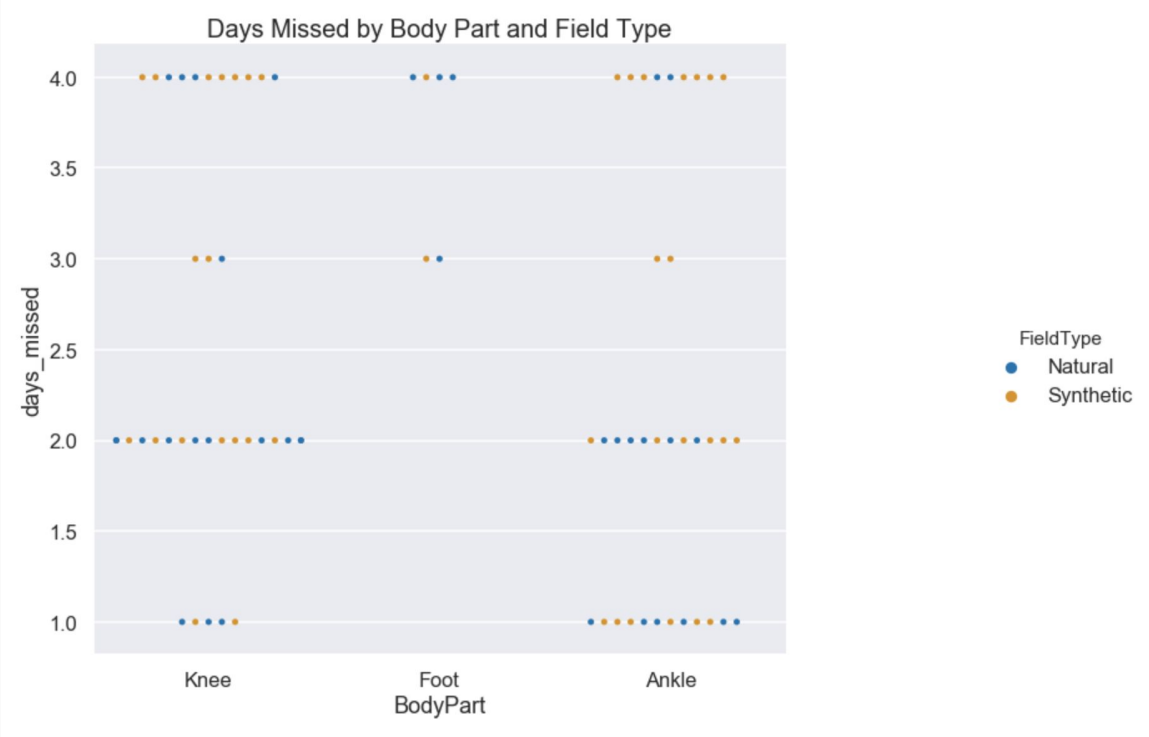
Does Turf vs. Grass Affect Days Missed?

Conclusion:

Grass and Turf don't appear to have a huge effect on time missed. Slight increase in frequency of more than 3 weeks missed on turf.



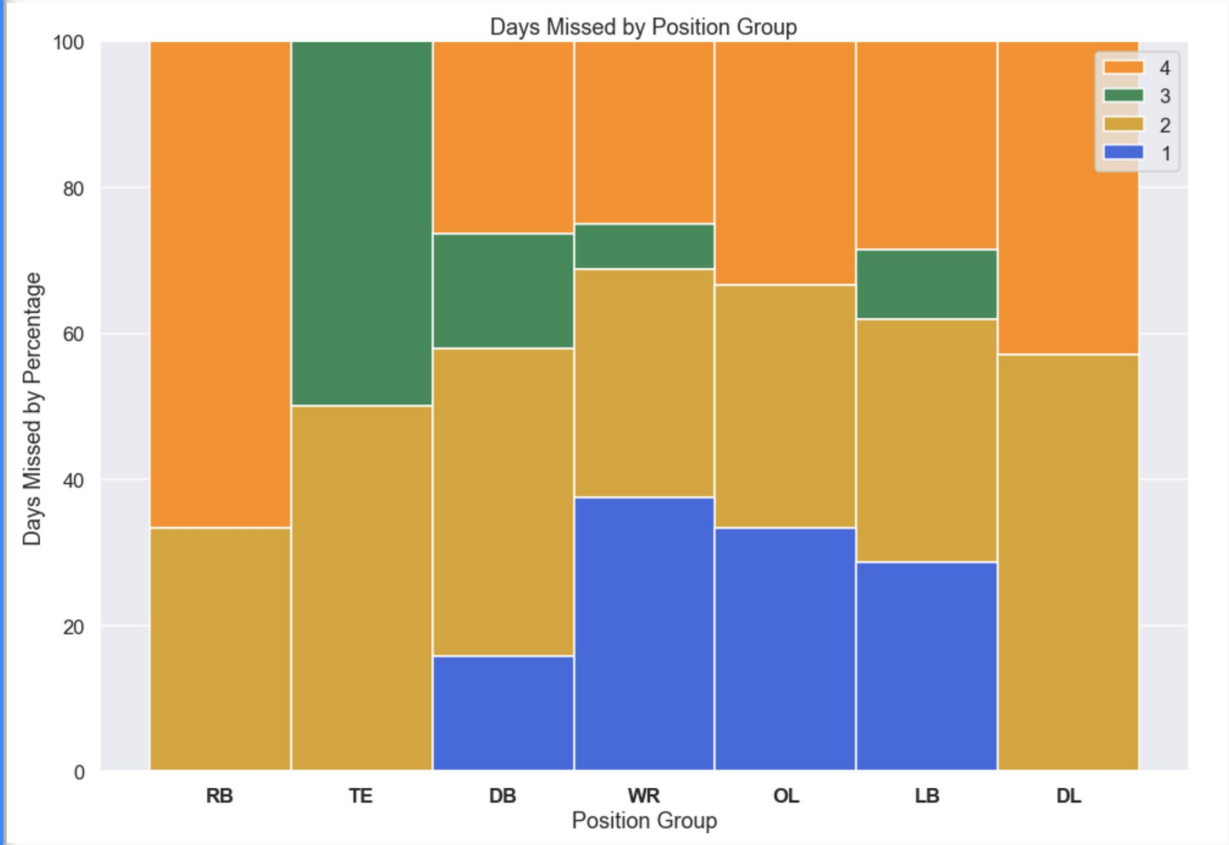
Body Part and Field Type Cont’d.



Does Position Group Affect Days Missed?

Conclusion:

Days missed are quite variable throughout position groups but interesting to note TEs, RBs, and DL are usually not out for less than 1 week.



Conclusion Summaries:

1. Knee and Ankle injuries occur at similar rates

2. Injuries occur at similar rates on grass and turf.

3. Wide Reciever, Defensive Back, and Linebacker are most frequently injured, mostly ankle/knee.

4. Knee/Ankle injuries most commonly miss <3 weeks, while foot injuries are always >2 months

5. Grass and Turf don't appear to have a significant effect on time missed.

6. Time missed is quite variable throughout position groups, but an interesting note that tight ends, runningbacks, and defensive lineman are never out for less than 1 week.

Prediction

Predictors

- The supreme intention of this problem wasn't just to analyze the previous data, but create an algorithm that could predict time missed due to injury in the future.

- The top predictors in our model were:
  - Body Part
  - Position Group
  - Field Type

Prediction

- I’ve created an algorithm which will predict which will improve your ability to predict the range of time the player is likely to miss by 21%.

- This could significantly decrease your stress when betting on games or deciding who to play and who to bench.

- Let’s try it out!

Thank You

Appendix

Validation information for model

```
The training accuracy is: 0.56


The testing accuracy is: 0.5


-------Classification Report--------
              precision    recall  f1-score   support

           1       0.57      0.80      0.67         5
           2       0.75      0.75      0.75         4
           3       0.00      0.00      0.00         0
           4       0.33      0.14      0.20         7

    accuracy                           0.50        16
   macro avg       0.41      0.42      0.40        16
weighted avg       0.51      0.50      0.48        16

-------Confusion Matrix--------
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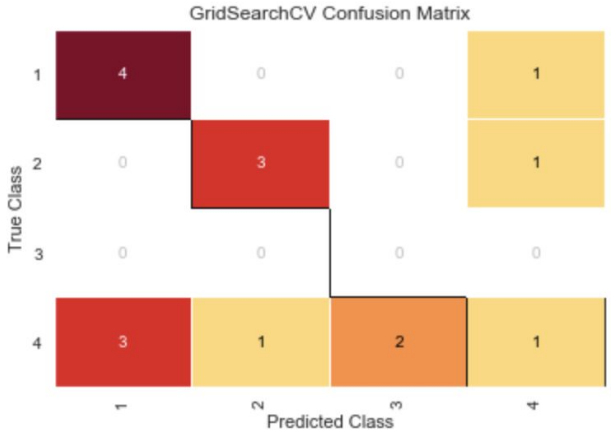

References

1. https://www.footballoutsiders.com/stat-analysis/2020/2019-adjusted-games-lost-part-i
2. https://www.weisspaarz.com/nfl-injuries-over-five-seasons/
3. https://www.kaggle.com/c/nfl-playing-surface-analytics/overview