**Kicked Off: A Revolution in National Football League(NFL) Field Goal Kicking Evaluation**

Football

1. **Introduction**

Who is the best kicker in the NFL? It’s a simple question that lacks a simple answer. Despite placekickers accounting for over 1/3 of all points scored in the most popular American sports league, contemporary field goal (FG) kicking metrics are inadequate. [1]

This paper addresses a key gap in football analytics. Traditional kicking metrics rely on simple make-miss counts but ignore two crucial factors 1) situational context and 2) ball flight. As a result, NFL kicker evaluations fall short. This project incorporates both factors, developing an ensemble of kicking metrics to create a more comprehensive set of metrics for assessing kicker performance.

1. **Methodology**
   1. **Contextual Factors**

Field goal difficulty is about a lot more than just yardage. We assert that analysis which ignores factors like weather, elevation, and playing surface is incomplete; considering these improves the assessment of kick difficulty. Here, we introduce **Split-The-Uprights-Difficulty** **(STUD)**, a metric derived from a calibrated gradient-boosted tree model that estimates the make probability of every FG in the NFL (Equation 1).

By applying contextual measures, we better appreciate FG difficulty. For instance, a 45-yard FG is made 69-89% of the time, depending on conditions. Kickers’ points over-expected are calculated by the difference between the outcome and probability multiplied by points available for a make, then summed (Equation 2). We also grade kickers on performance over expected, adjusted for attempts and difficulty, with the result given as a Z-scored percentile (Equation 3).

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|  |  | (2) |
|  |  | (3) |
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* 1. **Flight Metrics**

In addition, we propose a method for richer characterizations of both individual and aggregate kicking performances. Some made field goals are better kicks than others; some misses are worse than others. To date, these key differences are overlooked. Here, we introduce **Command+**, a spatial metric that quantifies accuracy according to where the ball crosses the back-of-the-endzone plane.

* 1. **Case Study**

We demonstrate the value of these new metrics with a case study that analyzes the FG kicking performances of all NFL kickers over two full seasons. Using a combination of publicly available video clips [2], play-by-play data [3,4], weather information [5], and other stadium factors, we charted every kick for the last two NFL seasons, assigned it a STUD score, and mapped its Command+ results.

1. **Results**

The outputs of the kicker evaluation using STUD can be seen in Figure 1.

A screenshot of a cell phone screen

Description automatically generated

Figure 1: 2022 NFL season kicker evaluation using STUD

In Figure 2, we showcase our charting data and the differences between makes and misses separately.

**A colorful dots in a line

Description automatically generated with medium confidence**

Figure 2: Command+ metric data sample

1. **Conclusion**

For decades, placekickers have been judged by an overly simple make-miss framework - ignoring both situational context and the flight quality of kicked footballs. Our results offer compelling evidence that integrating contextual and spatial approaches will improve the status quo of placekicking analytics in the NFL and beyond.

**References**

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