# Data Science's Impact on Fantasy Football

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## Abstract

There are many different websites and applications out there today that help fans build their teams for Fantasy Football. This project will explore the impact data science has had on Fantasy Football over the years. It will touch briefly on the history of analytics in Fantasy Football. Along with the ethically implications regarding gambling in fantasy leagues. There are various datasets available to a Fantasy Football fan and understanding the correct way to examine the data is essential. Lastly, the algorithms used to predict draft picks, weekly line-ups, and rankings of players will be explored.

## Author Keywords

fantasy football; mixed integer optimization; performance prediction; forecasts

## ACM Classification Keywords

• Information systems~Data analytics   • Theory of computation~Data modeling   • Theory of computation~Data structures and algorithms for data management

## Introduction

Fantasy football is a game where individuals build their own teams through drafting and play against other individual's teams. The outcome of these weekly games is determined by the actual statistics of the professional football players. Originally pen and paper were used to track these games, but technology has caused a massive increase of players. The main companies that are involved in fantasy football are ESPN Inc, Yahoo
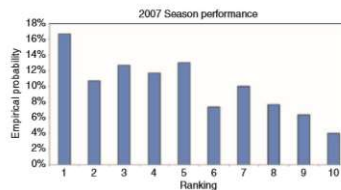
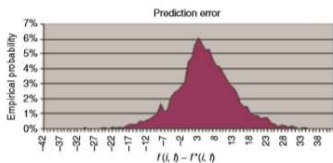**Figure 1.** The spread of the final ranks achieved by Becker's model for 2007 season.



**Figure 2.** The prediction error f(i, t) − f*(i, t) for the 2007 and 2008 seasons..

Inc., and CBS Corporation (16). Two major companies have been created for fantasy football; DraftKings and FanDuel (16).

Individual players value accurate forecasts and football player analysis; however, most do not want to give the time researching statistics. There have been different methods overtime to selecting players and some believe you must be a fan of football to play fantasy football (12). This is where data science shows this to not be true.

The goal of this research is to identify how data science has impacted fantasy football, the ethical implications, and the different algorithms used.

## Development of Football and Data Science

Fantasy football became extremely popular in the early 2000s due to the multiple options for applications (16). Plimi (15) produced one of the first methods for selecting players. It is a logical rule-based method that uses a defined condition that governs if/when a payer is drafted and then repeats itself. Data science impacted fantasy football in many ways; including,

Computer programming is used for scoring and analysis Football player's statistics are easily attainable data now.

As mentioned in the introduction data has impacted the way players participate in fantasy football. You do not have to be a football guru but being about to analyze data will suffice. In 2010 an accountant in Chicago was

named the best fantasy football player and he doesn't even subscribe to NFL network (12). His approach is, "A player's history with the WCOFS determines his ranking, adjusted with what Ashby called a "complex algorithm" to accommodate for length of play." (12)

## DATA SCIENCE METHODS

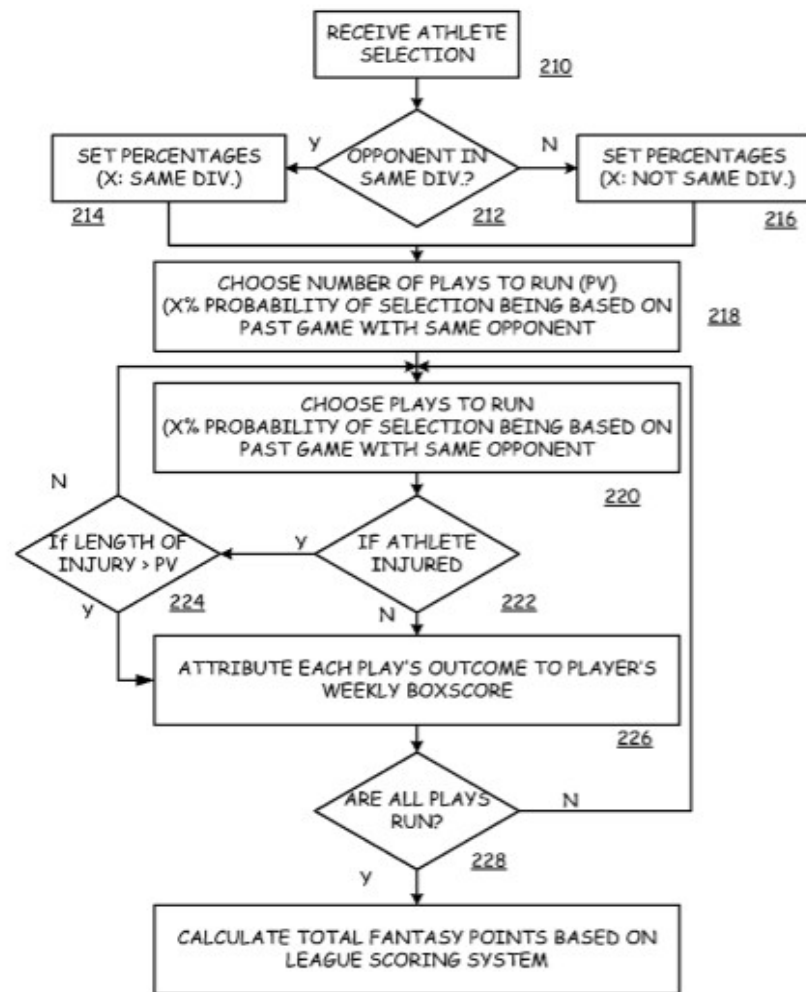There were multiple different methods used in different academic papers.

The first one I would like to highlight is one that uses a mixed integer programming (MIP) to predict for draft selection and weekly lineup (1). They used data from 2004-06 seasons to train their model and it would then simulate the 2007/2008 seasons (1). They used two core methodologies:

Using a complete optimization model to manage draft construction and weekly lineups.

The prediction is based on using the historical statistical performance in perspective of the team's opponents.

To see the final ranks for the 2007 season, see figure one and the prediction errors are in figure two.

The second example is an older method by Sorrells (17). They query databases for sport statistics to generate mock performance so that it can be compared to current active athletes (17). The results are a statistical box score for a former athlete. In figure two you can see a flow of how their method reaches certain plays that are used in the statistics.

RECEIVE ATHLETE
SELECTION
210

SET PERCENTAGES
(X: SAME DIV.)
214

y ← OPPONENT IN
SAME DIV.? → N
212

SET PERCENTAGES
(X: NOT SAME DIV.)
216

CHOOSE NUMBER OF PLAYS TO RUN (PV)
(X% PROBABILITY OF SELECTION BEING BASED ON
PAST GAME WITH SAME OPPONENT
218

CHOOSE PLAYS TO RUN
(X% PROBABILITY OF SELECTION BEING BASED ON
PAST GAME WITH SAME OPPONENT
220

N ← If LENGTH OF
INJURY > PV
224

y ← IF ATHLETE
INJURED
222

y

N

ATTRIBUTE EACH PLAY'S OUTCOME TO PLAYER'S
WEEKLY BOXSCORE
226

ARE ALL PLAYS
RUN?
228
N

y

CALCULATE TOTAL FANTASY POINTS BASED ON
LEAGUE SCORING SYSTEM

**Flow Diagram 1. Illustrating an example of a method of arriving at certain plays that are used to create statistics.**

**Figure 3.** DraftKings Logo


**Figure 4**. FanDuel Logo

**ETHICS IN FANTASY FOOTBALL**

There are a couple of different points to cover when it comes to ethics and fantasy football:

The legality of Fantasy Football as far as gambling goes. Fantasy football started out not being free. If you wanted to use some of the more popular platforms there were fees charged (16). DraftKings and FanDuel do still charge fees and have payouts. A lawsuit occurred in 2006 when an individual, Charles Hunphrey, filed a lawsuit against multiple companies on the bases of illegal by state wagering and gambling laws (16). He did loss based on the separation of entry fees and bets/wager. Another example was in 2015 when the "daily fantasy" on DraftKings and FanDuel were deemed illegal gambling in the state of New York. These companies argued that they are not accepting wagers based on chance. This is based off the Unlawful Gambling Enforcement Act of 2006 (16).

Insider knowledge by employees is another example of possible ethical issues with fantasy football. In 2015 there were allegations that employees of DraftKings and FanDuel were placing bets based on information that is not normally available to the public (4). This brought up the question of what access employees had to information about where most of the money was being bet for players (4).

## Acknowledgements

Overall fantasy football and data science has had quite a relationship over the years. Technology and data have helped grow fantasy gaming industry. It will continue to impact the way individuals draft and play weekly. There is also the question of if it is considered gambling with the knowledge that data has given it. Is it chance or skill? Even if you are not a sports fan or play fantasy football this is a topic to follow over the years because decision around data analysis and football will only impact other scenarios in the future.

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