Fantasy Football Analytics

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To our daughter, Maisie.

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Preface

This is a book in progress—it is incomplete. I will continue to add to and update it as I am able.

Open Access

This is an open-access book. This means that it is freely available for anyone to access.

License

Figure 1 Creative Commons License

The online version of this book is licensed under the Creative Commons Attribution License[1]. In short, you can use my work as long as you cite it.

[1] https://creativecommons.org/licenses/by/4.0/

Citation

The APA-style citation for the book is:

Petersen, I. T. (2024). *Fantasy football analytics*. Version 0.0.1. University of Iowa Libraries. https://github.com/isaactpetersen/Fantasy-Football-Analytics-Textbook. [INSERT DOI LINK]

The BibTeX citation for the book is:

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@book{petersenFantasyFootballAnalytics,
  title = {Fantasy football analytics},
  author = {Petersen, Isaac T.},
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  doi = {INSERT},
  isbn = {INSERT},
 url = {https://github.com/isaactpetersen/Fantasy-Football-Analytics-Textbook}
}
```

Accessibility

I strive to follow principles of accessibility[2] (archived at https://perma.cc/8XJ9-Q6QJ) to make the book content accessible to people with visual impairments and physical disabilities. If there are additional ways I can make the content more accessible, please let me know.

How to Contribute

This is an open-access textbook. My goal is to share data analysis strategies for free! Anyone is welcome to contribute to the project. If you would like to contribute, feel free to open an issue[3] or create a pull request[4] on

[2] https://bookdown.org/yihui/rmarkdown-cookbook/html-accessibility.html
[3] https://github.com/isaactpetersen/Fantasy-Football-Analytics-Textbook/issues
[4] https://github.com/isaactpetersen/Fantasy-Football-Analytics-Textbook/pulls

GitHub. The GitHub repository for the book is located here: https://github.com/isaactpetersen/Fantasy-Football-Analytics-Textbook. If you have data or analysis examples that are you willing to share and include in the book, feel free to contact me.

Acknowledgments

1

Introduction

How can we use information to make predictions about uncertain events? This book is about empiricism (basing theories on observed data) and judgment, prediction, and decision making in the context of uncertainty. The book provides an introduction to modern analytical techniques used to make informed predictions, test theories, and draw conclusions from a given dataset.

1.1 What is Fantasy Football?

Fantasy football is an online game where participants assemble (i.e., "draft") imaginary teams composed of real-life National Football League (NFL) players. In this game, participants compete against their opponents (friends/coworkers/classmates), accumulating points based on players' actual statistical performances in games. The goal is to outscore one's opponent each week to win matches and ultimately claim victory in the league.

1.2 Why Focus on Fantasy Football?

Many students find statistics intimidating in part because of how it is typically taught—with examples like dice rolls and coin flips that are not particularly exciting to students. My contention is that applied examples are a more effective lens to teach many concepts in psychology and data analysis. It can be more engaging and relatable to learn statistics in the applied context of sports, a domain that is more intuitive to many. Many people play fantasy sports. This book involves applying statistics to a particular domain (football). People actually want to learn statistical principles and methods when they can apply them to interesting questions (e.g., sports). In my opinion [and supported by evidence; Motz (2013)], this is a much more effective way of en-

gaging people and teaching statistics than in the context of abstract coin flips and dice rolls. Fantasy football relies heavily on prediction—trying to predict which players will perform best and selecting them accordingly. In this way, fantasy football provides a plethora of decision making opportunities in the face of uncertainty, and a wealth of data for analyzing these decisions. However, unlike many other applied domains in psychology, fantasy football (1) allows a person to see the accuracy of their predictions on a timely basis and (2) provides a safe environment for friendly competition. Thus, it provides a unique domain to evaluate—and improve—the accuracy of various prediction models.

1.3 Educational Value

Skills in data analysis are highly valuable. This book includes practical and conceptual tools that build a foundation for critical thinking. The book aims to help readers evaluate theory in the light of evidence (and vice versa) and to refine decision making in the context of uncertainty. Readers will learn about the ways that psychological science (and related disciplines) poses questions, formulates hypotheses, designs studies to test those questions, and interprets the findings, collectively with the aim to answer questions, improve decision making, and solve problems.

Of course, this is not a traditional psychology textbook. However, the class incorporates important psychological concepts, such as cognitive biases in judgment and prediction, etc. In the modern world of big data, research and society need people who know how to make sense of the information around us. Psychology is in a prime position to teach applied statistics to a wide variety of students, most of whom will not have careers as psychologists. Psychology can teach the importance of statistics given humans' cognitive biases. It can also teach about how these biases can influence how people interpret statistics. This course will teach readers the applications of statistics (prediction) and research methods (empiricism) to answer questions they find interesting, while applying scientific and psychological rigor.

1.4 Learning Objectives

This book aims to help readers accomplish the following learning objectives:

- Apply empirical inference and appreciate the value it provides over speculative supposition.
- Ask educated questions when confronted with decisions in the face of uncertainty.
- Understand human decision making, including common heuristics and cognitive biases and how to mitigate them analytically.
- Engage in critical thinking about causality, including devising plausible alternative explanations for observed effects.
- Understand causal inference including confounding, causal pathways, and counterfactuals.
- Think empirically about human behavior and performance.
- Describe the strengths and weaknesses of humans versus computers in prediction scenarios.
- Manipulate and summarize datasets.
- Critically evaluate the strengths and limitations of different statistical models and methodologies used in predicting uncertain events, enhancing their understanding of statistical inference and model selection.
- Use various analytical techniques for predicting the outcome of uncertain events, and for uncovering latent causes of patterns in observed data.
- Interpret findings from various statistical approaches and evaluate the accuracy of predictions.
- Engage in iterative problem-solving processes, refining analytical approaches based on feedback and outcomes, and adapting strategies accordingly.
- Communicate statistical findings and analyses in both written and oral formats, demonstrating proficiency in presenting complex information to diverse audiences.
- Make sense of big data.
- Use practical analytical skills that can be applied in future research and job settings.

1.5 Disclosures

I am the Owner of Fantasy Football Analytics, LLC, which operates https://fantasyfootballanalytics.net.

1.6 Disclaimer

"*This material probably won't win you fantasy football championships. You could take what we learn and apply it to fantasy football and you might become 5 percent more likely to win. Or… Consider the broader relevance of this. You could learn data analysis and figure out ways to apply it to other systems. And you could be making a six-figure salary within the next five years.*" – Benjamin Motz, Ph.D.

2

Getting Started with R for Data Analysis

The book uses R for statistical analyses (http://www.r-project.org). R is a free software environment; you can download it at no charge here: https://cran.r-project.org.

2.1 Initial Setup

To get started, follow the following steps:

1. Install R: https://cran.r-project.org
2. Install RStudio Desktop: https://posit.co/download/rstudio-desktop
3. After installing RStudio, open RStudio and run the following code in the console to install several key R packages:

```
install.packages(c("petersenlab","tidyverse","psych"))
```

> **Note 1: If you are in Dr. Petersen's class**
>
> If you are in Dr. Petersen's class, also perform the following steps:
>
> 1. Set up a free account on GitHub.com[a].
> 2. Download GitHub Desktop: https://desktop.github.com
>
> [a] https://github.com

2.2 Installing Packages

You can install R packages using the following syntax:

```
install.packages("INSERT_PACKAGE_NAME_HERE")
```

References

Motz, B. (2013). Fantasy football: A touchdown for undergraduate statistics education. *Proceedings of the Games, Learning, and Society Conference*, *9.0*, 222–228.

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