

# Increasing Undergraduate Student Knowledge and Interest Using a Sports Stats Club

Justin Post - North Carolina State University

Monday, August 10, 2015

# Overview

- ▶ NCSU's Sports Analytics (Statistics) Club
- ▶ Positive Outcomes We've Seen
- ▶ Areas of Improvement
- ▶ Advice for New Clubs

# Sports Analytics Club

Our club at NCSU

- ▶ Created in Fall 2013

# Sports Analytics Club

## Our club at NCSU

- ▶ Created in Fall 2013
- ▶ Student-run organization

# Sports Analytics Club

## Our club at NCSU

- ▶ Created in Fall 2013
- ▶ Student-run organization
- ▶ Committed to quantitative analysis of sports strategy and management

# Sports Analytics Club

## Our club at NCSU

- ▶ Created in Fall 2013
- ▶ Student-run organization
- ▶ Committed to quantitative analysis of sports strategy and management
- ▶ Promotes students to share ideas and complete research projects

# Sports Analytics Club

## Our club at NCSU

- ▶ Created in Fall 2013
- ▶ Student-run organization
- ▶ Committed to quantitative analysis of sports strategy and management
- ▶ Promotes students to share ideas and complete research projects
- ▶ Open to any undergrad NCSU students

# NCSU's Club

- ▶ How we got started:
  - ▶ E-mail to list servs
  - ▶ Advertise in classes
  - ▶ Organizational meeting
  - ▶ Funding



# NCSU's Club

- ▶ How we got started:
  - ▶ E-mail to list servs
  - ▶ Advertise in classes
  - ▶ Organizational meeting
  - ▶ Funding
- ▶ A typical meeting:
  - ▶ Discuss upcoming events
  - ▶ Fantasy sports
  - ▶ Interesting articles/Hot sports topics
  - ▶ Presentations

# NCSU's Club

- ▶ Other events
  - ▶ Sport Tuesday
  - ▶ Guest speakers
    - ▶ James Gilman - Professional poker player (retired)
    - ▶ Our grad students - Andrew Wilcox, Ryan Parker
    - ▶ Shane Reese from BYU

# NCSU's Club

- ▶ Other events
  - ▶ Sport Tuesday
  - ▶ Guest speakers
    - ▶ James Gilman - Professional poker player (retired)
    - ▶ Our grad students - Andrew Wilcox, Ryan Parker
    - ▶ Shane Reese from BYU
  - ▶ Conferences
    - ▶ JSM, UNC Basketball Analytics Summit, NESSIS

# NCSU's Club

- ▶ Other events
  - ▶ Sport Tuesday
  - ▶ Guest speakers
    - ▶ James Gilman - Professional poker player (retired)
    - ▶ Our grad students - Andrew Wilcox, Ryan Parker
    - ▶ Shane Reese from BYU
  - ▶ Conferences
    - ▶ JSM, UNC Basketball Analytics Summit, NESSIS
- ▶ Recently connected with NCSU athletics
  - ▶ Baseball, Volleyball, Track, Marketing

# Student and Faculty Projects

Projects from many sports

- ▶ Factors affecting NFL FG kicking

# Student and Faculty Projects

Projects from many sports

- ▶ Factors affecting NFL FG kicking
- ▶ Umpire classification of balls and strikes in MLB

# Student and Faculty Projects

Projects from many sports

- ▶ Factors affecting NFL FG kicking
- ▶ Umpire classification of balls and strikes in MLB
- ▶ NBA shooting trends

# Student and Faculty Projects

Projects from many sports

- ▶ Factors affecting NFL FG kicking
- ▶ Umpire classification of balls and strikes in MLB
- ▶ NBA shooting trends
- ▶ NFL combine/NCAA performance to predict NFL success



# Student and Faculty Projects

Projects from many sports

- ▶ Factors affecting NFL FG kicking
- ▶ Umpire classification of balls and strikes in MLB
- ▶ NBA shooting trends
- ▶ NFL combine/NCAA performance to predict NFL success
- ▶ Best teams in MLB at scoring runners

# Student and Faculty Projects

## Projects from many sports

- ▶ Factors affecting NFL FG kicking
- ▶ Umpire classification of balls and strikes in MLB
- ▶ NBA shooting trends
- ▶ NFL combine/NCAA performance to predict NFL success
- ▶ Best teams in MLB at scoring runners
- ▶ Kaggle NCAA bracket competition

# Student and Faculty Projects

Projects from many sports

- ▶ Factors affecting NFL FG kicking
- ▶ Umpire classification of balls and strikes in MLB
- ▶ NBA shooting trends
- ▶ NFL combine/NCAA performance to predict NFL success
- ▶ Best teams in MLB at scoring runners
- ▶ Kaggle NCAA bracket competition
- ▶ NCAA basketball overrated and upset picks

# Student and Faculty Projects

Projects from many sports

- ▶ Factors affecting NFL FG kicking
- ▶ Umpire classification of balls and strikes in MLB
- ▶ NBA shooting trends
- ▶ NFL combine/NCAA performance to predict NFL success
- ▶ Best teams in MLB at scoring runners
- ▶ Kaggle NCAA bracket competition
- ▶ NCAA basketball overrated and upset picks
- ▶ Predicting the next play in NFL games

# Student and Faculty Projects

Projects from many sports

- ▶ Factors affecting NFL FG kicking
- ▶ Umpire classification of balls and strikes in MLB
- ▶ NBA shooting trends
- ▶ NFL combine/NCAA performance to predict NFL success
- ▶ Best teams in MLB at scoring runners
- ▶ Kaggle NCAA bracket competition
- ▶ NCAA basketball overrated and upset picks
- ▶ Predicting the next play in NFL games
- ▶ Predicting performance in NCSU baseball using physical assessments

# Student and Faculty Projects

Projects from many sports

- ▶ Factors affecting NFL FG kicking
- ▶ Umpire classification of balls and strikes in MLB
- ▶ NBA shooting trends
- ▶ NFL combine/NCAA performance to predict NFL success
- ▶ Best teams in MLB at scoring runners
- ▶ Kaggle NCAA bracket competition
- ▶ NCAA basketball overrated and upset picks
- ▶ Predicting the next play in NFL games
- ▶ Predicting performance in NCSU baseball using physical assessments
- ▶ Predicting track performance using training data

# Student and Faculty Projects

Projects from many sports

- ▶ Factors affecting NFL FG kicking
- ▶ Umpire classification of balls and strikes in MLB
- ▶ NBA shooting trends
- ▶ NFL combine/NCAA performance to predict NFL success
- ▶ Best teams in MLB at scoring runners
- ▶ Kaggle NCAA bracket competition
- ▶ NCAA basketball overrated and upset picks
- ▶ Predicting the next play in NFL games
- ▶ Predicting performance in NCSU baseball using physical assessments
- ▶ Predicting track performance using training data
- ▶ MMA

# Gains in Skills and Knowledge

1. Coding!! SAS, JMP, R



# Gains in Skills and Knowledge

## 1. Coding!! SAS, JMP, R

- ▶ Data scraping - Done mostly in R
  - ▶ Regular Expression matching
  - ▶ readLines, readHTMLTable
  - ▶ Selector Gadget via rvest package

# Gains in Skills and Knowledge

## 1. Coding!! SAS, JMP, R

- ▶ Data scraping - Done mostly in R
  - ▶ Regular Expression matching
  - ▶ readLines, readHTMLTable
  - ▶ Selector Gadget via rvest package
- ▶ Data management - Done mostly in SAS
  - ▶ Messy data - missingness, format, etc.
  - ▶ Combining from multiple sources

# Gains in Skills and Knowledge

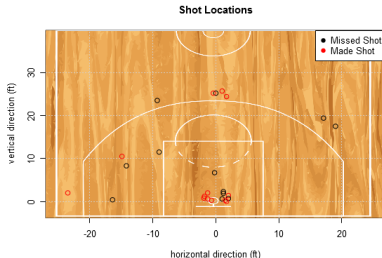
## ► R shiny Apps R Shiny Basketball App

Player:  
 LeBron James

Color Code Made/Missed

Number of Observations to Print  
 5

Time of Shots During Game  
 0 48 58



	Distance	TimeShot
1	Min : 0.0	Min : 48.28
2	1st Qu.: 2.0	1st Qu.: 50.18
3	Median : 6.0	Median : 51.63
4	Mean : 11.4	Mean : 51.53
5	3rd Qu.: 24.0	3rd Qu.: 52.60
6	Max : 25.0	Max : 57.65

Proportion Made	
Mean	0.52
SD	0.10

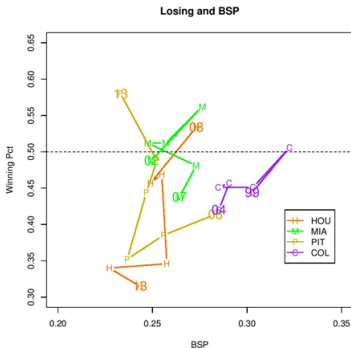
	Year	ShotResult	ActionType	ShotType	BasicZone	Zone	Range	Distance	X.1	Y	TimeShot
54409	2014-15	Made Shot	Reverse Layup Shot	2PT Field Goal	Restricted Area	Center(C)	Less Than 8 ft.	2	-1.90	0.80	48.28
54410	2014-15	Made Shot	Layup Shot	2PT Field Goal	Restricted Area	Center(C)	Less Than 8 ft.	2	2.00	1.40	49.28
54411	2014-15	Missed Shot	Jump Shot	2PT Field Goal	Mid-Range	Left Side(L)	8-16 ft.	14	-9.00	11.50	49.90
54412	2014-15	Missed Shot	Putback Layup Shot	2PT Field Goal	Restricted Area	Center(C)	Less Than 8 ft.	2	1.20	2.30	50.22
54417	2014-15	Missed Shot	Jump Shot	2PT Field Goal	Mid-Range	Left Side(L)	16-24 ft.	16	-14.20	8.30	52.15

# Gains in Skills and Knowledge

- ▶ Visualizations
  - ▶ Basketball shooting locations
  - ▶ NFL predictions

# Gains in Skills and Knowledge

- ▶ Visualizations
  - ▶ Basketball shooting locations
  - ▶ NFL predictions
  - ▶ Baserunner scoring



# Gains in Skills and Knowledge

## 2. Practical Concerns

- ▶ Statistical thinking
- ▶ Applicable methods

# Gains in Skills and Knowledge

## 2. Practical Concerns

- ▶ Statistical thinking
- ▶ Applicable methods

## 3. Advanced Methods

- ▶ Logistic Regression
- ▶ Multiple Imputation
- ▶ Bayesian Spatial Methods
- ▶ Clustering
- ▶ Regression Trees
- ▶ SVM

## Gains in Skills and Knowledge

### 4. Networking and Soft Skills

- ▶ Conferences attended
- ▶ Formal and informal presentation skills
  - ▶ Presentations by 4 members at JSM 2014 (3 projects)
  - ▶ Presentations by 5 members this year (2 projects)
  - ▶ Student run meetings



## Gains in Skills and Knowledge

### 4. Networking and Soft Skills

- ▶ Conferences attended
- ▶ Formal and informal presentation skills
  - ▶ Presentations by 4 members at JSM 2014 (3 projects)
  - ▶ Presentations by 5 members this year (2 projects)
  - ▶ Student run meetings
- ▶ Connections with faculty

## Gains in Skills and Knowledge

### 4. Networking and Soft Skills

- ▶ Conferences attended
- ▶ Formal and informal presentation skills
  - ▶ Presentations by 4 members at JSM 2014 (3 projects)
  - ▶ Presentations by 5 members this year (2 projects)
  - ▶ Student run meetings
- ▶ Connections with faculty
- ▶ Connections with other students

## Gains in Skills and Knowledge

### 4. Networking and Soft Skills

- ▶ Conferences attended
- ▶ Formal and informal presentation skills
  - ▶ Presentations by 4 members at JSM 2014 (3 projects)
  - ▶ Presentations by 5 members this year (2 projects)
  - ▶ Student run meetings
- ▶ Connections with faculty
- ▶ Connections with other students
- ▶ Leadership roles

## Gains in Skills and Knowledge

### 4. Networking and Soft Skills

- ▶ Conferences attended
- ▶ Formal and informal presentation skills
  - ▶ Presentations by 4 members at JSM 2014 (3 projects)
  - ▶ Presentations by 5 members this year (2 projects)
  - ▶ Student run meetings
- ▶ Connections with faculty
- ▶ Connections with other students
- ▶ Leadership roles
- ▶ Resume building/Interview discussions

Students excited about statistics!

## Things to Improve Upon

- ▶ More participation in meetings

## Things to Improve Upon

- ▶ More participation in meetings
- ▶ Credit for projects

## Things to Improve Upon

- ▶ More participation in meetings
- ▶ Credit for projects
- ▶ Involving Freshmen and Sophomores

## Things to Improve Upon

- ▶ More participation in meetings
- ▶ Credit for projects
- ▶ Involving Freshmen and Sophomores
- ▶ Involving grad students as mentors



## Things to Improve Upon

- ▶ More participation in meetings
- ▶ Credit for projects
- ▶ Involving Freshmen and Sophomores
- ▶ Involving grad students as mentors
- ▶ Continue with NCSU athletics (Model ourselves after BYU)

# Starting a Club

- ▶ Make connections first
  - ▶ Other faculty
  - ▶ Athletic department
  - ▶ Upper level students

# Starting a Club

- ▶ Make connections first
  - ▶ Other faculty
  - ▶ Athletic department
  - ▶ Upper level students
- ▶ 1st meeting important!
  - ▶ Have fun things you'll do at each meeting thought out
  - ▶ Schedule bonding trips (sporting events, bowling, conferences etc.)

# Starting a Club

- ▶ Make connections first
  - ▶ Other faculty
  - ▶ Athletic department
  - ▶ Upper level students
- ▶ 1st meeting important!
  - ▶ Have fun things you'll do at each meeting thought out
  - ▶ Schedule bonding trips (sporting events, bowling, conferences etc.)
- ▶ Fantasy sports with faculty

# Starting a Club

- ▶ Make connections first
  - ▶ Other faculty
  - ▶ Athletic department
  - ▶ Upper level students
- ▶ 1st meeting important!
  - ▶ Have fun things you'll do at each meeting thought out
  - ▶ Schedule bonding trips (sporting events, bowling, conferences etc.)
- ▶ Fantasy sports with faculty
- ▶ Projects
  - ▶ Set out firm goals of what you want to accomplish
  - ▶ Utilize free resources ([www4.stat.ncsu.edu/~post/sports](http://www4.stat.ncsu.edu/~post/sports))
  - ▶ Common space (github or google drive)
  - ▶ Team projects
  - ▶ Write-up and presentation

## Wrap-up

- ▶ Real (and messy) data
- ▶ Computational skills
- ▶ Statistical thinking
- ▶ Exposure to advanced methods
- ▶ Communication skills

## Wrap-up

- ▶ Real (and messy) data
- ▶ Computational skills
- ▶ Statistical thinking
- ▶ Exposure to advanced methods
- ▶ Communication skills
- ▶ Fun!

## Wrap-up

Thanks for listening!

[jbpost2@ncsu.edu](mailto:jbpost2@ncsu.edu)