Analyzing Collegiate Volleyball: What Statistics Tell Us is Most Important to Winning and Why

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Agenda

- Why Dan and Keegan?
- Introduction to the research done
- Presentation and analysis of some results
- Q&A

Desired Outcome

- Leave with something to think about
Abstract

Is there a science behind winning?
Are we asking the right questions?
What questions to ask? (maybe)

A need for different metrics?
- What makes a good player ‘good’?
- What types of players are critical for a team?
- Is a more scientific approach needed?
- Shouldn’t we know how important things are?
- Shouldn’t we be able to rate the performance?

Our process
- Rate importance. What fundamentals are important?
- Rate quality. How am I performing in each fundamental?
- Rate performance. At what level should I execute?
- Realize it will always be a “work in progress”
The Data Set

Currently working on DII and Club data

Number of Touches

- 840000 2014 Women's
- 375000 2015 Men's
Creation of The Models

- Over 1,000 hours of statisticians working on the data
- Different approaches and scientific methods
  - Logistic regression
  - Multivariate normal kernel estimation
  - Simple and multiple linear regression
  - Distribution analysis
Consider Some Statistical Dilemmas

- **Setting**
  - Currently difficult to analyze since they are so closely knit to the attack (Is a team’s attack efficiency a product of great setting or great swings?)
  - The precise location of the ball in relation to the player making the attack is needed
  - They still always set the same people
  - Solution: separate attack and set

- **Blocking**
  - Passive fundamental

- **Defense**
  - Passive fundamental
  - Needs location of all defenders in order to evaluate defensive range
Importance Studies

- Method: Logistic Regression based on the outcome of each rally
- Outcome: Estimate of how your odds of winning the rally change based off whether that fundamental or skill was present
- Importance: Measure of how unlikely the above outcome is possible due to sheer randomness
- Due to limitations, we worked on ratings
VolleyMetrics Ratings

- **Reasoning:**
  The importance of a fundamental is found in improving the chance that your teammate performs the next fundamental to the best of their abilities. (Pass, Set, Attack)

- ‘Scoring’ fundamentals: attack and serve

- ‘Counter-scoring’ fundamentals: block, dig, pass
  - The best attacking team may not always be the best team.
VolleyMetrics Attack Rating Example
Fundamentals Importance

Women’s Volleyball

Men’s Volleyball

Win Probability
- Below 50%
- Above 50%
Skills Importance

Womens Skills Importance

Mens Skills Importance

Win Probability

- >50%
- 50%
Positions Importance

Women’s Volleyball

Men’s Volleyball

Womens Positions Importance

Mens Positions Importance

Win Probability

a <50%

a >50%
Fundamentals Within Positions Importance

Women’s Volleyball

Men’s Volleyball
Questions and Answers

Thank you