DATA SCIENCE IN SPORTS

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Domain Area

Sports Analytics

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Domain Area: *Sports Analytics*

https://www.grandviewresearch.com/industry-analysis/sports-analytics-market
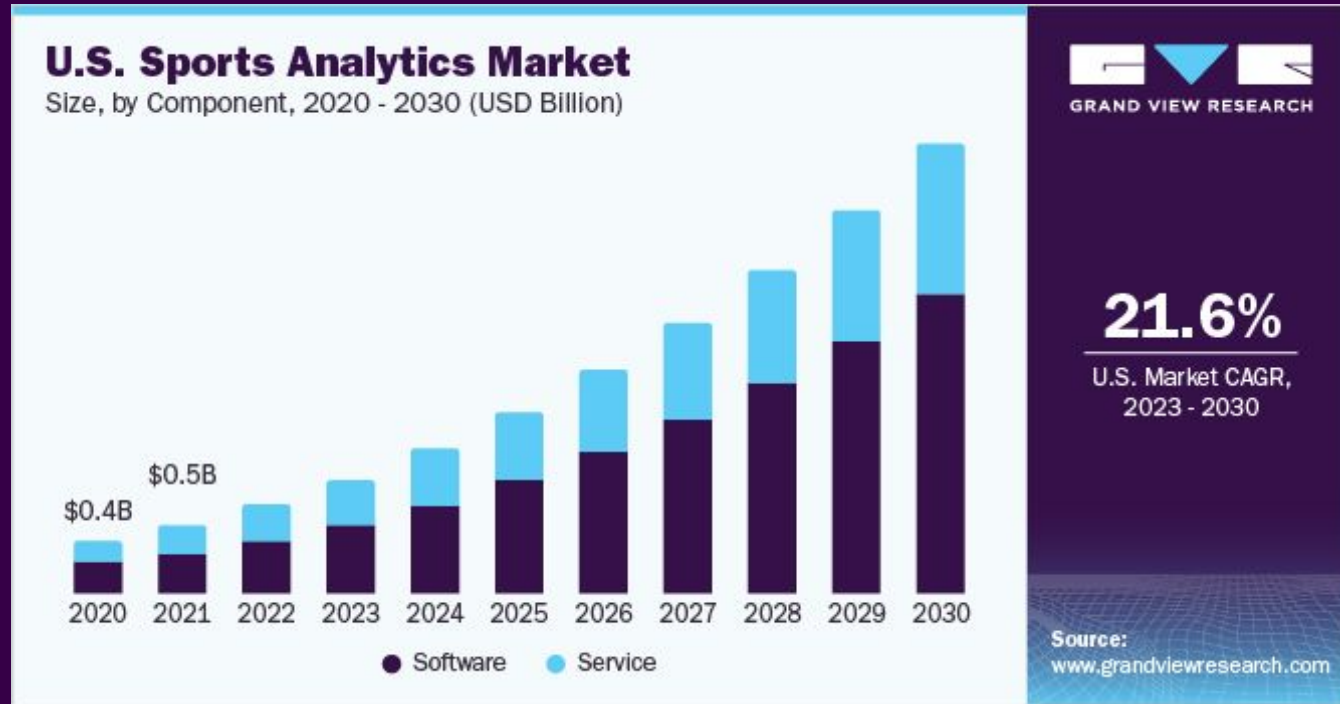
01

How is Data Science helpful in Sports Analytics?

THREE MAIN GOALS

01

Player & Game Performance

Performance evaluation of player with the goals of:

- Best possible players
- Best possible line–up
- Best decisions on field

02

Player Health & Injury Analytics

Injury prevention to overcome:

- Team performance cost
- Financial cost

03

Business Analytics

Analytical operations concerning:

- Strategically adapt the ticket prices
- Increase fan engagement

01 Player & Game Performance

Performance data allow us to:

- Appropriately evaluate players

- Identify the required skill set

- Quantify player's relative importance to team's success

- Develop data–based models for player scouting

- Simulate games or by analyze game tactics

Game Strategy & Decision-Making Impact

Performance
Analysis

Game Situation
Analysis

Injury
Prevention

Substitution
Strategies

Pitch
Selection

Situational
Awareness

Play
Calling

Fan
Engagement

Strategic
Timeouts

Example

Thomas Tuchel,
Former Chelsea Football Club Manager

" So we had some statistics, we were well prepared, that Kepa is the best in percentage in saving penalties. "

Kepa saved two penalties!

Kepa Arrizabalaga,
Chelsea Football Club Goalkeeper

Analytics in Player Scouting and Recruitment

Scouting

- Performance Analysis
- Advanced Metrics
- Video Analysis
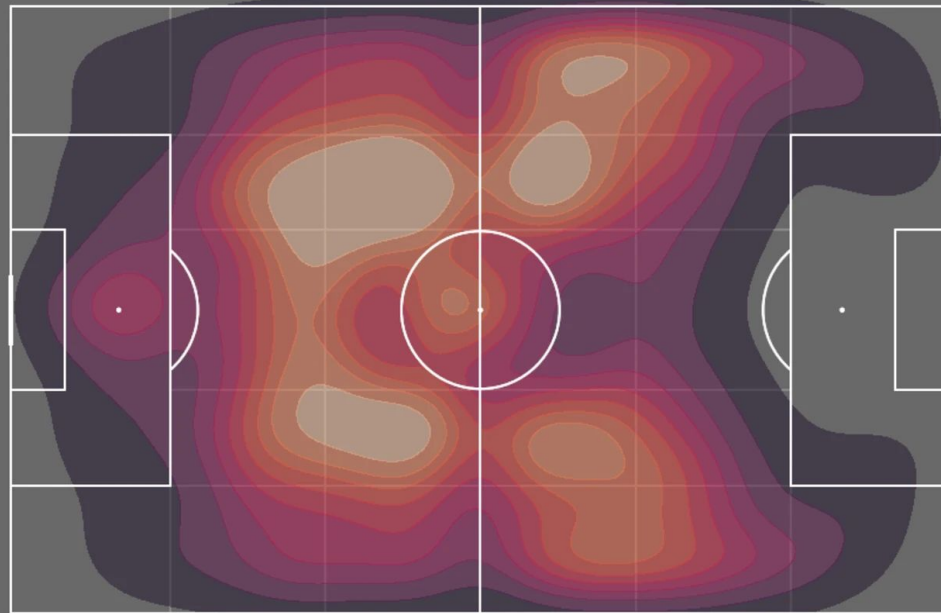- Scouting Reports
- Opponent Analysis
- Comparative Analysis

Recruitment

- Data-Driven Decision-Making
- Predictive Analytics
- Financial Analysis

Arsenal Regular Play Heat Map

02 Player Health & Injury Analytics

- Using descriptive factors (heart rate, blood pressure…) from frontier technology to:
  - Measure athletes' physical condition (stress levels)
  - Analyze effect of different trainings

- This avoids:
  - Salary is paid, even when player is injured
  - Team performance decreases
  - Injury risk reduction and faster recovery process

Example: Zephyr BioHarness Wearable Technology

→ Predict and prevent injuries based on overall mechanical load and BMI

Mechanical Load X BMI for Prediction of Concussion
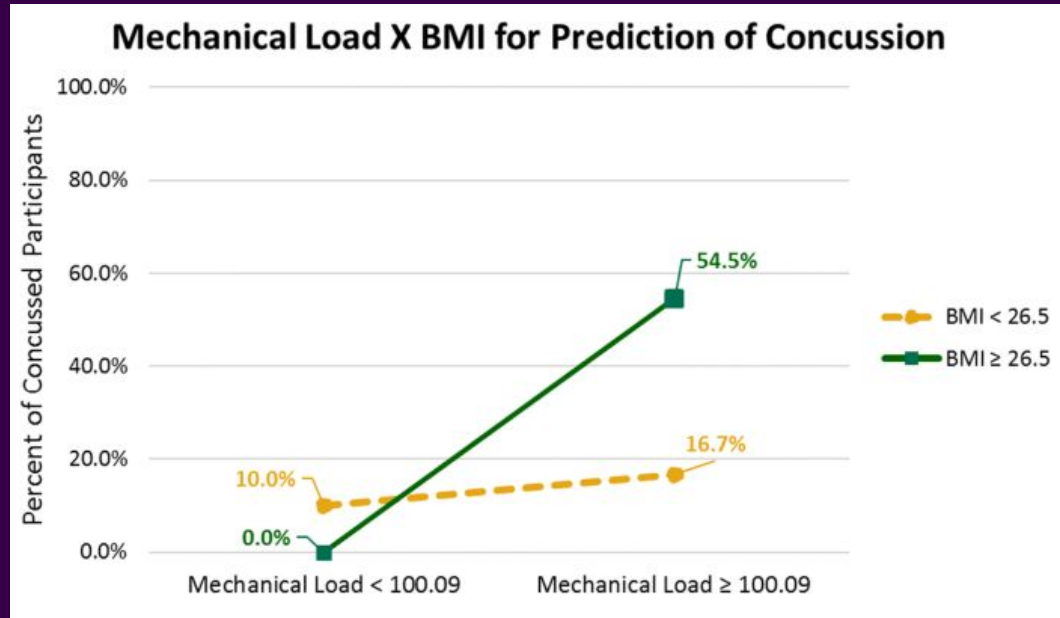
Results:
- Identify players with higher injury risk
- Balance overall exertion levels
- Enroll in conditioning programs

https://link.springer.com/article/10.1007/s10796-020-10018-3

Sports Analytics: Player Development & Injury Prevention

Ways in which analytics contribute to player development and injury prevention:

- Performance Monitoring
- Individualized Training Plans
- Load Management
- Biomechanical Analysis
- Injury Risk Assessment
- Player Tracking Wearables
- Video Analysis
- Rehabilitation Monitoring
- Nutritional Guidance
- Longitudinal Tracking

03 *Business Analytics*

- **Ticket Pricing models:** Static vs. Dynamic Pricing

- **Increasing Fan Engagement:**

  - Sport–related behaviors

  - Impression–management behavior

  - Relationship–building behaviors

  - Non–transactional extra role behaviors

FC Bayern Munich Perfects the Fan Experience with Digital Solutions

- **Goal:** build a bond with supporters outside the stadium and create additional experiences for them

- **How?**

  - Through SAP HANA – customer data is combined in a 'Golden Fan Record' (+250 attributes)

  - Anticipating fan wishes and utilizing existing capacities

SAP S/4 HANA

02

What are some of companies/research groups working in sports?

Companies

Prozone Sports

Prozone Sports Ltd, a pioneer in performance analysis for 19 years, collaborates with top sports clubs and organizations to provide world-leading performance analysis services.

Genius Sports

London-based Genius Sports specializes in sports data, betting, and media tech. Trusted in 150+ countries, they partner with 400+ global sports organizations, such as NFL, EPL, and FIBA.
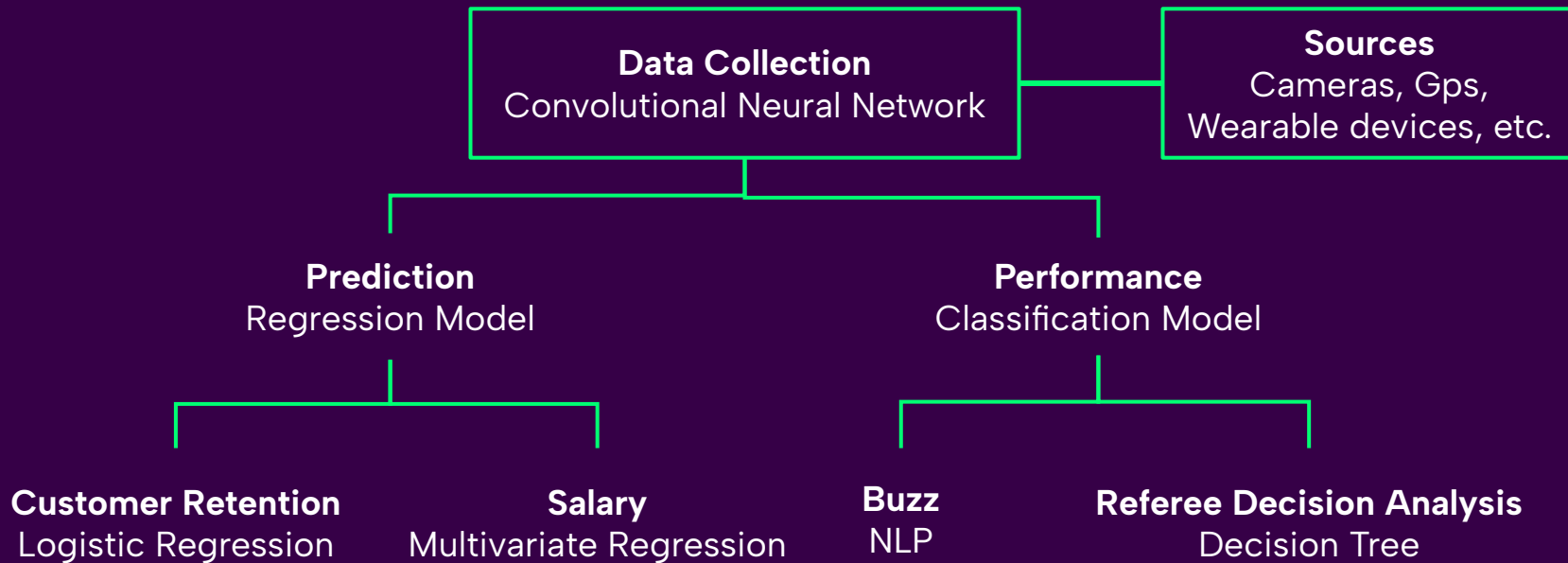
Sportradar

Sportradar is a Silicon Valley technology startup that developed an analytics platform to interpret the data and provide relevant, actionable information to the team staff.

How Data Science iS Used

Data Collection
Convolutional Neural Network

Sources
Cameras, Gps,
Wearable devices, etc.

Prediction
Regression Model

Performance
Classification Model

Customer Retention
Logistic Regression

Salary
Multivariate Regression

Buzz
NLP

Referee Decision Analysis
Decision Tree

03

Data Scientist in Sports:
Daily Role & Ethical Challenges?

Day-to-day Activities

Communication

Data-Driven Research and Analysis

Specialization in a Sport or Team

Day-to-Day in Sports

Golf and basketball

- Analyzing data
- Setting up the infrastructure

Football company

- Pipeline monitoring
- Scouting reports
- Explain Blackbox ML solutions to football experts

Challenges & Ethics

Challenges

- Privacy Concerns
- Informed Consent
- Data Security
- Data Ownership

Ethical Considerations

- Fair Use
- Transparency
- Data Retention
- Bias Mitigation
- Accountability

04

What are the skills that a data scientist should have when working in this domain?

Essential Skills

Statistical Analysis

Machine Learning

Data Manipulation

Sports Knowledge

Data Visualization

Domain-Specific Metrics

Specialized Tools

Data Collection

- Stats Perform
- Sportradar
- Opta

Analytics

- Sports Insights
- Sportscode
- Catapault Sports

Visualization Tools

- Tableau
- Power BI
- QlickView

How to get Involved?

Gain Sports Knowledge

Build Portfolio

Join Sports Analytics Communities

Reddit Communities
Sports Analytics: for nerds who love sports

Attend Conferences and Workshops

MIT Sloan Sports Analytics Conference

05

What are some courses that you could take at CU or elsewhere?

COURSES AT CU

LEEDS SCHOOL OF BUSINESS

Leeds School of Business offers a 9-credit "boot camp" for sports and recreation enthusiasts, covering topics like sports analytics.

DIGITAL IMAGE PROCESSING

Course teaches the fundamental techniques for image representation and compression.

NEURAL NETWORK AND DEEP LEARNING

Learn to design neural network architectures and training procedures

MACHINE LEARNING

The curriculum encompasses mathematics, statistics, machine learning, ethics, and societal aspects to provide a holistic education.

OTHER COURSES

UNIVERSITY OF MICHIGAN

This sports online analytics course uses real data from various sports leagues to teach predictive modeling, machine learning, and data analysis to sports enthusiasts, professionals, and Python learners.

SYRACUSE UNIVERSITY

Syracuse University's sport analytics program educates students on the principles of research methodology, sport economics, database management, finance, computer mathematics, statistics and economics.

GEORGE MASON UNIVERSITY

Courses in sport analytics provide students with a foundational understanding of the sport industry coupled with the study of how data can be used in the world of sport to enable teams, leagues, and other sports businesses to gain an advantage over their competitors.

THANKS!

DO YOU HAVE ANY QUESTIONS?

Scan to get resources

CREDITS: This presentation template was created by **Slidesgo**, and includes icons by **Flaticon**, and infographics & images by **Freepik**

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