Carnegie Mellon University

RAJASTHAN ROYALS PROJECTS

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Background & Introduction

Background Information

- **Team Overview** Rajasthan Royals (RR) was founded in 2008, won the inaugural IPL season and are renowned for developing young talent.
- **Current Need** The team faces a pivotal moment in their rebuilding process while the Mega Auction requires strategic decisions. Since there will be only a few old players left, they must strategically choose from **a pool of young talents and international players** to build their squads.

Research Question How do player traits affect their potential performance in the IPL? How is the geographical talent distribution for IPL players?

Research Goal Identify and predict high-potential Under 19 (U19) players for the Rajasthan Royals IPL team to assist in upcoming Mega Auction selections.

Data Collection & Information

Under 19 (U19) Player Dataset Manually collected data from ESPN Cricket for U19 players (2016–2024) in Indian, South Africa, Australia, England, and etc. Include variables such as playing role, **U19 debut year**, **IPL debut year**, and etc.

Geographical Dataset Manually checked latitude and longitude points for IPL player locations, which are provided by Auction Dataset from **Rajasthan Royals**

Auction Dataset Details of reserve prices and player traits like born place and playing role.

Data Cleaning & Integration Combined **U19 Player Dataset** with **Auction Dataset** by name filtering to investigate their reserve prices.

Methods

Exploratory Data Analysis (EDA) Used **ggplot2** package in R to draw visualizations that show the correlations among players' U19 transition time, reserve prices, and playing roles.

- **Key Metrics**: Years between U19 and IPL debut

Geographical Visualization Combined tools like **GeoPandas** and **Matplotlib** in Python to create maps showing player distributions by roles and state associations.

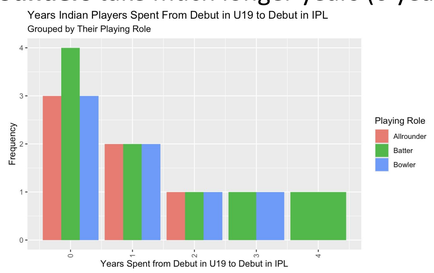
Hierarchical Model for Reserved Price Employed a hierarchical mixed-effects model to account for both fixed and random effects influencing reserve price

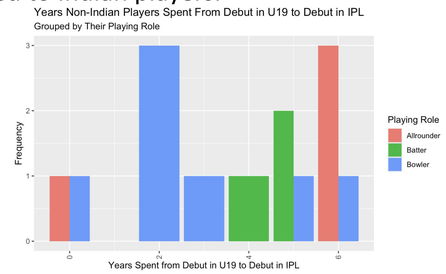
- **Fix effects** Playing role, Year (2023, 2024), and Age
- **Random effects** Regional variability captured by State Association (38 levels).

Results

U19 Player Analysis

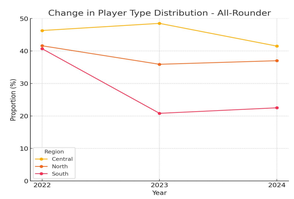
- **Indian Players:** Indian U19 players' transition to the IPL is very fast (mostly within 1-2 years). Compare to other role, batters tend to need more time.
- **Non-Indian Players:** In general, non-Indian players requires much **more time** to transit from U19 to IPL. It is noticeable that **all-rounders** take much longer years (6 years) compared to Indian players.

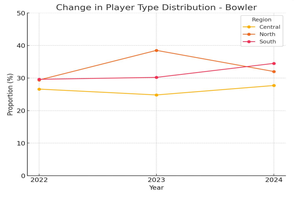


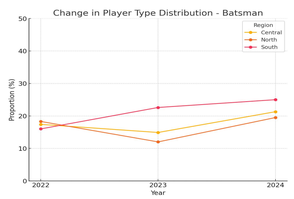


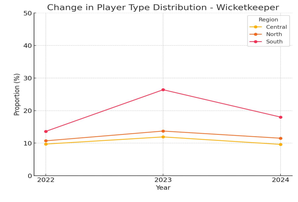
Geographic Trends

- **Central Region** Consistently high proportion of all-rounders.
- **North Region** Increased focus on bowlers, with declines in batters.
- **South Region** Growth in batters and bowlers, becoming a key talent hub.









Hierarchical Model for Reserved Price

- **Age** is the strongest predictor, with older players commanding higher reserve prices.
- Batsmen have significantly **higher reserve prices** than bowlers or wicketkeepers.
- The calculated ICC for our model is **0.0196**. This indicates that approximately **1.96%** of the total variation in reserve prices can be attributed to **differences between regions** (State Associations).

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Random effects:
 Groups            Name        Variance Std.Dev.
 State_Association (Intercept)  10.56    3.249
 Residual                      528.32   22.985
Number of obs: 1383, groups:  State_Association, 38

Fixed effects:
                     Estimate Std. Error t value
(Intercept)         -16.7619     4.0470  -4.142
SpecialismBATSMAN     2.5724     1.8092   1.422
SpecialismBOWLER      2.7952     1.5008   1.862
SpecialismWICKETKEEPER  0.6616   2.0520   0.322
Year2023             -3.9940     1.6042  -2.490
Year2024             -2.1695     1.7632  -1.230
Age                   1.5798     0.1499  10.542
```

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Correlation of Fixed Effects:
            (Intr) SBATSM SBOWLE SWICKE Yr2023 Yr2024
SpclBATSMAN -0.073
SpclsBOWLER -0.078  0.361
SWICKETKEEP -0.084  0.262  0.320
Year2023    -0.111 -0.003 -0.037 -0.061
Year2024    -0.087 -0.020 -0.074 -0.043  0.220
Age         -0.955 -0.058 -0.075 -0.025  0.029  0.016
[1] 0.01959182
```

Conclusions & Limitations

Findings

- Prioritize scouting bowlers from U19 tournaments and high-performing state associations.
- Balance younger, cost-effective talent with experienced international players.

Limitations The collected U19 dataset is small since there are limited number of players who successfully made from U19 to IPL.