NBA Player Analysis 2023 – 2024

Key Insights from Player Performance Data

Summary

This report presents a comprehensive analysis of the 2023–2024 NBA Player Statistics dataset, covering performance metrics such as average points per game (PTS), assists (AST), rebounds (TRB), and shooting efficiency (FG%, 3P%, and 2P%). This analysis aims to uncover key trends in player performance and relationships between variables.

Analysis Objectives

- Identify the top-performing players and their contributions to the team.
- Analyze shooting efficiency and shot distribution patterns among players.
- Investigate the relationship between age, player position, and performance.
- Conduct statistical tests and forecasting to understand trends over time and predict future performance.

Data Overview

Player Information:

- **Player**: Player's name.
- **Age**: Player's age during the season.
- **Pos (Position)**: Player's position (e.g., PG, SG, SF, PF, C).
- **Tm (Team)**: Team the player.

Performance Metrics:

- **PTS (Points per Game)**: Average points scored by the player per game.**AST (Assists per Game)**: Average assists made by the player per game.
- **TRB (Total Rebounds per Game)**: Total rebounds, including offensive and defensive rebounds.
- **G (Games Played)**: Number of games the player has played.
- **FG% (Field Goal Percentage)**: Shooting accuracy from the field.
- **3P% (Three-Point Percentage)**: Accuracy of three-point shots.
- **2P% (Two-Point Percentage)**: Accuracy of two-point shots.

Additional Metrics:

- **FT% (Free Throw Percentage)**: Accuracy of free throw attempts.
- **MP (Minutes Played)**: Average minutes played per game.
- **TOV (Turnovers)**: Average turnovers (mistakes) committed by the player per game.
- **STL (Steals) & BLK (Blocks)**: Player's contribution to defense.

Data Cleaning & Preparation

1. **Handling Missing Values**

   Step: Use dropna() to remove rows containing missing values.

   Explanation: Missing values can introduce bias in calculations such as averages, regressions, or other statistical tests. By removing incomplete rows, the analysis is performed only on valid and reliable data.

2. **Cleaning Incorrectly Encoded Data**

   Step: Use unicodedata.normalize() to convert incorrectly encoded characters into the correct format, selecting a normalization mode like NFKD to separate diacritics (accents) from base characters.

   Explanation: The unicodedata library ensures text is correctly formatted. The NFKD mode separates diacritics (e.g., é becomes e) without losing meaning, then removes non-ASCII characters if necessary.

3. **Adding `datemonth` and `month` Columns**

   Step: Use the `['month']` method for the month, and `['year'],['month'],['day']` to format the date as *yyyy-mm-dd* using `to_datetime`.

   Explanation: This step is done to facilitate analysis and data processing for chart visualization. By adding these columns, you can easily filter and group the data based on the month or full date.

4. **Reordering Dataset Columns**

   Step:
   columns = ['datemonth', 'month'] + [col for col in dataset.columns if col not in ['datemonth', 'month']]
   dataset = dataset[columns].

   Explanation: This step ensures the data is ordered in a way that makes it easier to read, especially when used for plotting. By placing `datemonth` and `month` at the beginning, you can streamline the visualization process.

EDA Insight

Monthly Performance Trends & MoM%

- The monthly performance trends show fluctuations in metrics such as **PTS (Points per Game), AST (Assists per Game)**, and **TRB (Rebounds per Game)** over several months.

- **MoM% (Month-over-Month Percentage Change)** helps identify areas of strength or weakness for a player, which can be used for strategic planning.

Example: **A.J. Lawson**
In **January**, there was a **70.45% increase** in **Total Rebounds per Game (TRB)**, but a **24.57% decrease** in **Points per Game (PTS)** compared to the previous month.

Month: November ▾

Top 5 Players by PTS - November
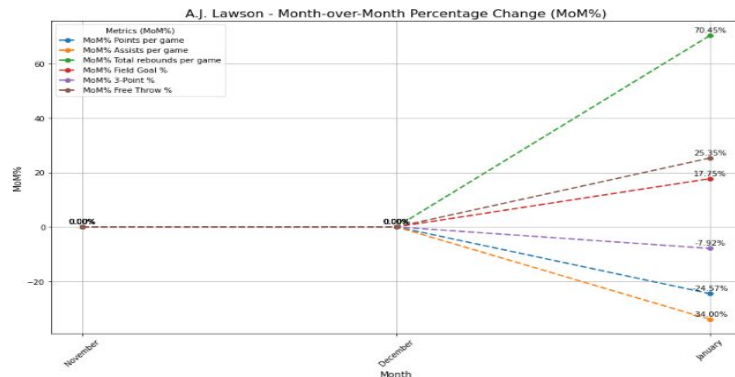
EDA Insight
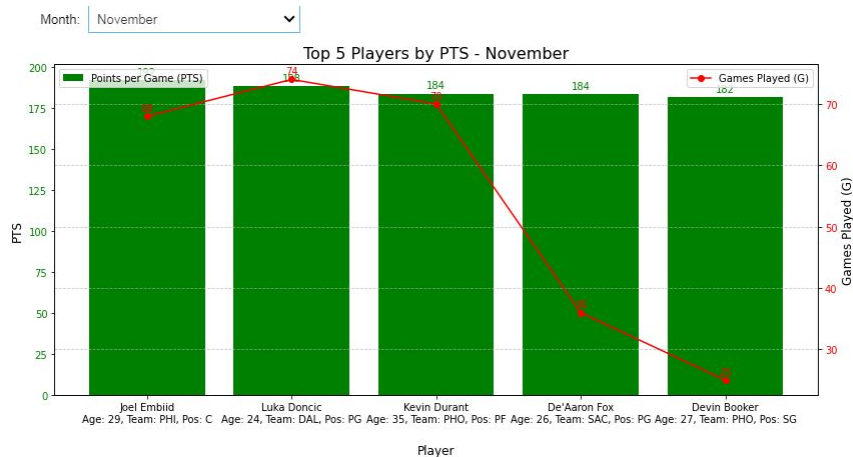
- This trend illustrates a graph of the top 5 productive players per month based on metrics such as PTS (Points per Game) and G (Games Played).

- The graph helps coaches identify players who can be relied upon during critical moments.
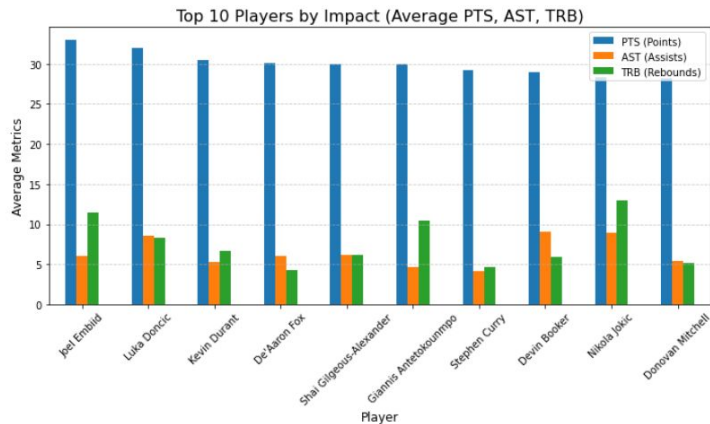
Example: **Devin Booker**
In **November**, Booker showed a high contribution despite playing fewer games, with **182 PTS (Points per Game)** and **25 G (Games Played)**.
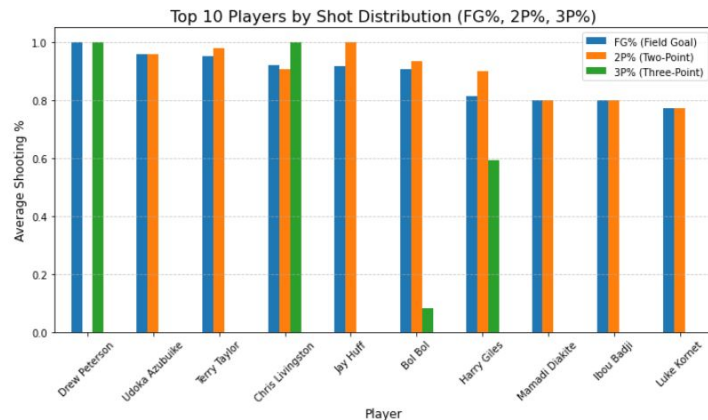
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EDA Insight

Top 10 Players by Impact (PTS, ATS, TRB)

- Top 10 Players Based on Average
  Contribution in PTS (Points), AST (Assists),
  and TRB (Rebounds).
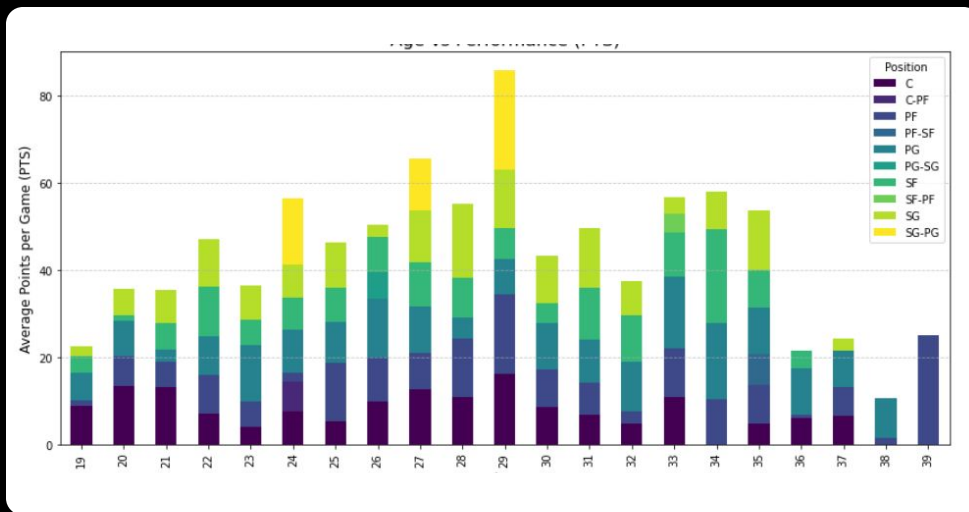
Top 10 Players by Shot Distribution (FG%, 2P%, 3P%)

- Analyzing Player Shooting Efficiency Based
  on Average **FG% (Field Goal Percentage),
  2P% (Two-Point Percentage),** and **3P%
  (Three-Point Percentage).**

EDA Insight

Age Vs Performance (PTS).

- Exploring the Relationship Between **Player Age, Position,** and **Average PTS (Points per Game)**

Statistical Analysis

Analysis of Variance (ANOVA) & Regression Analysis

1. **Analysis of Variance (ANOVA)**
   To assess whether the mean values for a particular metric differ across months, helping to identify trends or changes in player performance over time.

2. **Regression Analysis**
   To model and predict outcomes such as **scoring performance (PTS)** using other variables (e.g., age, position, shooting percentages). It can also help identify the strength and nature of relationships between variables.

Example: **Alex Fudge**
F-Statistic: A very large value (inf) indicates that the variability between groups (e.g., months) is significantly higher than the variability within groups, suggesting substantial differences across time periods.
P-Value: The value of 0.0000 is below the threshold of 0.05, indicating that the observed differences are statistically significant and not due to chance.
Intercept: **-0.33** is the initial negative PTS value.
Coefficient: It shows an increase of **0.50** on average per month.
Prediction: In the following month, the increase is predicted to reach **1.67**.
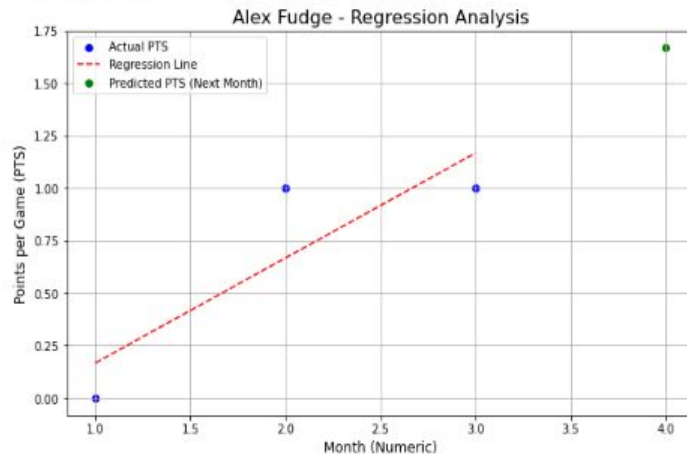
Analysis of Variance (ANOVA)

F-Statistic: inf

P-Value: 0.0000

There is a significant difference in PTS across the months.

*Note: p-value < 0.05 indicates a significant result (threshold).

Alex Fudge - Regression Analysis

- Actual PTS
- Regression Line
- Predicted PTS (Next Month)

Regression Analysis

Regression results for **Alex Fudge**:

Intercept: -0.33

Coefficient: 0.50

Predicted PTS for next month (February): 1.67

Key Insight

01 **Monthly Performance Trends & MoM%**
A.J. Lawson in **January** showed a significant increase in **TRB (+70.45%)**, although **PTS decreased (-24.57%).**

02 **Top 5 Players Productive by Month**
Joel Embiid, Luka Dončić, and **Kevin Durant** consistently ranked in the Top 5 most productive players every month.

03 **Top 10 Players by Impact & Shot Distribution**
Players like **Nikola Jokić** show significant contributions across various categories, making him a valuable asset to the team.

04 **Top 10 Players by Impact & Shot Distribution**
Young players (aged 23-26) tend to score higher, especially in the **G (Guard)** position.

Recommendation

01 **Strategic Player Utilization**
Use MoM% analysis to determine which players need to be relied upon or have their performance improved.

02 **Efficiency Training**
Improve shooting efficiency for players with low FG% to optimize their contribution, particularly in 3P%.

03 **Player Development**
Focus on players in their prime age (23-26 years) to optimize the team's performance.

04 **Team Strategy Optimization**
Use the data of top players per month to design strategies for important matches.

Conclusion

01 The NBA 2023-2024 dataset shows that statistical analysis and data exploration, such as MoM%, top player metrics, and age vs. performance, can provide insights into player performance.

02 Young players in the G position tend to show the best performance, while shooting efficiency remains a factor to analyze.

03 The combination of ANOVA and Regression analysis helps make strategic decisions and predict player performance in the future.

04 Recommendations based on insights help coaches, team management, and analysts develop more effective team strategies.

THANK YOU!