

# Exploratory Data Analysis (EDA) Summary

Analysis of team performance statistics, win-loss data, and game-level distributions focusing on variability, correlation with performance, and shifts in league averages across the 2022 to 2024 seasons.

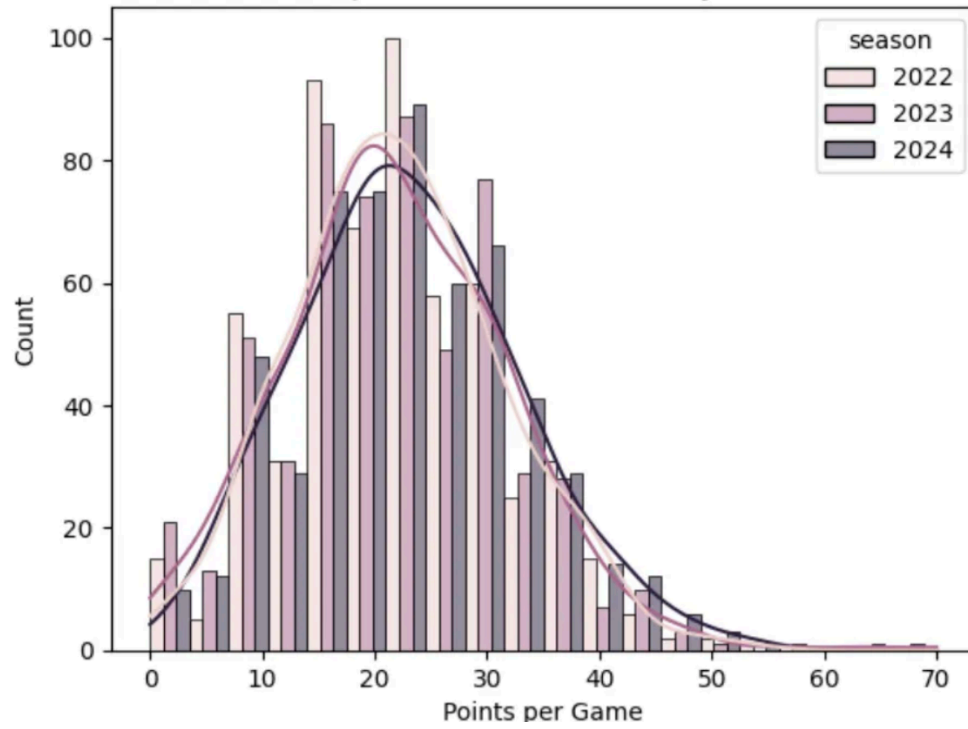
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## Which Stats Vary Most?

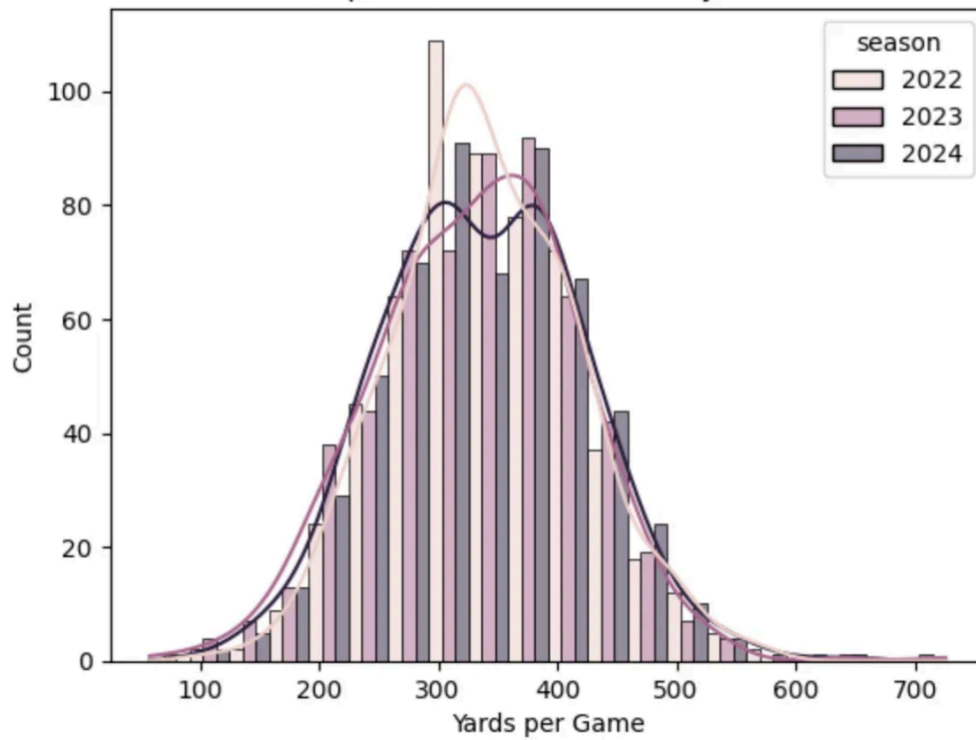
The distributions for **Points per Game** and **Rush Yards per Game** show noticeable variability across the three seasons (2022, 2023, and 2024), indicating shifts in league-wide tendencies.

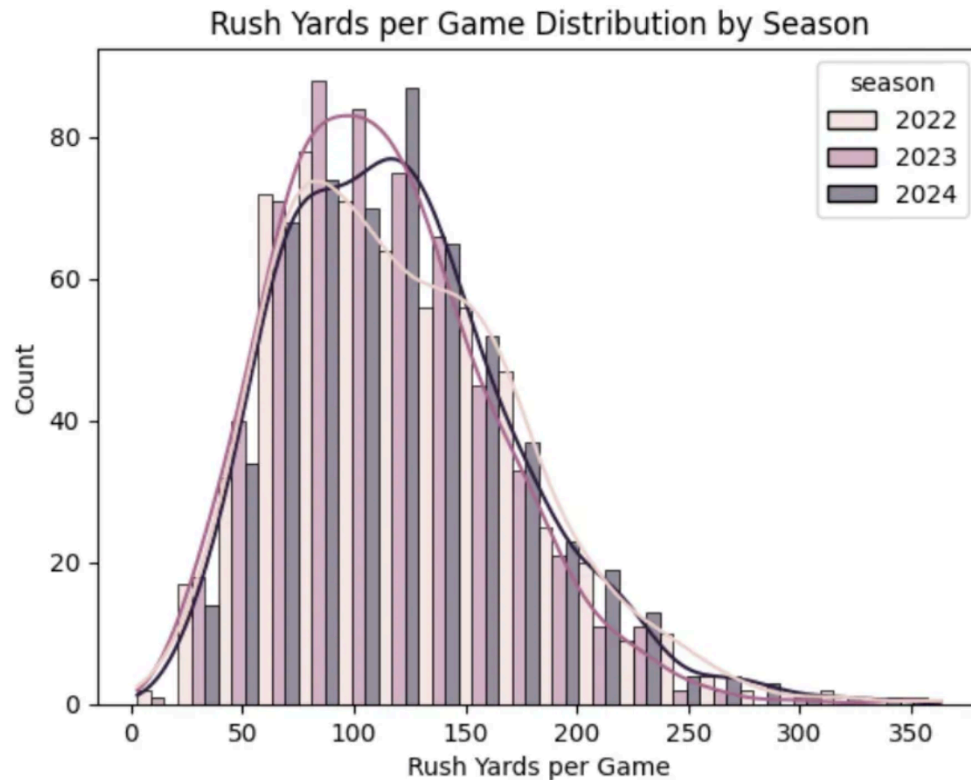
- **Rush Yards per Game:** This statistic shows a substantial rightward shift in its distribution, with the peak moving from around **75 yards** in 2022 to about **125 yards** in 2024. This change suggests the biggest shift in team-level output.
- **Points per Game:** The distribution also shifts slightly, with the most common score per game rising from around **20 points** in 2022 to approximately **22–23 points** by 2024, showing a slight increase in average scoring.
- **Yards per Game (Total Offense):** While the means increase, the distributions for total yards per game appear **relatively stable** across the seasons, with the majority of teams remaining in the **250 to 450-yard** range.
- **Sacks, Turnovers:** The provided data suggests most teams are consistently clustered around low values: **2 sacks per game** and **0–1 turnovers per game (and vice versa)**, implying relatively low inter-team variability for these stats in a given game.

Points per Game Distribution by Season



Yards per Game Distribution by Season





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## Which Stats Correlate with Performance?

Performance can be assessed by scoring ability (Points) and overall winning (Wins).

### Correlation with Scoring (Points For)

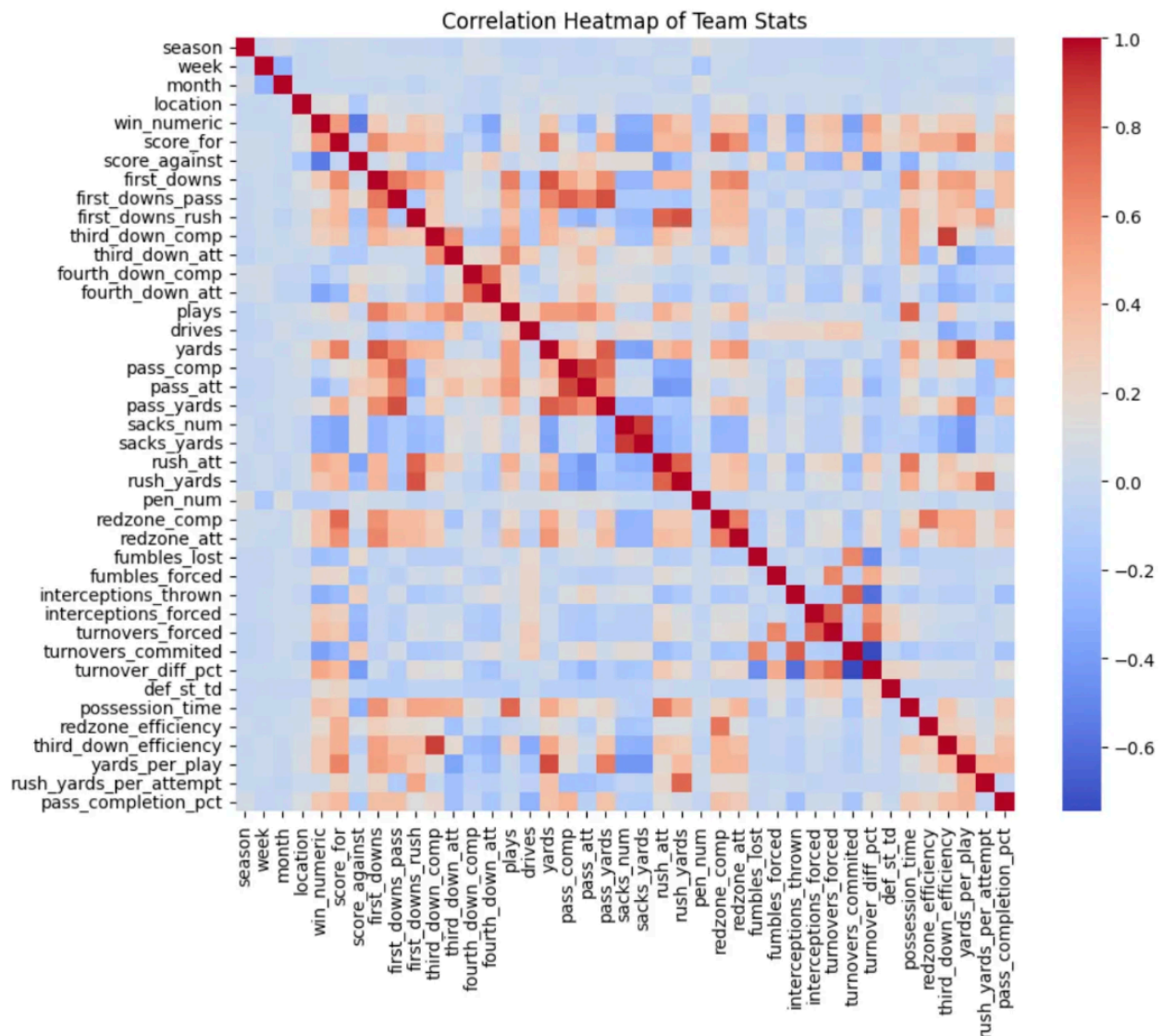
Several statistics show a strong positive correlation with a team's offensive **Score For**, indicating they are key drivers of points:

- **Redzone Efficiency (0.8):** Redzone completions and attempts are the strongest predictors, with completion percentage having a **0.8 correlation**.
- **Yards and Efficiency (0.7):** Total **Yards** and **Yards Per Play** both show a **0.7 correlation**, highlighting that moving the ball efficiently is essential for scoring.
- **First Downs (0.6):** Achieving **First Downs** has a **0.6 correlation**, showing the importance of sustaining drives.

### Correlation with Winning (Wins)

Three key stats are moderately correlated with overall team wins:

- **Turnover Differential (0.6):** This is one of the strongest predictors of overall winning, showing that winning the turnover battle is crucial.
- **Score For (0.6):** The amount a team scores is directly tied to winning.
- **Rush Attempts (0.6):** This suggests that establishing a running game and controlling the clock may be associated with more wins.



## How Have League Averages Shifted?

League averages have generally shifted toward a slightly **more productive and rush-heavy offensive environment** from 2022 to 2024.

- **Overall Offensive Production (Yards):** The average offensive production has steadily increased:
    - **2022:** ~Low **300 yards** per game.
    - **2023:** ~Mid **300 yards** per game.
    - **2024:** ~Mid **300 yards** per game.
  - **Rushing vs. Passing:** The increase in total offense is driven entirely by the ground game, while passing yards have remained stable:
    - **Rushing:** Increased significantly from ~**75 yards** per game (2022) to ~**125 yards** per game (2024). This is the **most dramatic shift** observed.
    - **Passing:** Remained stable at ~**210 yards** per game across all three seasons.
  - **Scoring (Points):** There is a clear upward trend in scoring:
    - The league average point total increased by roughly **1 point per game each year** from 2022 to 2023, with most teams now scoring **20–22 points** per game.
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## Team Performance Overview (2022–2024)

- **Elite Consistency (Top Tier):** The **Chiefs** are the most dominant team, appearing in the Top 5 by Wins in all three seasons and leading the league with ~**49 total wins** (2022-2024). The **Eagles** (45 total wins) and **Bills** also showed consistent elite performance.
- **Bottom Tier Consistency:** The **Cardinals**, **Panthers**, **Bears**, **Patriots**, and **Titans** consistently feature in the Bottom 5 by Wins across individual or total seasons (2022-2024), with win totals hovering around **14 to 16 wins** for the three-year period.
- **Win Slope Analysis:** The cumulative win charts confirm performance tiering:
  - **High Slope Teams (e.g., Bills, Ravens, Lions, Chiefs):** Exhibit the steepest, most consistent accumulation of wins.
  - **Mid-Slope Teams (e.g., Cowboys, Buccaneers, Packers):** Show good, steady winning but at a lower rate (e.g., Cowboys ~33 wins).
  - **Flat Slope Teams (e.g., Panthers, Cardinals, Titans, Giants):** Exhibit the slowest win accumulation, often leveling off early.

