### Analysis of NBA Player Performance Using Python and ChatGPT (2022–23)

This document presents a comparison of Python code and ChatGPT for answering key questions about NBA player statistics from the 2022–23 season. A dataset of 50 players was analyzed, with each question addressed using both Python scripts and ChatGPT prompts. The results are compared side by side to highlight both the strengths and limitations of LLMs (Large Language Models) for quantitative data analysis. Where relevant, notes are included to document any mismatches or points where the language model required clarification.

**Included Questions:**

1. Who scored the most points per game?
2. Who is the best all-around player (PTS + REB + AST)?
3. Who is the most complete player? (open-ended/judgment)
4. Who is the best shooter? (FG%, 3P%, FT%)
5. How many players averaged at least 25 points per game?
6. How many players averaged at least 8 assists per game?

For each question, this document provides:

* The question and data prompt
* The Python code and output
* The ChatGPT prompt and answer
* A comparison and brief commentary

The purpose is to explore where LLMs can accurately answer real-world data questions, where they may need prompt engineering, and where human validation is essential.

**Q1. Who scored the most points per game?**

* top\_scorer = df.loc[df['PTS'].idxmax()]

print(f"Top scorer: {top\_scorer['Player']} ({top\_scorer['PTS']} PPG)")  
**Output:**  
Top scorer: Joel Embiid (33.1 PPG)

#### LLM GPT Prompt

Given the following table of NBA players and their points per game (PTS) for 2022–23, who scored the most points per game?

| Player | PTS |

#### |--------------------------|------| Joel Embiid | 33.1 | Luka Doncic | 32.4 | Damian Lillard | 32.2 | Shai Gilgeous-Alexander | 31.4 | Giannis Antetokounmpo | 31.1 | Jayson Tatum | 30.1 | Donovan Mitchell | 28.3 | Stephen Curry | 29.4 | Kevin Durant | 29.1 | LeBron James | 28.9 | Trae Young | 26.2 | Jaylen Brown | 26.6 | De’Aaron Fox | 25.0 | Kyrie Irving | 27.1 | Julius Randle | 25.1 | ... (rest of 50 players) ****GPT Answer****

Joel Embiid scored the most points per game in the 2022–23 NBA season with 33.1 PPG.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  | | --- | --- | --- | --- | | Question | Python Answer | GPT Answer | Match? | | Who scored the most points per game? | Joel Embiid (33.1) | Joel Embiid (33.1) | Yes | |

**Q2. Who is the best all-around player (sum of PTS + REB + AST per game)?**

* df['ALL\_AROUND'] = df['PTS'] + df['REB'] + df['AST']

top\_all\_around = df.loc[df['ALL\_AROUND'].idxmax()]

print(f"Best all-around: {top\_all\_around['Player']} ({top\_all\_around['ALL\_AROUND']})")

**Output:**  
Best all-around: Luka Doncic (49.0)

#### ****GPT Prompt****

Given this table of NBA player per-game stats for 2022–23, who is the best all-around player if we define it as the sum of points, rebounds, and assists per game (PTS + REB + AST)?  
(Table below, just first 15 for brevity)

| Player | PTS | REB | AST |

|--------------------------|------|------|------|  
Joel Embiid | 33.1 | 10.2 | 4.2 |  
Luka Doncic | 32.4 | 8.6 | 8.0 |  
Damian Lillard | 32.2 | 4.8 | 7.3 |  
Shai Gilgeous-Alexander | 31.4 | 4.8 | 5.5 |  
Giannis Antetokounmpo | 31.1 | 11.8 | 5.7 |  
Jayson Tatum | 30.1 | 8.8 | 4.6 |  
Donovan Mitchell | 28.3 | 4.3 | 4.4 |  
Stephen Curry | 29.4 | 6.1 | 6.3 |  
Kevin Durant | 29.1 | 6.7 | 5.0 |  
LeBron James | 28.9 | 8.3 | 6.8 |  
Trae Young | 26.2 | 3.0 | 10.2 |  
Jaylen Brown | 26.6 | 6.9 | 3.5 |  
De’Aaron Fox | 25.0 | 4.2 | 6.1 |  
Kyrie Irving | 27.1 | 5.1 | 5.5 |  
Julius Randle | 25.1 | 10.0 | 4.1 |

#### ****GPT Answer****

Luka Doncic is the best all-around player by this measure, with a combined average of 49.0 (32.4 PTS + 8.6 REB + 8.0 AST per game).

**Q3. Who is the “most complete” player (across all stat categories)?**

#### ****GPT Prompt****

Given this full table of NBA stats, which player would you call the “most complete” across all categories, and why?

| Player | PTS | REB | AST | STL | BLK | FG% | 3P% | FT% |

|--------------------------|------|------|------|-----|-----|------|-----|------|  
Joel Embiid | 33.1 | 10.2 | 4.2 | 1.0 | 1.7 | .548 | .33 | .857 |  
Luka Doncic | 32.4 | 8.6 | 8.0 | 1.4 | 0.5 | .496 | .349| .744 |  
Giannis Antetokounmpo | 31.1 | 11.8 | 5.7 | 0.8 | 0.8 | .553 | .275| .645 |  
Jayson Tatum | 30.1 | 8.8 | 4.6 | 1.1 | 0.7 | .466 | .35 | .853 |  
LeBron James | 28.9 | 8.3 | 6.8 | 0.9 | 0.6 | .500 | .324| .766 |  
Nikola Jokic | 24.5 | 11.8 | 9.8 | 1.3 | 0.7 | .632 | .383| .822 |  
... (rest of table)

#### ****GPT Answer****

It’s subjective, but players like Giannis Antetokounmpo and Nikola Jokic stand out because they contribute heavily in points, rebounds, assists, and play defense. Giannis averages 31.1 PTS, 11.8 REB, 5.7 AST; Jokic (if included) has high rebounds, assists, and efficiency.  
The answer may depend on how you weigh stats.

#### ****Python Validation****

LLM gives a narrative answer here. My Python can only rank by specific metrics, not by an undefined ‘complete’ stat. This shows a limitation in using LLMs for open or undefined criteria.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Question | Python Answer | GPT Answer (summary) | Match? | Notes |
| Who is the most complete player? | Not applicable | "Giannis and Jokic both contribute heavily across all stats, but it depends on how 'complete' is defined. Giannis has more scoring, Jokic more playmaking." | N/A | Open-ended question. No single formula to validate. |

**Q4: Who is the best shooter?**

* # Highest field goal percentage

best\_fg = df.loc[df['FG%'].idxmax()]['Player']

# Highest three-point percentage

best\_3p = df.loc[df['3P%'].idxmax()]['Player']

# Highest free throw percentage

best\_ft = df.loc[df['FT%'].idxmax()]['Player']

print(f"Highest FG%: {best\_fg}")

print(f"Highest 3P%: {best\_3p}")

print(f"Highest FT%: {best\_ft}")

Prompt to GPT:

Given this table of NBA players and their shooting stats for 2022–23, who is the best shooter? (Consider FG%, 3P%, and FT%.)

| Player | FG% | 3P% | FT% |

|--------------------|------|------|------|  
Joel Embiid | .548 | .330 | .857 |  
Luka Doncic | .496 | .349 | .744 |  
Damian Lillard | .463 | .371 | .916 |  
Stephen Curry | .496 | .428 | .915 |  
Kevin Durant | .560 | .400 | .919 |  
Jayson Tatum | .466 | .350 | .853 |  
LeBron James | .500 | .324 | .766 |  
... (rest of table)

**ChatGPT’s Answer:**

The “best shooter” depends on which shooting percentage you value most:

Kevin Durant has the highest field goal percentage (.560) and a very strong free throw percentage (.919).

Stephen Curry has the highest three-point percentage (.428) among these players and is also excellent at free throws (.915).

Damian Lillard leads in free throw percentage (.916) and is also strong from three.

If you value three-point shooting, Stephen Curry is likely the best. For overall efficiency and free throw shooting, Kevin Durant stands out.

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| Question | Python Answer | GPT Answer (summary) | Match? | Notes |
| Who is the best shooter? | FG%: Kevin Durant, 3P%: Stephen Curry, FT%: Kevin Durant / Lillard | “Depends: Curry for 3P%, Durant for FG% & FT%. Best shooter depends on definition.” | Partial | LLM gave nuanced answer prompt was ambiguous on “best.” |

**Q5: How many players averaged at least 25 points per game?**

* num\_25plus = df[df['PTS'] >= 25].shape[0]

print(f"Players with 25+ PPG: {num\_25plus}")

Prompt to GPT:

Given the following table of NBA players and their points per game (PTS) for the 2022–23 season, how many players averaged at least 25 points per game?  
  
| Player | PTS |

|--------------------------|------|  
Joel Embiid | 33.1 |  
Luka Doncic | 32.4 |  
Damian Lillard | 32.2 |  
Shai Gilgeous-Alexander | 31.4 |  
Giannis Antetokounmpo | 31.1 |  
Jayson Tatum | 30.1 |  
Donovan Mitchell | 28.3 |  
Stephen Curry | 29.4 |  
Kevin Durant | 29.1 |  
LeBron James | 28.9 |  
Trae Young | 26.2 |  
Jaylen Brown | 26.6 |  
De’Aaron Fox | 25.0 |  
Kyrie Irving | 27.1 |  
Julius Randle | 25.1 |  
... (rest of table)

ChatGPT’s Answer:

Based on the table, there are 15 players who averaged at least 25 points per game in the 2022–23 season.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Question | Python Answer | GPT Answer | Match? | Notes |
| How many players averaged ≥25 PPG? | 15 | 15 | Yes | Both agreed, direct count. |

**Q6: How many players averaged at least 8 assists per game?**

* eight\_ast = df[df['AST'] >= 8].shape[0]

print(f"Players with ≥8 AST: {eight\_ast}")

Prompt to GPT:

Given this table of NBA players’ stats from the 2022–23 season, how many players averaged at least 8 assists per game?  
  
| Player | AST |

|---------------------|------|  
Luka Doncic | 8.0 |  
Trae Young | 10.2 |  
James Harden | 10.7 |  
Darius Garland | 7.8 |  
Tyrese Haliburton | 10.4 |  
Nikola Jokic | 9.8 |  
Jalen Brunson | 6.2 |  
... (rest of table)

GPT Answer:

There are 4 players who averaged at least 8 assists per game: Trae Young (10.2), James Harden (10.7), Tyrese Haliburton (10.4), and Nikola Jokic (9.8).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Question | Python Answer | GPT Answer | Match? | Notes |
| How many players averaged ≥8 AST per game? | 5 | 4 | No | GPT missed Luka Doncic (8.0); possibly skipped boundary value or parsing. |