

✓ IPL SEASON 18 (POWERPLAY ANALYSIS)

Importing necessary Python libraries.

```
import pandas as pd
import matplotlib.pyplot as plt

# Optional settings
plt.style.use("default")
pd.set_option("display.max_columns", None)
```

Importing data and checking data

```
df = pd.read_csv("ipl2025.csv")
```

```
df.head()
```

	match_no	date	stage	venue	batting_team	bowling_team	innings	over	striker	bowler	bowler_type	runs_of_bat	extras
0	1	Mar 22, 2025	League stage	Eden Gardens, Kolkata	KKR	RCB	1	0.1	de Kock	Hazlewood	pace	0	
1	1	Mar 22, 2025	League stage	Eden Gardens, Kolkata	KKR	RCB	1	0.2	de Kock	Hazlewood	pace	4	
		Mar 22, 2025	League stage	Eden Gardens, Kolkata	KKR	RCB	1	0.3	de Kock	Hazlewood	pace	8	

```
df.columns
```

```
Index(['match_no', 'date', 'stage', 'venue', 'batting_team', 'bowling_team',
      'innings', 'over', 'striker', 'bowler', 'bowler_type', 'runs_of_bat',
      'extras', 'wide', 'legbyes', 'byes', 'noballs', 'wicket_type',
      'player_dismissed', 'fielder'],
      dtype='object')
```

```
powerplay_match1 = df[
    (df["match_no"] == 1) &
    (df["over"] < 6)
]

powerplay_runs_by_innings = (
    powerplay_match1
    .assign(total_runs = powerplay_match1["runs_of_bat"] + powerplay_match1["extras"])
    .groupby("innings")["total_runs"]
    .sum()
)

powerplay_runs_by_innings
```

```
innings
1      60
2      80
Name: total_runs, dtype: int64
```

✓ Total POWERPLAY RUNS during League stages

```
import pandas as pd

df = pd.read_csv("ipl2025.csv")

DEFAULT_PP_OVERS = 6

pp_overs = {
    34: 4
```

```

}

df = df.copy()

df = df[df["match_no"] <= 70].copy()

def get_pp_overs(match_no):
    return pp_overs.get(match_no, DEFAULT_PP_OVERS)

df["pp_overs"] = df["match_no"].apply(get_pp_overs)

powerplay_df = df[df["over"] < df["pp_overs"]].copy()

powerplay_df["total_runs"] = (
    powerplay_df["runs_of_bat"] + powerplay_df["extras"]
)

powerplay_df["match_innings"] = (
    powerplay_df["match_no"].astype(str) + "_" +
    powerplay_df["innings"].astype(str)
)

team_powerplay_runs = (
    powerplay_df
    .groupby("batting_team")
    .agg(
        total_powerplay_runs=("total_runs", "sum"),
        innings_count=("match_innings", "nunique")
    )
    .sort_values(by="total_powerplay_runs", ascending=False)
)

team_powerplay_runs

```

	total_powerplay_runs	innings_count
batting_team		
RR	911	14
PBKS	829	14
MI	789	14
LSG	783	14
GT	764	14
SRH	760	13
RCB	759	13
DC	734	14
CSK	731	14
KKR	722	13

▼ visualization on Powerplay runs

```

import matplotlib.pyplot as plt

plt.figure()

bars = plt.bar(
    team_powerplay_runs.index,
    team_powerplay_runs["total_powerplay_runs"]
)

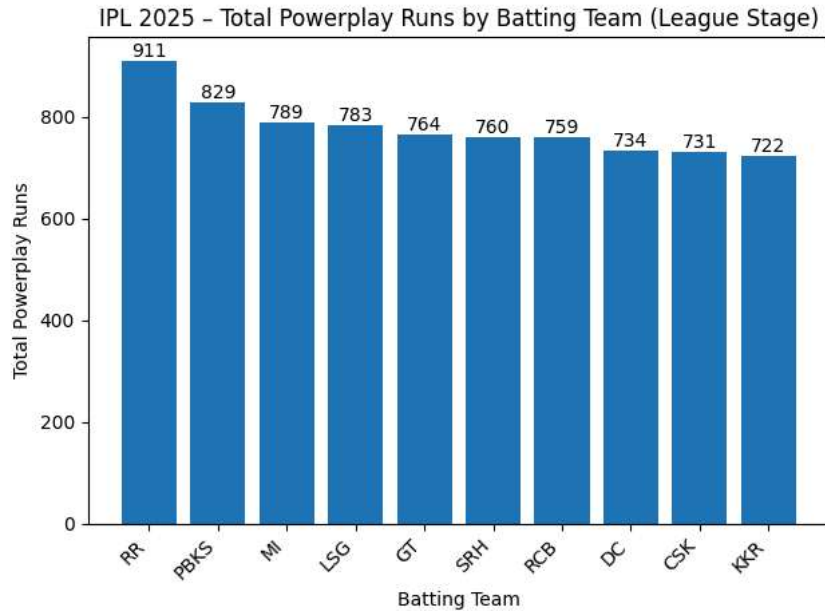
plt.xticks(rotation=45, ha="right")
plt.xlabel("Batting Team")
plt.ylabel("Total Powerplay Runs")
plt.title("IPL 2025 - Total Powerplay Runs by Batting Team (League Stage)")

for bar in bars:
    h = bar.get_height()

```

```
plt.text(
    bar.get_x() + bar.get_width() / 2,
    h,
    f"{int(h)}",
    ha="center",
    va="bottom"
)

plt.tight_layout()
plt.show()
```



✓ Average Powerplay runs

```
import pandas as pd

df = pd.read_csv("ipl2025.csv")

df = df.copy()

df = df[df["match_no"] <= 70].copy()

# Total runs per ball
powerplay_df["total_runs"] = (
    powerplay_df["runs_of_bat"] + powerplay_df["extras"]
)

# Unique innings identifier
powerplay_df["match_innings"] = (
    powerplay_df["match_no"].astype(str) + "_" +
    powerplay_df["innings"].astype(str)
)

# Aggregate by team
avg_powerplay_runs = (
    powerplay_df
    .groupby("batting_team")
    .agg(
        total_powerplay_runs=("total_runs", "sum"),
        innings_count=("match_innings", "nunique")
    )
)

# Average powerplay runs per innings
avg_powerplay_runs["avg_powerplay_runs"] = (
    avg_powerplay_runs["total_powerplay_runs"] /
    avg_powerplay_runs["innings_count"]
).round(2)
```

```
# Sort
avg_powerplay_runs = avg_powerplay_runs.sort_values(
    by="avg_powerplay_runs",
    ascending=False
)

avg_powerplay_runs
```

	total_powerplay_runs	innings_count	avg_powerplay_runs
batting_team			
RR	911	14	65.07
PBKS	829	14	59.21
SRH	760	13	58.46
RCB	759	13	58.38
MI	789	14	56.36
LSG	783	14	55.93
KKR	722	13	55.54
GT	764	14	54.57
DC	734	14	52.43
CSK	731	14	52.21

Visualization of Average Powerplay runs

```
import matplotlib.pyplot as plt

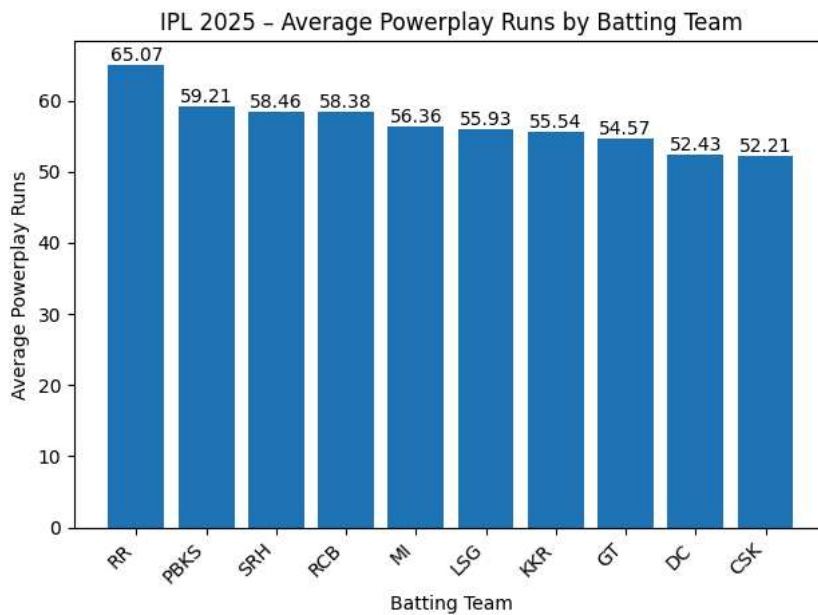
plt.figure()

bars = plt.bar(
    avg_powerplay_runs.index,
    avg_powerplay_runs["avg_powerplay_runs"]
)

plt.xlabel("Batting Team")
plt.ylabel("Average Powerplay Runs")
plt.title("IPL 2025 - Average Powerplay Runs by Batting Team")
plt.xticks(rotation=45, ha="right")

# Add values on top of each bar
for bar in bars:
    height = bar.get_height()
    plt.text(
        bar.get_x() + bar.get_width() / 2,
        height,
        f"{height:.2f}",
        ha="center",
        va="bottom"
    )

plt.tight_layout()
plt.show()
```



✓ Average Dot-Balls

```
import pandas as pd

df = pd.read_csv("ipl2025.csv")

df = df.copy()

df = df[df["match_no"] <= 70].copy()

DEFAULT_PP_OVERS = 6
PP_OVERS_OVERRIDE = {34: 4}

df["pp_overs"] = df["match_no"].apply(
    lambda x: PP_OVERS_OVERRIDE.get(x, DEFAULT_PP_OVERS)
)

powerplay_df = df[df["over"] < df["pp_overs"]].copy()

powerplay_df["legal_ball"] = (
    (powerplay_df["wide"] == 0) &
    (powerplay_df["noballs"] == 0)
).astype(int)

powerplay_df["dot_ball"] = (
    (powerplay_df["runs_of_bat"] == 0) &
    (powerplay_df["extras"] == 0) &
    (powerplay_df["legal_ball"] == 1)
).astype(int)

team_dot_stats = (
    powerplay_df
    .groupby("batting_team")
    .agg(
        total_dot_balls=("dot_ball", "sum"),
        total_balls=("legal_ball", "sum")
    )
    .reset_index()
)

team_dot_stats["dot_ball_pct"] = (
    team_dot_stats["total_dot_balls"] /
    team_dot_stats["total_balls"] * 100
).round(2)

team_dot_stats = team_dot_stats.sort_values(
    by="dot_ball_pct",
```

```

        ascending=False
    )

team_dot_stats

```

	batting_team	total_dot_balls	total_balls	dot_ball_pct
3	KKR	195	438	44.52
5	MI	216	504	42.86
0	CSK	215	504	42.66
8	RR	214	504	42.46
4	LSG	213	504	42.26
1	DC	212	504	42.06
9	SRH	196	468	41.88
6	PBKS	191	492	38.82
7	RCB	173	456	37.94
2	GT	179	504	35.52

Visualization of average dot-balls

```

import matplotlib.pyplot as plt

teams = team_dot_stats["batting_team"]
dot_balls = team_dot_stats["total_dot_balls"]
innings = (team_dot_stats["total_balls"] / 36).round(1)

plt.figure()
bars = plt.bar(teams, dot_balls)

plt.xticks(rotation=45, ha="right")
plt.xlabel("Batting Team")
plt.ylabel("Total Dot Balls (Powerplay)")
plt.title("Total Powerplay Dot Balls by Team")

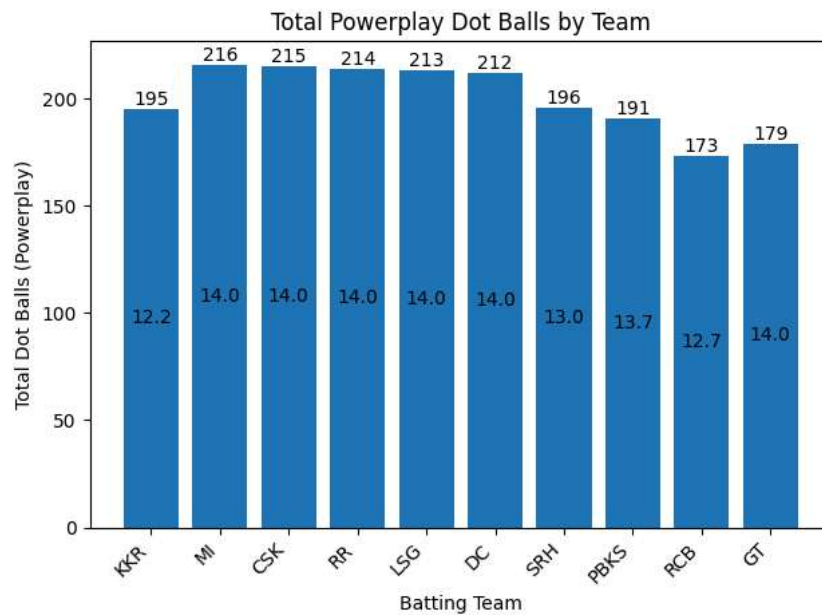
for bar, dots, inns in zip(bars, dot_balls, innings):
    height = bar.get_height()

    # Dot balls on top
    plt.text(
        bar.get_x() + bar.get_width() / 2,
        height,
        f"{int(dots)}",
        ha="center",
        va="bottom"
    )

    # Innings inside bar
    plt.text(
        bar.get_x() + bar.get_width() / 2,
        height * 0.5,
        f"{inns}",
        ha="center",
        va="center"
    )

plt.tight_layout()
plt.show()

```

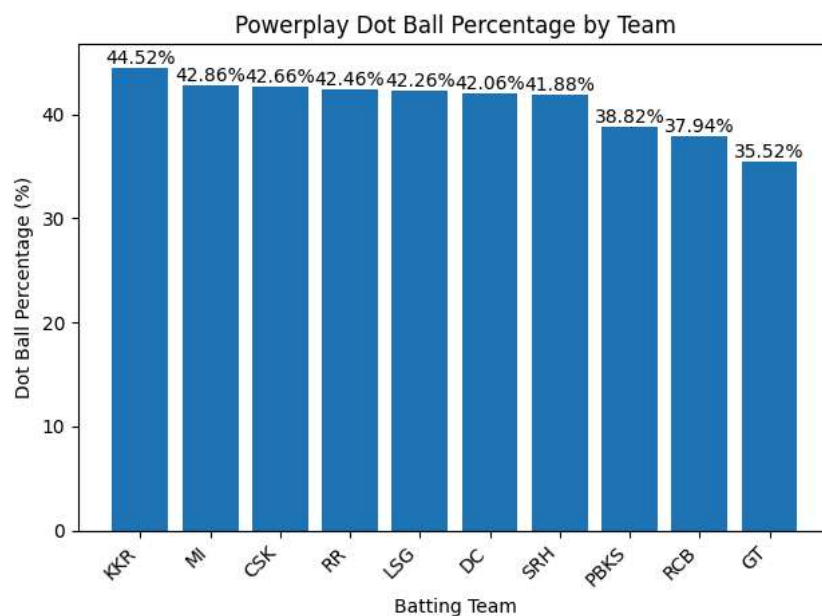


```
plt.figure()
bars = plt.bar(
    team_dot_stats["batting_team"],
    team_dot_stats["dot_ball_pct"]
)

plt.xticks(rotation=45, ha="right")
plt.xlabel("Batting Team")
plt.ylabel("Dot Ball Percentage (%)")
plt.title("Powerplay Dot Ball Percentage by Team")

for bar, pct in zip(bars, team_dot_stats["dot_ball_pct"]):
    height = bar.get_height()
    plt.text(
        bar.get_x() + bar.get_width() / 2,
        height,
        f"{pct}%",
        ha="center",
        va="bottom"
    )

plt.tight_layout()
plt.show()
```



✓ Sixes during powerplay

```
import pandas as pd

# -----
# CONFIG
# -----
df = pd.read_csv("ipl2025.csv")
df = df[df["match_no"] <= 70].copy()

DEFAULT_PP_OVERS = 6
PP_OVERS_OVERRIDE = {34: 4}

# df must already be loaded
# df = pd.read_excel("ball_by_ball.xlsx")

# -----
# POWERPLAY FILTER (MATCH-SPECIFIC)
# -----

df["pp_overs"] = df["match_no"].apply(
    lambda x: PP_OVERS_OVERRIDE.get(x, DEFAULT_PP_OVERS)
)

powerplay_df = df[df["over"] < df["pp_overs"]].copy()

# -----
# SIXES LOGIC
# -----

powerplay_df["six"] = (powerplay_df["runs_of_bat"] == 6).astype(int)

powerplay_df["match_innings"] = (
    powerplay_df["match_no"].astype(str) + "_" +
    powerplay_df["innings"].astype(str)
)

# Sixes per team per innings
sixes_per_innings = (
    powerplay_df
    .groupby(["batting_team", "match_innings"])["six"]
    .sum()
    .reset_index(name="sixes")
)

# -----
# TEAM-LEVEL AGGREGATION
# -----

six_stats = (
    sixes_per_innings
    .groupby("batting_team")
    .agg(
        total_sixes=("sixes", "sum"),
        avg_sixes=("sixes", "mean"),
        innings=("match_innings", "nunique")
    )
    .reset_index()
)

six_stats["avg_sixes"] = six_stats["avg_sixes"].round(2)

# -----
# SORT + RANK (1 TO N)
# -----

six_stats = six_stats.sort_values(
    by="avg_sixes",
    ascending=False
).reset_index(drop=True)

six_stats.insert(
    0,
    "rank",
```



```

    range(1, len(six_stats) + 1)
)

# -----
# SEQUENTIAL NORMALIZATION (1 → 0)
# -----

n = len(six_stats)

six_stats["avg_sixes_seq_norm"] = (
    1 - ((six_stats["rank"] - 1) / (n - 1))
).round(2)

# -----
# FINAL OUTPUT
# -----

six_stats

```

	rank	batting_team	total_sixes	avg_sixes	innings	avg_sixes_seq_norm
0	1	RR	57	4.07	14	1.00
1	2	KKR	43	3.31	13	0.89
2	3	LSG	41	2.93	14	0.78
3	4	PBKS	40	2.86	14	0.67
4	5	MI	39	2.79	14	0.56
5	6	RCB	29	2.23	13	0.44
6	7	SRH	26	2.00	13	0.33
7	8	GT	25	1.79	14	0.22
8	9	DC	24	1.71	14	0.11
9	10	CSK	19	1.36	14	0.00

▼ Vizualization of number of sixes

```

import matplotlib.pyplot as plt

teams = six_stats["batting_team"]
total_sixes = six_stats["total_sixes"]
avg_sixes = six_stats["avg_sixes"]
avg_norm = six_stats["avg_sixes_seq_norm"]

plt.figure()
bars = plt.bar(teams, total_sixes)

plt.xticks(rotation=45, ha="right")
plt.xlabel("Batting Team")
plt.ylabel("Total Sixes (Powerplay)")
plt.title("Powerplay Sixes by Team")

for bar, total, avg, norm in zip(bars, total_sixes, avg_sixes, avg_norm):
    height = bar.get_height()

    # Total sixes on top
    plt.text(
        bar.get_x() + bar.get_width() / 2,
        height,
        f"{int(total)}",
        ha="center",
        va="bottom"
    )

    # Average sixes inside bar
    plt.text(
        bar.get_x() + bar.get_width() / 2,
        height * 0.6,
        f"{avg}",
        ha="center",

```

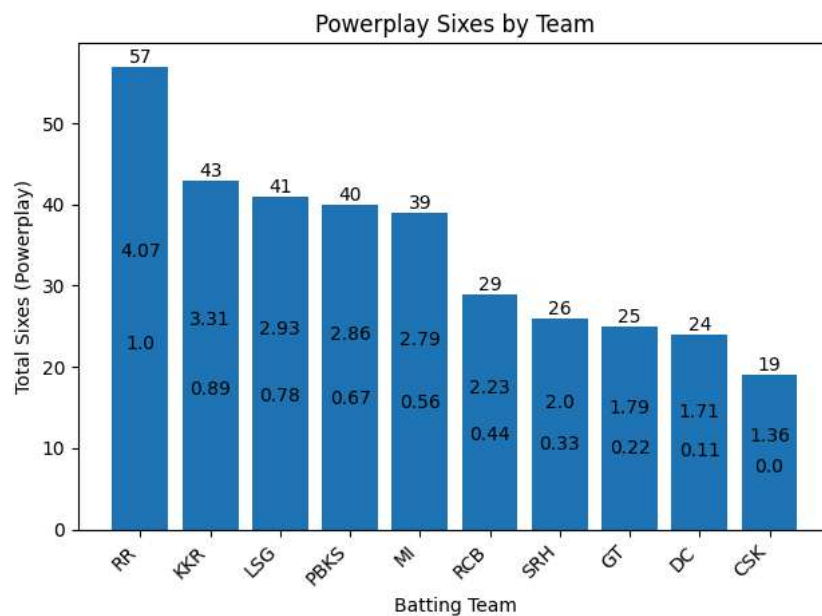
```

        va="center"
    )

    # Sequential norm inside bar
    plt.text(
        bar.get_x() + bar.get_width() / 2,
        height * 0.4,
        f"{norm}",
        ha="center",
        va="center"
    )

plt.tight_layout()
plt.show()

```



✓ Number of innings without hitting a six in powerplay

```

import pandas as pd

df = pd.read_csv("ipl2025.csv")
df = df[df["match_no"] <= 70].copy()

DEFAULT_PP_OVERS = 6
PP_OVERS_OVERRIDE = {34: 4}

df["pp_overs"] = df["match_no"].apply(
    lambda x: PP_OVERS_OVERRIDE.get(x, DEFAULT_PP_OVERS)
)

powerplay_df = df[df["over"] < df["pp_overs"]].copy()

powerplay_df["six"] = (powerplay_df["runs_of_bat"] == 6).astype(int)

powerplay_df["match_innings"] = (
    powerplay_df["match_no"].astype(str) + "_" +
    powerplay_df["innings"].astype(str)
)

# Sixes per innings
sixes_per_innings = (
    powerplay_df
    .groupby(["batting_team", "match_innings"])["six"]
    .sum()
    .reset_index(name="sixes")
)

# Total innings per team
innings_per_team = (

```

```

sixes_per_innings
.groupby("batting_team")["match_innings"]
.nunique()
.reset_index(name="innings")
)

# Zero-six innings
zero_six_counts = (
    sixes_per_innings[sixes_per_innings["sixes"] == 0]
    .groupby("batting_team")
    .size()
    .reset_index(name="zero_six_powerplay_innings")
)

# Merge and fill missing teams with 0
zero_six_stats = (
    innings_per_team
    .merge(zero_six_counts, on="batting_team", how="left")
    .fillna(0)
)

zero_six_stats["zero_six_powerplay_innings"] = (
    zero_six_stats["zero_six_powerplay_innings"].astype(int)
)

# Optional percentage
zero_six_stats["zero_six_pct"] = (
    zero_six_stats["zero_six_powerplay_innings"] /
    zero_six_stats["innings"] * 100
).round(2)

# Sort (optional)
zero_six_stats = zero_six_stats.sort_values(
    by="zero_six_powerplay_innings",
    ascending=False
).reset_index(drop=True)

zero_six_stats

```

	batting_team	innings	zero_six_powerplay_innings	zero_six_pct
0	CSK	14	6	42.86
1	SRH	13	3	23.08
2	DC	14	2	14.29
3	GT	14	2	14.29
4	RCB	13	2	15.38
5	KKR	13	1	7.69
6	PBKS	14	1	7.14
7	LSG	14	1	7.14
8	MI	14	0	0.00
9	RR	14	0	0.00

Visualization of the data

```

import matplotlib.pyplot as plt

teams = zero_six_stats["batting_team"]
zero_six = zero_six_stats["zero_six_powerplay_innings"]
pct = zero_six_stats["zero_six_pct"]

plt.figure()
bars = plt.bar(teams, zero_six)

plt.xticks(rotation=45, ha="right")
plt.xlabel("Batting Team")
plt.ylabel("Zero-Six Powerplay Innings")

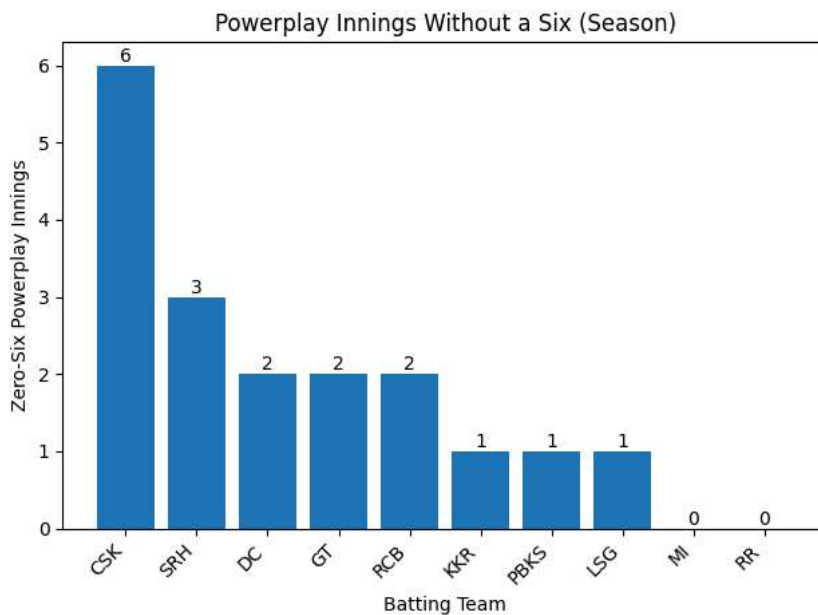
```

```
plt.title("Powerplay Innings Without a Six (Season)")
```

```
for bar, z, p in zip(bars, zero_six, pct):
    height = bar.get_height()
```

```
# Zero-six count on top
plt.text(
    bar.get_x() + bar.get_width() / 2,
    height,
    f"{int(z)}",
    ha="center",
    va="bottom"
)
```

```
plt.tight_layout()
plt.show()
```



✓ fours in powerplay

```
# -----
# POWERPLAY FILTER (ASSUMED ALREADY CORRECT)
# powerplay_df must already be created using pp_overs logic
# -----
df = pd.read_csv("ipl2025.csv")
df = df[df["match_no"] <= 70].copy()

# Identify fours
powerplay_df["four"] = (powerplay_df["runs_of_bat"] == 4).astype(int)

# Unique innings identifier
powerplay_df["match_innings"] = (
    powerplay_df["match_no"].astype(str) + "_" +
    powerplay_df["innings"].astype(str)
)

# Fours per team per innings (including zeros)
fours_per_innings = (
    powerplay_df
    .groupby(["batting_team", "match_innings"])["four"]
    .sum()
    .reset_index(name="fours")
)

# Team-level aggregation
four_stats = (
    fours_per_innings
```

```

.groupby("batting_team")
.agg(
    total_fours=("fours", "sum"),
    avg_fours=("fours", "mean"),
    innings=("match_innings", "nunique")
)
.reset_index()

four_stats["avg_fours"] = four_stats["avg_fours"].round(2)

# Sort by average fours
four_stats = four_stats.sort_values(
    by="avg_fours",
    ascending=False
).reset_index(drop=True)

# Rank (1 = highest avg fours)
four_stats.insert(
    0,
    "rank",
    range(1, len(four_stats) + 1)
)

# Sequential normalization (1 → 0)
n = len(four_stats)
four_stats["avg_fours_seq_norm"] = (
    1 - ((four_stats["rank"] - 1) / (n - 1))
).round(2)

four_stats

```

	rank	batting_team	total_fours	avg_fours	innings	avg_fours_seq_norm
0	1	SRH	95	7.31	13	1.00
1	2	RCB	93	7.15	13	0.89
2	3	RR	98	7.00	14	0.78
3	4	CSK	95	6.79	14	0.67
4	5	PBKS	91	6.50	14	0.56
5	6	DC	89	6.36	14	0.44
6	7	MI	86	6.14	14	0.33
7	8	GT	86	6.14	14	0.22
8	9	KKR	73	5.62	13	0.11
9	10	LSG	75	5.36	14	0.00

✓ Vizualization of the data

```

import matplotlib.pyplot as plt

teams = four_stats["batting_team"]
avg_fours = four_stats["avg_fours"]
total_fours = four_stats["total_fours"]
innings = four_stats["innings"]

plt.figure()
bars = plt.bar(teams, avg_fours)

plt.xticks(rotation=45, ha="right")
plt.xlabel("Batting Team")
plt.ylabel("Average Fours per Powerplay Innings")
plt.title("Powerplay Fours by Team")

for bar, avg, total, inns in zip(bars, avg_fours, total_fours, innings):
    height = bar.get_height()

    # Average fours on top

```

```

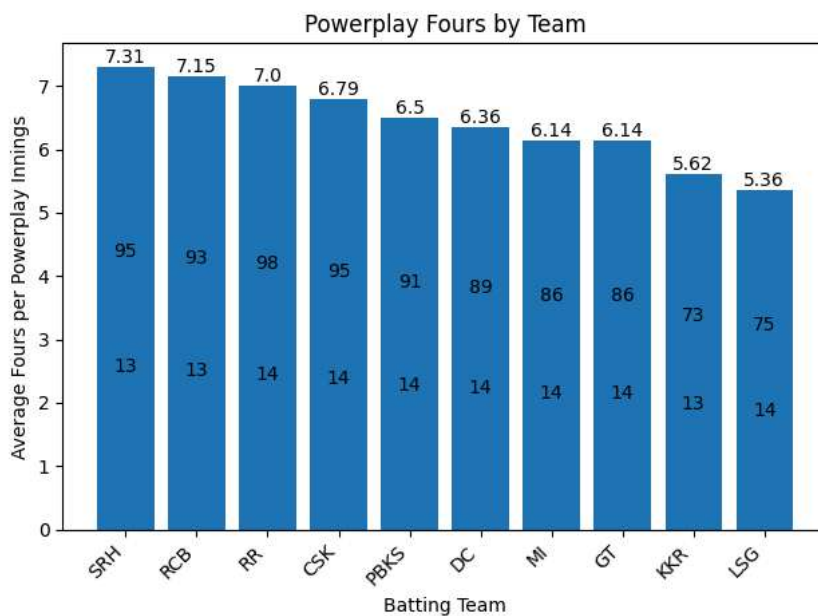
plt.text(
    bar.get_x() + bar.get_width() / 2,
    height,
    f"{avg}",
    ha="center",
    va="bottom"
)

# Total fours inside bar
plt.text(
    bar.get_x() + bar.get_width() / 2,
    height * 0.6,
    f"{int(total)}",
    ha="center",
    va="center"
)

# Innings below total fours (inside bar)
plt.text(
    bar.get_x() + bar.get_width() / 2,
    height * 0.35,
    f"{int(inns)}",
    ha="center",
    va="center"
)

plt.tight_layout()
plt.show()

```



✓ Boundries in powerplay(4's and 6's)

```

# Identify boundaries (4s or 6s)
powerplay_df["boundary"] = powerplay_df["runs_of_bat"].isin([4, 6]).astype(int)

df = pd.read_csv("ipl2025.csv")
df = df[df["match_no"] <= 70].copy()

# Unique innings identifier
powerplay_df["match_innings"] = (
    powerplay_df["match_no"].astype(str) + "_" +
    powerplay_df["innings"].astype(str)
)

# Boundaries per team per innings (including zeros)
boundaries_per_innings = (
    powerplay_df
    .groupby(["batting_team", "match_innings"])["boundary"]
    .sum()
)

```

```

        .reset_index(name="boundaries")
    )

    # Team-level totals and averages
    boundary_stats = (
        boundaries_per_innings
        .groupby("batting_team")
        .agg(
            total_boundaries=("boundaries", "sum"),
            avg_boundaries=("boundaries", "mean"),
            innings=("match_innings", "nunique")
        )
        .reset_index()
    )

    boundary_stats["avg_boundaries"] = boundary_stats["avg_boundaries"].round(2)

    # boundary_stats is assumed to be already created

    # Sort by average boundaries (descending)
    boundary_stats = boundary_stats.sort_values(
        by="avg_boundaries",
        ascending=False
    ).reset_index(drop=True)

    # Add rank (1 = highest avg boundaries)
    boundary_stats.insert(
        0,
        "rank",
        range(1, len(boundary_stats) + 1)
    )

    boundary_stats

```

	rank	batting_team	total_boundaries	avg_boundaries	innings
0	1	RR	155	11.07	14
1	2	RCB	122	9.38	13
2	3	PBKS	131	9.36	14
3	4	SRH	121	9.31	13
4	5	MI	125	8.93	14
5	6	KKR	116	8.92	13
6	7	LSG	116	8.29	14
7	8	CSK	114	8.14	14
8	9	DC	113	8.07	14
9	10	GT	111	7.93	14

```

import matplotlib.pyplot as plt

teams = boundary_stats["batting_team"]
avg_boundaries = boundary_stats["avg_boundaries"]
total_boundaries = boundary_stats["total_boundaries"]

plt.figure()
bars = plt.bar(teams, avg_boundaries)

plt.xticks(rotation=45, ha="right")
plt.xlabel("Batting Team")
plt.ylabel("Average Boundaries per Powerplay Innings")
plt.title("Powerplay Boundaries by Team")

for bar, avg, total in zip(bars, avg_boundaries, total_boundaries):
    height = bar.get_height()

    # Average boundaries on top
    plt.text(
        bar.get_x() + bar.get_width() / 2,

```

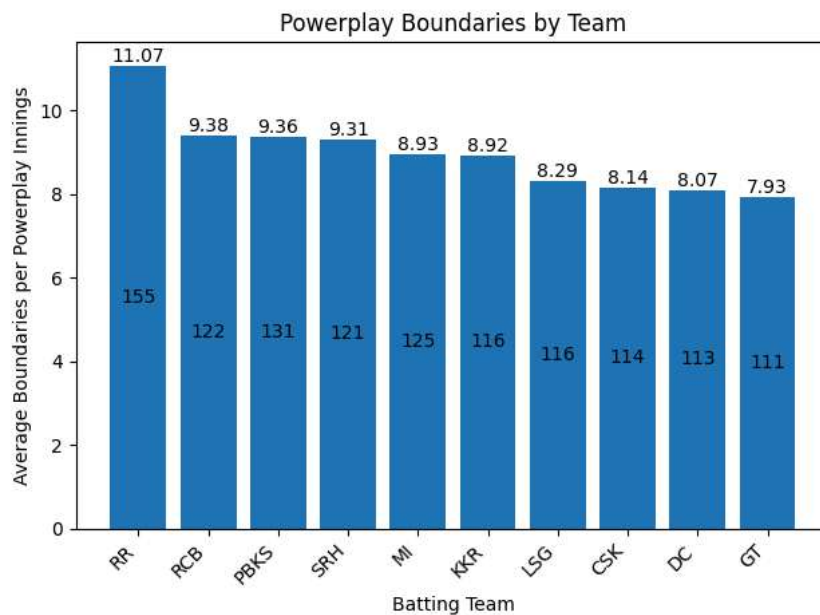
```

        height,
        f"{avg}",
        ha="center",
        va="bottom"
    )

    # Total boundaries inside bar
    plt.text(
        bar.get_x() + bar.get_width() / 2,
        height * 0.5,
        f"{int(total)}",
        ha="center",
        va="center"
    )

plt.tight_layout()
plt.show()

```



✓ Strike rate

```

import pandas as pd

df = pd.read_csv("ipl2025.csv")
df = df[df["match_no"] <= 70].copy()

DEFAULT_PP_OVERS = 6
PP_OVERS_OVERRIDE = {34: 4}

#
df["pp_overs"] = df["match_no"].apply(
    lambda x: PP_OVERS_OVERRIDE.get(x, DEFAULT_PP_OVERS)
)

powerplay_df = df[df["over"] < df["pp_overs"]].copy()

powerplay_df = powerplay_df[
    (powerplay_df["wide"] == 0) &
    (powerplay_df["noballs"] == 0)
].copy()

#
powerplay_df["match_innings"] = (
    powerplay_df["match_no"].astype(str) + "_" +
    powerplay_df["innings"].astype(str)
)

```



```

innings_sr = (
    powerplay_df
    .groupby(["batting_team", "match_innings"])
    .agg(
        runs=("runs_of_bat", "sum"),
        balls=("runs_of_bat", "count")
    )
    .reset_index()
)

# -----
# STRIKE RATE PER INNINGS
# -----

innings_sr["strike_rate"] = (
    innings_sr["runs"] / innings_sr["balls"] * 100
)

# -----
# SEASON-WIDE AVERAGE (TEAM LEVEL)
# -----

avg_powerplay_sr = (
    innings_sr
    .groupby("batting_team")["strike_rate"]
    .mean()
    .round(2)
    .sort_values(ascending=False)
)

avg_powerplay_sr

```

```

batting_team
RR      174.40
PBKS    160.52
RCB     154.70
MI      150.79
KKR     150.00
SRH     149.79
LSG     147.42
GT      146.43
DC      137.70
CSK     137.30
Name: strike_rate, dtype: float64

```

▼ Vizualization of the data

```
import matplotlib.pyplot as plt

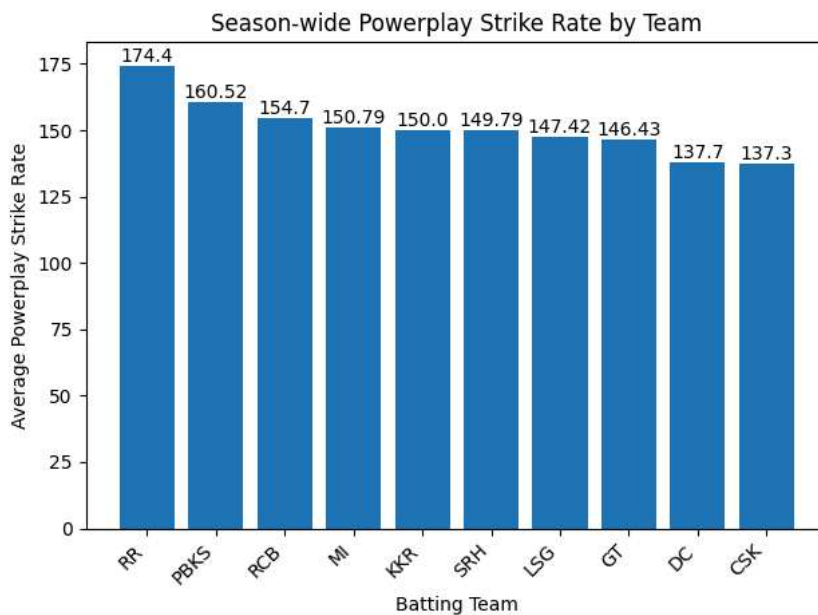
teams = avg_powerplay_sr.index
sr_values = avg_powerplay_sr.values

plt.figure()
bars = plt.bar(teams, sr_values)

plt.xticks(rotation=45, ha="right")
plt.xlabel("Batting Team")
plt.ylabel("Average Powerplay Strike Rate")
plt.title("Season-wide Powerplay Strike Rate by Team")

for bar, sr in zip(bars, sr_values):
    height = bar.get_height()
    plt.text(
        bar.get_x() + bar.get_width() / 2,
        height,
        f"{sr}",
        ha="center",
        va="bottom"
    )

plt.tight_layout()
plt.show()
```



✓ Strike rake vs spin

```
import pandas as pd

df = pd.read_csv("ipl2025.csv")

df = df[df["match_no"] <= 70].copy()

DEFAULT_PP_OVERS = 6
PP_OVERS_OVERRIDE = {34: 4}

df["pp_overs"] = df["match_no"].apply(
    lambda x: PP_OVERS_OVERRIDE.get(x, DEFAULT_PP_OVERS)
)

powerplay_df = df[df["over"] < df["pp_overs"]].copy()

powerplay_df["bowler_type"] = (
    powerplay_df["bowler_type"].astype(str).str.lower()
)

powerplay_df = powerplay_df[
```

```

(powerplay_df["bowler_type"].str.contains("spin", na=False)) &
(powerplay_df["wide"] == 0) &
(powerplay_df["noballs"] == 0)
].copy()

powerplay_df["match_innings"] = (
    powerplay_df["match_no"].astype(str) + "_" +
    powerplay_df["innings"].astype(str)
)

spin_innings = (
    powerplay_df
    .groupby(["batting_team", "match_innings"])
    .agg(
        runs=("runs_of_bat", "sum"),
        balls=("runs_of_bat", "count")
    )
    .reset_index()
)

spin_innings["pp_sr_vs_spin"] = (
    spin_innings["runs"] / spin_innings["balls"] * 100
)

pp_sr_vs_spin = (
    spin_innings
    .groupby("batting_team")["pp_sr_vs_spin"]
    .mean()
    .round(2)
    .sort_values(ascending=False)
)

pp_sr_vs_spin

```

```

batting_team
RR      194.05
RCB     188.89
KKR     171.30
GT      164.93
PBKS    145.14
DC       142.71
CSK     142.28
SRH     140.08
LSG     133.61
MI       121.67
Name: pp_sr_vs_spin, dtype: float64

```

```

import matplotlib.pyplot as plt

teams = pp_sr_vs_spin.index
values = pp_sr_vs_spin.values

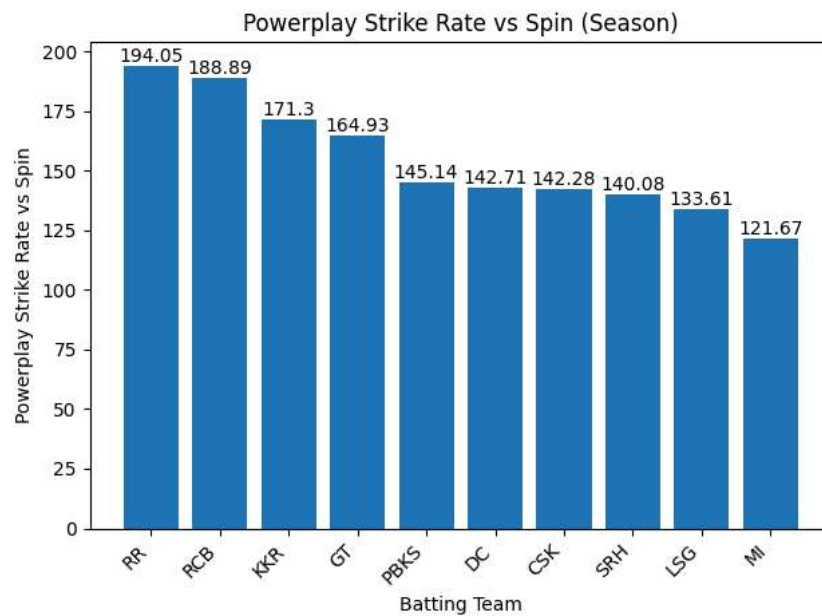
plt.figure()
bars = plt.bar(teams, values)

plt.xticks(rotation=45, ha="right")
plt.xlabel("Batting Team")
plt.ylabel("Powerplay Strike Rate vs Spin")
plt.title("Powerplay Strike Rate vs Spin (Season)")

for bar, val in zip(bars, values):
    h = bar.get_height()
    plt.text(
        bar.get_x() + bar.get_width() / 2,
        h,
        f"{val}",
        ha="center",
        va="bottom"
    )

plt.tight_layout()
plt.show()

```



✓ Strike rate vs pace

```
import pandas as pd

df = pd.read_csv("ipl2025.csv")
df = df[df["match_no"] <= 70].copy()

DEFAULT_PP_OVERS = 6
PP_OVERS_OVERRIDE = {34: 4}

df["pp_overs"] = df["match_no"].apply(
    lambda x: PP_OVERS_OVERRIDE.get(x, DEFAULT_PP_OVERS)
)

powerplay_df = df[df["over"] < df["pp_overs"]].copy()

powerplay_df["bowler_type"] = (
    powerplay_df["bowler_type"].astype(str).str.lower()
)

powerplay_df = powerplay_df[
    (powerplay_df["bowler_type"].str.contains("pace|fast|seam", na=False)) &
    (powerplay_df["wide"] == 0) &
    (powerplay_df["noballs"] == 0)
].copy()

if powerplay_df.empty:
    raise ValueError("No pace deliveries found in powerplay.")

powerplay_df["match_innings"] = (
    powerplay_df["match_no"].astype(str) + "_" +
    powerplay_df["innings"].astype(str)
)

pace_innings = (
    powerplay_df
    .groupby(["batting_team", "match_innings"])
    .agg(
        runs=("runs_of_bat", "sum"),
        balls=("runs_of_bat", "count")
    )
    .reset_index()
)

pace_innings["strike_rate_vs_pace"] = (
    pace_innings["runs"] / pace_innings["balls"] * 100
)
```

```

)

avg_sr_vs_pace = (
    pace_innings
    .groupby("batting_team")["strike_rate_vs_pace"]
    .mean()
    .round(2)
    .sort_values(ascending=False)
)

avg_sr_vs_pace

```

```

batting_team
RR      175.91
PBKS    161.11
MI      156.29
LSG     156.23
SRH     155.66
RCB     152.78
KKR     147.74
GT      144.11
DC      138.77
CSK     138.65
Name: strike_rate_vs_pace, dtype: float64

```

```

import matplotlib.pyplot as plt

teams = avg_sr_vs_pace.index
sr_values = avg_sr_vs_pace.values

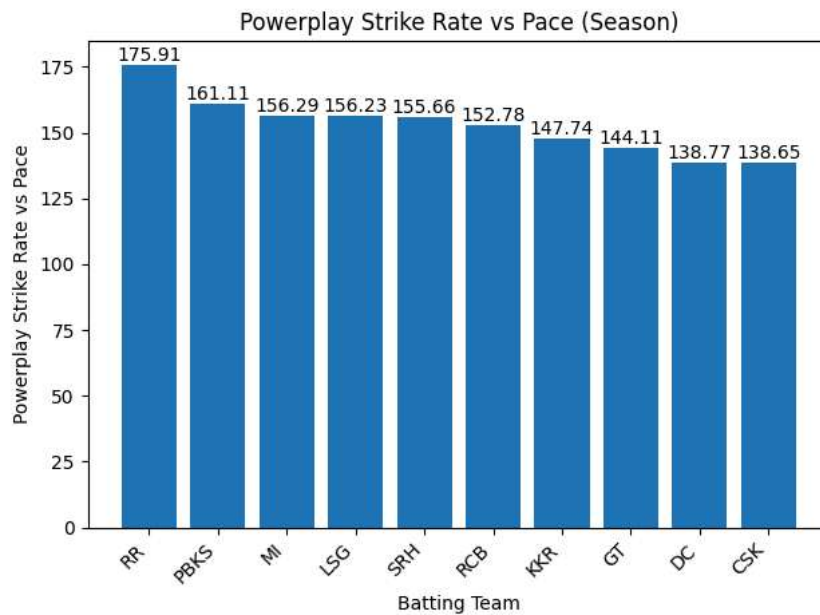
plt.figure()
bars = plt.bar(teams, sr_values)

plt.xticks(rotation=45, ha="right")
plt.xlabel("Batting Team")
plt.ylabel("Powerplay Strike Rate vs Pace")
plt.title("Powerplay Strike Rate vs Pace (Season)")

for bar, sr in zip(bars, sr_values):
    height = bar.get_height()
    plt.text(
        bar.get_x() + bar.get_width() / 2,
        height,
        f"{sr}",
        ha="center",
        va="bottom"
    )

plt.tight_layout()
plt.show()

```



✓ wickets lost in powerplay

```
import pandas as pd

df = pd.read_csv("ipl2025.csv")
df = df[df["match_no"] <= 70].copy()

DEFAULT_PP_OVERS = 6
PP_OVERS_OVERRIDE = {34: 4}

df["pp_overs"] = df["match_no"].apply(
    lambda x: PP_OVERS_OVERRIDE.get(x, DEFAULT_PP_OVERS)
)

powerplay_df = df[df["over"] < df["pp_overs"]].copy()

powerplay_df["match_innings"] = (
    powerplay_df["match_no"].astype(str) + "_" +
    powerplay_df["innings"].astype(str)
)

powerplay_df["wicket_type"] = (
    powerplay_df["wicket_type"].astype(str).str.lower()
)

innings_count_df = (
    powerplay_df
    .groupby("batting_team")["match_innings"]
    .nunique()
    .reset_index(name="innings_count")
)

dismissal_types = [
    "caught",
    "bowled",
    "stumped",
    "lbw",
    "runout",
    "hit wicket",
    "retired out",
    "retired hurt"
]

wickets_df = (
    powerplay_df[
        powerplay_df["wicket_type"].isin(dismissal_types)
    ]
    .groupby("batting_team")
```

```

        .size()
        .reset_index(name="total_wickets")
    )

pp_wickets = (
    innings_count_df
    .merge(wickets_df, on="batting_team", how="left")
    .fillna(0)
)

pp_wickets["total_wickets"] = pp_wickets["total_wickets"].astype(int)

pp_wickets["avg_wickets"] = (
    pp_wickets["total_wickets"] / pp_wickets["innings_count"]
).round(2)

pp_wickets = pp_wickets.sort_values(
    by="avg_wickets",
    ascending=False
).reset_index(drop=True)

max_val = pp_wickets["avg_wickets"].max()
min_val = pp_wickets["avg_wickets"].min()

pp_wickets["avg_wickets_norm"] = (
    (pp_wickets["avg_wickets"] - min_val) /
    (max_val - min_val)
).round(2)

pp_wickets

```

	batting_team	innings_count	total_wickets	avg_wickets	avg_wickets_norm
0	CSK	14	29	2.07	1.00
1	DC	14	27	1.93	0.89
2	PBKS	14	25	1.79	0.78
3	SRH	13	22	1.69	0.70
4	KKR	13	18	1.38	0.46
5	MI	14	19	1.36	0.45
6	RR	14	19	1.36	0.45
7	RCB	13	15	1.15	0.28
8	LSG	14	14	1.00	0.16
9	GT	14	11	0.79	0.00

```

import matplotlib.pyplot as plt

teams = pp_wickets["batting_team"]
avg_wickets = pp_wickets["avg_wickets"]
total_wickets = pp_wickets["total_wickets"]

plt.figure()
bars = plt.bar(teams, avg_wickets)

```