



IPL 2024

## Cost-Effective Schedule Optimization

Under the guidance of:

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# ipl-project-prateek

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[1]: #IPL Project
      #Done By:

      #Group Members:

      #Bhawana Thawarani
      #Neha Roy Choudhury
      #Piyush Borse
      #Prajwal Wagh
      #Prateek Majumder
      #Yuvraj Singh Srinet
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[2]: import pandas as pd
      import numpy as np
      from itertools import combinations, permutations
      from datetime import datetime, timedelta
      import random
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[3]: hotel_rates_df = pd.read_csv("hotel_rates.csv")
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[4]: flight_costs_df = pd.read_csv("flight_costs.csv")
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[6]: # Define teams and their home cities
      teams = {
          "Delhi Capitals": "Delhi",
          "Kolkata Knight Riders": "Kolkata",
          "Mumbai Indians": "Mumbai",
          "Rajasthan Royals": "Jaipur",
          "Royal Challengers Bengaluru": "Bangalore",
          "Sunrisers Hyderabad": "Hyderabad",
          "Chennai Super Kings": "Chennai",
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    "Punjab Kings": "Mohali"
}

matches = list(permutations(teams.keys(), 2))

random.shuffle(matches)

# Set the start and end dates for the schedule
start_date = datetime(2024, 5, 24)
end_date = datetime(2024, 7, 20)

# Initialize scheduling variables
schedule = []
current_date = start_date
match_index = 0

# Create the match schedule
while current_date <= end_date and match_index < len(matches):
    home_team, away_team = matches[match_index]
    home_city = teams[home_team]
    away_city = teams[away_team]
    venue = f"{home_city} Stadium"
    route = f"{away_city}-{home_city}"

    # Determine if it's a weekend
    is_weekend = current_date.weekday() in [5, 6]
    flight_multiplier = 1.2 if is_weekend else 1
    hotel_multiplier = 1.1 if is_weekend else 1

    # Calculate costs
    flight_cost = flight_costs_df.loc[flight_costs_df['Route'] == route,
    ↪ 'IndiGo (INR)'].iloc[0] * flight_multiplier
    hotel_cost = hotel_rates_df.loc[(hotel_rates_df['City'] == home_city) &
    ↪ (hotel_rates_df['Hotel'] == 'Taj'), 'Rate (INR)'].iloc[0] * hotel_multiplier

    # Determine match times based on the day of the week
    if current_date.weekday() in [4, 5, 6]: # Friday, Saturday, Sunday
        times = ["2:30 PM", "6:30 PM"] if current_date.weekday() != 4 else ["6:
    ↪ 30 PM"]
    else:
        times = ["6:30 PM"]

    for time in times:
        schedule.append({
            "Date": current_date.strftime("%Y-%m-%d"),
            "Day": current_date.strftime("%A"),

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        "Time": time,
        "Match": f"{home_team} vs {away_team}",
        "Venue": venue,
        "Flight Cost (INR)": flight_cost,
        "Hotel Cost (INR)": hotel_cost
    })
    match_index += 1
    if match_index >= len(matches):
        break

    # Increment the date for the next match
    current_date += pd.DateOffset(days=1 if current_date.weekday() in [3, 4, 5]
    else 2)

# Convert the list to a DataFrame for better visualization
full_schedule_df = pd.DataFrame(schedule)

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[7]: full_schedule_df.head()
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[7]:      Date      Day      Time      Match \
0  2024-05-24  Friday  6:30 PM  Kolkata Knight Riders vs Punjab Kings
1  2024-05-25  Saturday  2:30 PM  Delhi Capitals vs Chennai Super Kings
2  2024-05-25  Saturday  6:30 PM  Delhi Capitals vs Chennai Super Kings
3  2024-05-26  Sunday  2:30 PM  Rajasthan Royals vs Kolkata Knight Riders
4  2024-05-26  Sunday  6:30 PM  Rajasthan Royals vs Kolkata Knight Riders

      Venue  Flight Cost (INR)  Hotel Cost (INR)
0  Kolkata Stadium           4300.0           8500.0
1   Delhi Stadium           5160.0           9900.0
2   Delhi Stadium           5160.0           9900.0
3  Jaipur Stadium           5160.0           8800.0
4  Jaipur Stadium           5160.0           8800.0

```

```
[8]: full_schedule_df
```

```

[8]:      Date      Day      Time \
0  2024-05-24  Friday  6:30 PM
1  2024-05-25  Saturday  2:30 PM
2  2024-05-25  Saturday  6:30 PM
3  2024-05-26  Sunday  2:30 PM
4  2024-05-26  Sunday  6:30 PM
5  2024-05-28  Tuesday  6:30 PM
6  2024-05-30  Thursday  6:30 PM
7  2024-05-31  Friday  6:30 PM
8  2024-06-01  Saturday  2:30 PM
9  2024-06-01  Saturday  6:30 PM
10 2024-06-02  Sunday  2:30 PM

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11	2024-06-02	Sunday	6:30 PM
12	2024-06-04	Tuesday	6:30 PM
13	2024-06-06	Thursday	6:30 PM
14	2024-06-07	Friday	6:30 PM
15	2024-06-08	Saturday	2:30 PM
16	2024-06-08	Saturday	6:30 PM
17	2024-06-09	Sunday	2:30 PM
18	2024-06-09	Sunday	6:30 PM
19	2024-06-11	Tuesday	6:30 PM
20	2024-06-13	Thursday	6:30 PM
21	2024-06-14	Friday	6:30 PM
22	2024-06-15	Saturday	2:30 PM
23	2024-06-15	Saturday	6:30 PM
24	2024-06-16	Sunday	2:30 PM
25	2024-06-16	Sunday	6:30 PM
26	2024-06-18	Tuesday	6:30 PM
27	2024-06-20	Thursday	6:30 PM
28	2024-06-21	Friday	6:30 PM
29	2024-06-22	Saturday	2:30 PM
30	2024-06-22	Saturday	6:30 PM
31	2024-06-23	Sunday	2:30 PM
32	2024-06-23	Sunday	6:30 PM
33	2024-06-25	Tuesday	6:30 PM
34	2024-06-27	Thursday	6:30 PM
35	2024-06-28	Friday	6:30 PM
36	2024-06-29	Saturday	2:30 PM
37	2024-06-29	Saturday	6:30 PM
38	2024-06-30	Sunday	2:30 PM
39	2024-06-30	Sunday	6:30 PM
40	2024-07-02	Tuesday	6:30 PM
41	2024-07-04	Thursday	6:30 PM
42	2024-07-05	Friday	6:30 PM
43	2024-07-06	Saturday	2:30 PM
44	2024-07-06	Saturday	6:30 PM
45	2024-07-07	Sunday	2:30 PM
46	2024-07-07	Sunday	6:30 PM
47	2024-07-09	Tuesday	6:30 PM
48	2024-07-11	Thursday	6:30 PM
49	2024-07-12	Friday	6:30 PM
50	2024-07-13	Saturday	2:30 PM
51	2024-07-13	Saturday	6:30 PM
52	2024-07-14	Sunday	2:30 PM
53	2024-07-14	Sunday	6:30 PM
54	2024-07-16	Tuesday	6:30 PM
55	2024-07-18	Thursday	6:30 PM

Match

Venue \

0	Kolkata Knight Riders vs Punjab Kings	Kolkata Stadium
1	Delhi Capitals vs Chennai Super Kings	Delhi Stadium
2	Delhi Capitals vs Chennai Super Kings	Delhi Stadium
3	Rajasthan Royals vs Kolkata Knight Riders	Jaipur Stadium
4	Rajasthan Royals vs Kolkata Knight Riders	Jaipur Stadium
5	Kolkata Knight Riders vs Royal Challengers Ben...	Kolkata Stadium
6	Royal Challengers Bengaluru vs Chennai Super K...	Bangalore Stadium
7	Mumbai Indians vs Punjab Kings	Mumbai Stadium
8	Rajasthan Royals vs Mumbai Indians	Jaipur Stadium
9	Rajasthan Royals vs Mumbai Indians	Jaipur Stadium
10	Kolkata Knight Riders vs Delhi Capitals	Kolkata Stadium
11	Kolkata Knight Riders vs Delhi Capitals	Kolkata Stadium
12	Chennai Super Kings vs Royal Challengers Benga...	Chennai Stadium
13	Sunrisers Hyderabad vs Mumbai Indians	Hyderabad Stadium
14	Sunrisers Hyderabad vs Royal Challengers Benga...	Hyderabad Stadium
15	Chennai Super Kings vs Delhi Capitals	Chennai Stadium
16	Chennai Super Kings vs Delhi Capitals	Chennai Stadium
17	Mumbai Indians vs Chennai Super Kings	Mumbai Stadium
18	Mumbai Indians vs Chennai Super Kings	Mumbai Stadium
19	Sunrisers Hyderabad vs Kolkata Knight Riders	Hyderabad Stadium
20	Royal Challengers Bengaluru vs Punjab Kings	Bangalore Stadium
21	Rajasthan Royals vs Royal Challengers Bengaluru	Jaipur Stadium
22	Kolkata Knight Riders vs Rajasthan Royals	Kolkata Stadium
23	Kolkata Knight Riders vs Rajasthan Royals	Kolkata Stadium
24	Punjab Kings vs Chennai Super Kings	Mohali Stadium
25	Punjab Kings vs Chennai Super Kings	Mohali Stadium
26	Punjab Kings vs Kolkata Knight Riders	Mohali Stadium
27	Punjab Kings vs Royal Challengers Bengaluru	Mohali Stadium
28	Delhi Capitals vs Royal Challengers Bengaluru	Delhi Stadium
29	Sunrisers Hyderabad vs Rajasthan Royals	Hyderabad Stadium
30	Sunrisers Hyderabad vs Rajasthan Royals	Hyderabad Stadium
31	Kolkata Knight Riders vs Sunrisers Hyderabad	Kolkata Stadium
32	Kolkata Knight Riders vs Sunrisers Hyderabad	Kolkata Stadium
33	Delhi Capitals vs Sunrisers Hyderabad	Delhi Stadium
34	Kolkata Knight Riders vs Mumbai Indians	Kolkata Stadium
35	Mumbai Indians vs Delhi Capitals	Mumbai Stadium
36	Rajasthan Royals vs Sunrisers Hyderabad	Jaipur Stadium
37	Rajasthan Royals vs Sunrisers Hyderabad	Jaipur Stadium
38	Rajasthan Royals vs Punjab Kings	Jaipur Stadium
39	Rajasthan Royals vs Punjab Kings	Jaipur Stadium
40	Punjab Kings vs Delhi Capitals	Mohali Stadium
41	Chennai Super Kings vs Mumbai Indians	Chennai Stadium
42	Punjab Kings vs Mumbai Indians	Mohali Stadium
43	Chennai Super Kings vs Sunrisers Hyderabad	Chennai Stadium
44	Chennai Super Kings vs Sunrisers Hyderabad	Chennai Stadium
45	Rajasthan Royals vs Delhi Capitals	Jaipur Stadium
46	Rajasthan Royals vs Delhi Capitals	Jaipur Stadium

47	Royal Challengers Bengaluru vs Kolkata Knight ...	Bangalore Stadium
48	Chennai Super Kings vs Rajasthan Royals	Chennai Stadium
49	Royal Challengers Bengaluru vs Delhi Capitals	Bangalore Stadium
50	Royal Challengers Bengaluru vs Mumbai Indians	Bangalore Stadium
51	Royal Challengers Bengaluru vs Mumbai Indians	Bangalore Stadium
52	Punjab Kings vs Rajasthan Royals	Mohali Stadium
53	Punjab Kings vs Rajasthan Royals	Mohali Stadium
54	Kolkata Knight Riders vs Chennai Super Kings	Kolkata Stadium
55	Mumbai Indians vs Sunrisers Hyderabad	Mumbai Stadium

	Flight Cost (INR)	Hotel Cost (INR)
0	4300.0	8500.0
1	5160.0	9900.0
2	5160.0	9900.0
3	5160.0	8800.0
4	5160.0	8800.0
5	4800.0	8500.0
6	4300.0	9500.0
7	4300.0	10000.0
8	5160.0	8800.0
9	5160.0	8800.0
10	5760.0	9350.0
11	5760.0	9350.0
12	4300.0	7000.0
13	4300.0	7500.0
14	4300.0	7500.0
15	5160.0	7700.0
16	5160.0	7700.0
17	5160.0	11000.0
18	5160.0	11000.0
19	4300.0	7500.0
20	4300.0	9500.0
21	4300.0	8000.0
22	5160.0	9350.0
23	5160.0	9350.0
24	4560.0	6600.0
25	4560.0	6600.0
26	4300.0	6000.0
27	4300.0	6000.0
28	4800.0	9000.0
29	4560.0	8250.0
30	4560.0	8250.0
31	5160.0	9350.0
32	5160.0	9350.0
33	4300.0	9000.0
34	4800.0	8500.0
35	4800.0	10000.0

36	4560.0	8800.0
37	4560.0	8800.0
38	4560.0	8800.0
39	4560.0	8800.0
40	4300.0	6000.0
41	4300.0	7000.0
42	4300.0	6000.0
43	4560.0	7700.0
44	4560.0	7700.0
45	5160.0	8800.0
46	5160.0	8800.0
47	4800.0	9500.0
48	3800.0	7000.0
49	4800.0	9500.0
50	5760.0	10450.0
51	5760.0	10450.0
52	4560.0	6600.0
53	4560.0	6600.0
54	4300.0	8500.0
55	4300.0	10000.0

```
[9]: # Define the start date
start_date = datetime(2024, 7, 20)

# Function to calculate the date for each match
def calculate_match_date(start_date, match_number):
    days_to_add = (match_number - 1) * 2
    return start_date + timedelta(days=days_to_add)

# Define the time slots
time_slots = ["6:30 PM", "6:30 PM", "6:30 PM"]

# Define the top 4 teams (Ranks 1 to 4)
teams = ["Rank 1", "Rank 2", "Rank 3", "Rank 4"]

# Define the venues
venues = ["Mumbai Stadium", "Bangalore Stadium", "Kolkata Stadium"]

# Initialize a list to store match details
matches = []

# Loop through each match
for i in range(3):
    match_number = i + 1
    match_date = calculate_match_date(start_date, match_number).strftime("%B_
    ↪%d, %Y")
    match_time = time_slots[i]
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team1 = teams[i]
team2 = teams[i+1]
venue = venues[i]

# Append match details to the list
matches.append([match_number, match_date, match_time, team1, team2, venue])

# Final match details
final_match_date = datetime(2024, 7, 28).strftime("%B %d, %Y")
final_venue = "Hyderabad Stadium" # Assuming final match venue is Hyderabad
matches.append(['Final', final_match_date, time_slots[0], 'Winner of Match 2',
               ↪ 'Loser of Match 1', final_venue])

# Create a DataFrame from the list of matches
df = pd.DataFrame(matches, columns=['Match', 'Date', 'Time', 'Team 1 (Rank)',
               ↪ 'Team 2 (Rank)', 'Venue'])

```

[10]: df

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[10]:      Match      Date      Time      Team 1 (Rank)      Team 2 (Rank) \
0         1  July 20, 2024  6:30 PM              Rank 1              Rank 2
1         2  July 22, 2024  6:30 PM              Rank 2              Rank 3
2         3  July 24, 2024  6:30 PM              Rank 3              Rank 4
3    Final  July 28, 2024  6:30 PM  Winner of Match 2  Loser of Match 1

      Venue
0    Mumbai Stadium
1  Bangalore Stadium
2   Kolkata Stadium
3  Hyderabad Stadium

```

[11]: df.to\_excel("final\_4\_match.xlsx")

[12]: full\_schedule\_df.to\_excel("IPL\_Tournament.xlsx")

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