IST 652 - project report notebook - Group 3 - cutting version1

May 1, 2023

1 IST 652 Project - Indian Premier League : Sports analysis

1.1 Group 3

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1.2 Datasets Defination

This dataset is about the Indian Premier League (IPL) cricket tournament until the year 2017. It contains detailed information on each IPL match played until 2017, including the date and location of the match, the two teams that competed, the result, and the scores. It also includes data on individual player performance, such as the number of runs scored, wickets taken, and catches made. Additionally, the dataset includes information about the IPL teams, such as the team name, home ground, and owner. This dataset can be used for various analytical purposes such as predicting match outcomes, identifying player trends, and evaluating team performance.

For our analysis, we'll be using 2 datasets.

Player by match : This dataset has around 13,993 data points across 22 columns. It contains details for each player by the match they played. It has columns like matchID, team1, team2, manOfTheMatch, PlayerName, PlayerID, DateOfBirth, etc.

Match : This dataset has 637 data points across 17 columns. It contains details of each match played from 2008 till 2017.

We will be merging these two datasets for our data exploration and analysis.

1.3 Datasets Links

Main link : https://data.world/raghu543/ipl-data-till-2017

Match dataset link : https://data.world/raghu543/ipl-data-till-2017/workspace/file?filename=Match.csv

Player by match link : https://data.world/raghu543/ipl-data-till-2017/workspace/file?filename=Player_match.csv

1.4 Importing packages

[39]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import ipywidgets as widgets
import seaborn as sns
from IPython.display import display
from sklearn.preprocessing import LabelEncoder
```

1.5 Phase 1 : data cleaning

[40]:
```
# Read the CSV file from the URL into a pandas dataframe with 'ISO-8859-1'␣
↪encoding
url = 'https://query.data.world/s/2a6soodhpibej6iu67a2upte7euehy?dws=00000'
player_match_df = pd.read_csv(url, encoding='ISO-8859-1')
player_match_df.head(3) # Display the dataframe
```

[40]:
```
   Player_match_SK  PlayerMatch_key  Match_Id  Player_Id Player_Name  \
0            12694      33598700006    335987          6    R Dravid
1            12695      33598700007    335987          7    W Jaffer
2            12696      33598700008    335987          8     V Kohli

         DOB    Batting_hand       Bowling_skill Country_Name Role_Desc  …  \
0  1/11/1973  Right-hand bat  Right-arm offbreak        India   Captain  …
1  2/16/1978  Right-hand bat  Right-arm offbreak        India    Player  …
2  11/5/1988  Right-hand bat    Right-arm medium        India    Player  …

  Season_year is_manofThematch  Age_As_on_match  IsPlayers_Team_won  \
0        2008            False               35               False
1        2008            False               30               False
2        2008            False               20               False

   Batting_Status  Bowling_Status  Player_Captain  Opposit_captain  \
0             NaN             NaN        R Dravid       SC Ganguly
1             NaN             NaN        R Dravid       SC Ganguly
2             NaN             NaN        R Dravid       SC Ganguly

  Player_keeper Opposit_keeper
0    MV Boucher        WP Saha
1    MV Boucher        WP Saha
2    MV Boucher        WP Saha

[3 rows x 22 columns]
```

[41]:
```
# Read the CSV file from the URL into a pandas dataframe with 'ISO-8859-1'␣
↪encoding
```

```
url2 = 'https://query.data.world/s/zsvjf3datludh4ih4efoxtieqjmq4f?dws=00000'
match_df = pd.read_csv(url2, encoding='ISO-8859-1')
match_df.head(3) # Display the dataframe
```

[41]:
```
   Match_SK  match_id                      Team1                  Team2  \
0         0    335987  Royal Challengers Bangalore  Kolkata Knight Riders
1         1    335988              Kings XI Punjab    Chennai Super Kings
2         2    335989            Delhi Daredevils       Rajasthan Royals

  match_date  Season_Year                                  Venue_Name  \
0  4/18/2008         2008                       M Chinnaswamy Stadium
1  4/19/2008         2008  Punjab Cricket Association Stadium, Mohali
2  4/19/2008         2008                           Feroz Shah Kotla

    City_Name Country_Name                  Toss_Winner  \
0   Bangalore        India  Royal Challengers Bangalore
1  Chandigarh        India          Chennai Super Kings
2       Delhi        India             Rajasthan Royals

            match_winner Toss_Name Win_Type Outcome_Type    ManOfMach  \
0  Kolkata Knight Riders     field     runs       Result  BB McCullum
1    Chennai Super Kings       bat     runs       Result   MEK Hussey
2       Delhi Daredevils       bat  wickets       Result  MF Maharoof

   Win_Margin  Country_id
0       140.0           1
1        33.0           1
2         9.0           1
```

[42]:
```
# Importing data set
match_datadf = pd.read_csv('Match.csv')
match_datadf.head(3)
```

[42]:
```
   Match_SK  match_id                      Team1                  Team2  \
0         0    335987  Royal Challengers Bangalore  Kolkata Knight Riders
1         1    335988              Kings XI Punjab    Chennai Super Kings
2         2    335989            Delhi Daredevils       Rajasthan Royals

  match_date  Season_Year                                  Venue_Name  \
0  4/18/2008         2008                       M Chinnaswamy Stadium
1  4/19/2008         2008  Punjab Cricket Association Stadium, Mohali
2  4/19/2008         2008                           Feroz Shah Kotla

    City_Name Country_Name                  Toss_Winner  \
0   Bangalore        India  Royal Challengers Bangalore
1  Chandigarh        India          Chennai Super Kings
2       Delhi        India             Rajasthan Royals
```

```
            match_winner Toss_Name Win_Type Outcome_Type    ManOfMach  \
0  Kolkata Knight Riders     field     runs       Result  BB McCullum
1    Chennai Super Kings       bat     runs       Result   MEK Hussey
2       Delhi Daredevils       bat  wickets       Result  MF Maharoof

   Win_Margin  Country_id
0       140.0           1
1        33.0           1
2         9.0           1
```

[43]:
```
player_match_df = player_match_df.rename(columns={'Match_Id': 'match_id', })
#renaming the column on which we are merging the datasets and which will be␣
 ↪used for further data analysis
```

[44]:
```
# Merge the datasets using match_id column
merged_df = pd.merge(player_match_df, match_df, on='match_id')
merged_df.head(3) # Print the merged dataframe
```

[44]:
```
   Player_match_SK  PlayerMatch_key  match_id  Player_Id Player_Name  \
0            12694      33598700006    335987          6    R Dravid
1            12695      33598700007    335987          7    W Jaffer
2            12696      33598700008    335987          8     V Kohli

         DOB    Batting_hand       Bowling_skill Country_Name_x Role_Desc  \
0  1/11/1973  Right-hand bat  Right-arm offbreak          India   Captain
1  2/16/1978  Right-hand bat  Right-arm offbreak          India    Player
2  11/5/1988  Right-hand bat    Right-arm medium          India    Player

   …  City_Name Country_Name_y                Toss_Winner  \
0  …  Bangalore          India  Royal Challengers Bangalore
1  …  Bangalore          India  Royal Challengers Bangalore
2  …  Bangalore          India  Royal Challengers Bangalore

            match_winner  Toss_Name  Win_Type  Outcome_Type    ManOfMach  \
0  Kolkata Knight Riders      field      runs        Result  BB McCullum
1  Kolkata Knight Riders      field      runs        Result  BB McCullum
2  Kolkata Knight Riders      field      runs        Result  BB McCullum

  Win_Margin Country_id
0      140.0          1
1      140.0          1
2      140.0          1

[3 rows x 38 columns]
```

[45]:
```
null_count = merged_df.isnull().sum() # Count the number of null values in each␣
↪column
print(null_count) # Print the results
```

```
Player_match_SK           0
PlayerMatch_key           0
match_id                  0
Player_Id                 0
Player_Name               0
DOB                       0
Batting_hand              0
Bowling_skill          1130
Country_Name_x            0
Role_Desc                 0
Player_team               0
Opposit_Team              0
Season_year               0
is_manofThematch          0
Age_As_on_match           0
IsPlayers_Team_won        0
Batting_Status        13992
Bowling_Status        13992
Player_Captain            0
Opposit_captain           0
Player_keeper             0
Opposit_keeper            0
Match_SK                  0
Team1                     0
Team2                     0
match_date                0
Season_Year               0
Venue_Name                0
City_Name                 0
Country_Name_y            0
Toss_Winner               0
match_winner             66
Toss_Name                 0
Win_Type                 22
Outcome_Type              0
ManOfMach                66
Win_Margin              198
Country_id                0
dtype: int64
```

[46]:
```
# Drop the 'Batting_Status' and 'Bowling_Status' columns from the DataFrame
clean_df = merged_df.drop(['Batting_Status', 'Bowling_Status'], axis=1)
clean_df.head(3) # Print the modified DataFrame
```

[46]:
```
   Player_match_SK  PlayerMatch_key  match_id  Player_Id Player_Name  \
0            12694      33598700006    335987          6    R Dravid
1            12695      33598700007    335987          7    W Jaffer
2            12696      33598700008    335987          8     V Kohli

         DOB    Batting_hand       Bowling_skill Country_Name_x Role_Desc  \
0  1/11/1973  Right-hand bat  Right-arm offbreak          India   Captain
1  2/16/1978  Right-hand bat  Right-arm offbreak          India    Player
2  11/5/1988  Right-hand bat    Right-arm medium          India    Player

   …  City_Name Country_Name_y                 Toss_Winner  \
0  …  Bangalore          India  Royal Challengers Bangalore
1  …  Bangalore          India  Royal Challengers Bangalore
2  …  Bangalore          India  Royal Challengers Bangalore

            match_winner  Toss_Name  Win_Type Outcome_Type    ManOfMach  \
0  Kolkata Knight Riders      field      runs       Result  BB McCullum
1  Kolkata Knight Riders      field      runs       Result  BB McCullum
2  Kolkata Knight Riders      field      runs       Result  BB McCullum

  Win_Margin Country_id
0      140.0          1
1      140.0          1
2      140.0          1

[3 rows x 36 columns]
```

[47]:
```
clean_df['Bowling_skill'].fillna('not a baller', inplace=True)
null_bowling_df = clean_df[clean_df['Bowling_skill'].isnull()]
null_bowling_df #the data points where bowling skill is null, that player is␣
 ↪not a baller,
# and so we fill the data points with 'not a baller'
```

[47]:
```
Empty DataFrame
Columns: [Player_match_SK, PlayerMatch_key, match_id, Player_Id, Player_Name,
DOB, Batting_hand, Bowling_skill, Country_Name_x, Role_Desc, Player_team,
Opposit_Team, Season_year, is_manofThematch, Age_As_on_match,
IsPlayers_Team_won, Player_Captain, Opposit_captain, Player_keeper,
Opposit_keeper, Match_SK, Team1, Team2, match_date, Season_Year, Venue_Name,
City_Name, Country_Name_y, Toss_Winner, match_winner, Toss_Name, Win_Type,
Outcome_Type, ManOfMach, Win_Margin, Country_id]
Index: []

[0 rows x 36 columns]
```

[48]:
```
clean_df['match_winner'].fillna('Match Abandoned', inplace=True)
clean_df['Win_Type'].fillna('Match Tied', inplace=True)
```

```
clean_df['ManOfMach'].fillna('No Man of the match', inplace=True)
clean_df['Win_Margin'].fillna('Match abandoned or Tied', inplace=True)
clean_df.head(3)
```

[48]:

```
   Player_match_SK  PlayerMatch_key  match_id  Player_Id Player_Name  \
0            12694      33598700006    335987          6    R Dravid
1            12695      33598700007    335987          7    W Jaffer
2            12696      33598700008    335987          8     V Kohli

         DOB    Batting_hand       Bowling_skill Country_Name_x Role_Desc  \
0  1/11/1973  Right-hand bat  Right-arm offbreak          India   Captain
1  2/16/1978  Right-hand bat  Right-arm offbreak          India    Player
2  11/5/1988  Right-hand bat    Right-arm medium          India    Player

   …  City_Name Country_Name_y                  Toss_Winner  \
0  …  Bangalore          India  Royal Challengers Bangalore
1  …  Bangalore          India  Royal Challengers Bangalore
2  …  Bangalore          India  Royal Challengers Bangalore

            match_winner  Toss_Name  Win_Type Outcome_Type    ManOfMach  \
0  Kolkata Knight Riders      field      runs       Result  BB McCullum
1  Kolkata Knight Riders      field      runs       Result  BB McCullum
2  Kolkata Knight Riders      field      runs       Result  BB McCullum

  Win_Margin Country_id
0      140.0          1
1      140.0          1
2      140.0          1

[3 rows x 36 columns]
```

[49]:

```
match_datadf.loc[match_datadf['Toss_Name'] == 'Field', 'Toss_Name'] = 'field'
match_datadf.loc[match_datadf['Toss_Name'] == 'Bat', 'Toss_Name'] = 'bat'
```

[50]:

```
match_datadf[match_datadf.isna().any(axis=1)]
```

[50]:

```
     Match_SK  match_id                        Team1  \
66         66    392195        Kolkata Knight Riders
130       130    419126          Chennai Super Kings
241       241    501270             Delhi Daredevils
328       328    598009          Sunrisers Hyderabad
341       341    598022  Royal Challengers Bangalore
416       416    729320        Kolkata Knight Riders
476       476    829746             Rajasthan Royals
486       486    829768  Royal Challengers Bangalore
511       511    829818  Royal Challengers Bangalore
605       605   1082619  Royal Challengers Bangalore
```

```
611       611   1082625                Gujarat Lions

                         Team2 match_date  Season_Year  \
66              Rajasthan Royals  4/23/2009         2009
130              Kings XI Punjab  3/21/2010         2010
241                Pune Warriors  5/21/2011         2011
328  Royal Challengers Bangalore   4/7/2013         2013
341             Delhi Daredevils  4/16/2013         2013
416             Rajasthan Royals  4/29/2014         2014
476              Kings XI Punjab  4/21/2015         2015
486             Rajasthan Royals  4/29/2015         2015
511             Delhi Daredevils  5/17/2015         2015
605           Sunrisers Hyderabad  4/25/2017         2017
611                Mumbai Indians  4/29/2017         2017

                                  Venue_Name  City_Name  Country_Name  \
66                                  Newlands  Cape Town  South Africa
130            MA Chidambaram Stadium, Chepauk    Chennai         India
241                           Feroz Shah Kotla      Delhi         India
328  Rajiv Gandhi International Stadium, Uppal  Hyderabad         India
341                       M Chinnaswamy Stadium  Bangalore         India
416                        Sheikh Zayed Stadium  Abu Dhabi         U.A.E
476                Sardar Patel Stadium, Motera  Ahmedabad         India
486                       M Chinnaswamy Stadium  Bangalore         India
511                       M Chinnaswamy Stadium  Bangalore         India
605                                        NaN  Bengaluru         India
611     Saurashtra Cricket Association Stadium     Rajkot         India

                     Toss_Winner                match_winner Toss_Name  \
66         Kolkata Knight Riders             Rajasthan Royals     field
130          Chennai Super Kings              Kings XI Punjab     field
241             Delhi Daredevils                          NaN       bat
328  Royal Challengers Bangalore          Sunrisers Hyderabad       bat
341  Royal Challengers Bangalore  Royal Challengers Bangalore     field
416             Rajasthan Royals             Rajasthan Royals       bat
476              Kings XI Punjab              Kings XI Punjab     field
486             Rajasthan Royals                          NaN     field
511  Royal Challengers Bangalore                          NaN     field
605                          NaN                    abandoned       NaN
611                Gujarat Lions                         tied       bat

      Win_Type Outcome_Type    ManOfMach  Win_Margin  Country_id
66         Tie    Superover    YK Pathan         NaN           2
130        Tie    Superover     J Theron         NaN           1
241  NO Result    No Result          NaN         NaN           1
328        Tie    Superover    GH Vihari         NaN           1
341        Tie    Superover      V Kohli         NaN           1
```

```
416        Tie    Superover  JP Faulkner         NaN           3
476        Tie    Superover     SE Marsh         NaN           1
486  NO Result    No Result           NaN         NaN           1
511  NO Result    No Result           NaN         NaN           1
605        NaN    abandoned           NaN         0.0           1
611        NaN         tied    KH Pandya          0.0           1
```

[51]:
```
match_datadf.dropna(subset=['match_winner'])
match_datadf.dropna(subset=['Toss_Name'])
```

[51]:
```
     Match_SK  match_id                       Team1  \
0           0    335987  Royal Challengers Bangalore
1           1    335988              Kings XI Punjab
2           2    335989            Delhi Daredevils
3           3    335990              Mumbai Indians
4           4    335991        Kolkata Knight Riders
..        …       …                            …
632       632   1082646            Delhi Daredevils
633       633   1082647              Mumbai Indians
634       634   1082648          Sunrisers Hyderabad
635       635   1082649              Mumbai Indians
636       636   1082650              Mumbai Indians

                         Team2 match_date  Season_Year  \
0          Kolkata Knight Riders  4/18/2008         2008
1            Chennai Super Kings  4/19/2008         2008
2               Rajasthan Royals  4/19/2008         2008
3    Royal Challengers Bangalore  4/20/2008         2008
4                Deccan Chargers  4/20/2008         2008
..                           …        …           …
632  Royal Challengers Bangalore  5/14/2017         2017
633      Rising Pune Supergiants  5/16/2017         2017
634        Kolkata Knight Riders  5/17/2017         2017
635        Kolkata Knight Riders  5/19/2017         2017
636      Rising Pune Supergiants  5/21/2017         2017

                                  Venue_Name           City_Name  \
0                      M Chinnaswamy Stadium           Bangalore
1    Punjab Cricket Association Stadium, Mohali         Chandigarh
2                           Feroz Shah Kotla               Delhi
3                           Wankhede Stadium              Mumbai
4                               Eden Gardens             Kolkata
..                                       …                 …
632                         Feroz Shah Kotla               Delhi
633                         Wankhede Stadium              Mumbai
634                    M Chinnaswamy Stadium           Bengaluru
635                    M Chinnaswamy Stadium           Bengaluru
```

```
636    Rajiv Gandhi International Stadium Uppal  Hyderabad (Deccan)

    Country_Name                  Toss_Winner                match_winner  \
0          India  Royal Challengers Bangalore       Kolkata Knight Riders
1          India          Chennai Super Kings         Chennai Super Kings
2          India             Rajasthan Royals            Delhi Daredevils
3          India               Mumbai Indians  Royal Challengers Bangalore
4          India              Deccan Chargers       Kolkata Knight Riders
..           …                            …                          …
632        India  Royal Challengers Bangalore  Royal Challengers Bangalore
633        India               Mumbai Indians     Rising Pune Supergiants
634        India        Kolkata Knight Riders       Kolkata Knight Riders
635        India               Mumbai Indians              Mumbai Indians
636        India               Mumbai Indians              Mumbai Indians

    Toss_Name Win_Type Outcome_Type         ManOfMach  Win_Margin  Country_id
0       field     runs       Result       BB McCullum       140.0           1
1         bat     runs       Result        MEK Hussey        33.0           1
2         bat  wickets       Result       MF Maharoof         9.0           1
3         bat  wickets       Result        MV Boucher         5.0           1
4         bat  wickets       Result         DJ Hussey         5.0           1
..        …      …           …               …         …          …
632       bat     runs       Result          HV Patel        10.0           1
633     field     runs       Result  Wasington Sundar        20.0           1
634     field  wickets       Result   NM Coulter-Nile         7.0           1
635     field  wickets       Result         KV Sharma         6.0           1
636       bat      run       Result         KH Pandya         1.0           1

[636 rows x 17 columns]
```

[52]:
```
match_datadf[match_datadf['match_winner'] == 'field']
```

[52]:
```
Empty DataFrame
Columns: [Match_SK, match_id, Team1, Team2, match_date, Season_Year, Venue_Name,
City_Name, Country_Name, Toss_Winner, match_winner, Toss_Name, Win_Type,
Outcome_Type, ManOfMach, Win_Margin, Country_id]
Index: []
```

Data by this point is completely clean. There were 4 columns that would've been major factors in analyzing the data, and they had null values. 1. Bowling skill : Since every data point is essential in our dataset, this column had 1130 values that were null. We researched on google diving into the details of the actual matches and figured out that these players who did not have a bowling skill were non-ballers. This means, they were either batters or fielders or wicket-keepers. To overcome this, we changed the null values to 'not a baller'. 2. Match winner : Since every match is important for our sport analysis, this column had 66 null values. Upon researching on google, we figured out that these matches did not have a winner due to match getting abandoned for reasons concerned with weather conditions. To fill in these gaps, we changed the null values to

'match abandoned'. Reference link for the reserach : https://www.espncricinfo.com/series/indian-premier-league-2011-466304/delhi-daredevils-vs-pune-warriors-68th-match-501265/match-report 3. Win type : The null values in these columns were for matches that were neither won nor lost. These matches were tied. So, we filled in the null values with 'match tied'. Reference link for the research : https://www.cricketwa.com/article/172/super-over-in-ipl.aspx 4. Win margin : Win margins are based on whether the winning team won the match by extra runs, or extra wickets. The null values in this column substituted to the matches that were either tied or abandoned. So to fill in the gaps, we changed the null values to 'match abandoned or tied'. Reference link for research : https://www.cricketwa.com/article/172/super-over-in-ipl.aspx (tied matches) https://www.espncricinfo.com/series/indian-premier-league-2011-466304/delhi-daredevils-vs-pune-warriors-68th-match-501265/match-report (match abandoned)

Our data is entirely clean now for further analysis and we are ready to answer the questions that we initially set up for the analysis.

[53]:
```
null_count1 = clean_df.isnull().sum() # Count the number of null values in each␣
↪column
print(null_count1) # Print the results
```

```
Player_match_SK       0
PlayerMatch_key       0
match_id              0
Player_Id             0
Player_Name           0
DOB                   0
Batting_hand          0
Bowling_skill         0
Country_Name_x        0
Role_Desc             0
Player_team           0
Opposit_Team          0
Season_year           0
is_manofThematch      0
Age_As_on_match       0
IsPlayers_Team_won    0
Player_Captain        0
Opposit_captain       0
Player_keeper         0
Opposit_keeper        0
Match_SK              0
Team1                 0
Team2                 0
match_date            0
Season_Year           0
Venue_Name            0
City_Name             0
Country_Name_y        0
Toss_Winner           0
```

```
match_winner          0
Toss_Name             0
Win_Type              0
Outcome_Type          0
ManOfMach             0
Win_Margin            0
Country_id            0
dtype: int64
```

[54]:
```
clean_df.columns # Listing all the columns present in the clean_df dataframe
```

[54]:
```
Index(['Player_match_SK', 'PlayerMatch_key', 'match_id', 'Player_Id',
       'Player_Name', 'DOB', 'Batting_hand', 'Bowling_skill', 'Country_Name_x',
       'Role_Desc', 'Player_team', 'Opposit_Team', 'Season_year',
       'is_manofThematch', 'Age_As_on_match', 'IsPlayers_Team_won',
       'Player_Captain', 'Opposit_captain', 'Player_keeper', 'Opposit_keeper',
       'Match_SK', 'Team1', 'Team2', 'match_date', 'Season_Year', 'Venue_Name',
       'City_Name', 'Country_Name_y', 'Toss_Winner', 'match_winner',
       'Toss_Name', 'Win_Type', 'Outcome_Type', 'ManOfMach', 'Win_Margin',
       'Country_id'],
      dtype='object')
```

1.6 Team Performance Analysis

Question : How has the performances of different teams been over the years?

[55]:
```
TeamP_df = clean_df[['match_id', 'Team1', 'Team2', 'Win_Type', 'match_winner',␣
↪'Win_Margin', 'Season_Year']]
TeamP_df.set_index('match_id', inplace=True)
TeamP_df # Creating a subset of the data and setting the match_id as index
```

[55]:
```
                                Team1                    Team2 Win_Type  \
match_id
335987    Royal Challengers Bangalore    Kolkata Knight Riders     runs
335987    Royal Challengers Bangalore    Kolkata Knight Riders     runs
335987    Royal Challengers Bangalore    Kolkata Knight Riders     runs
335987    Royal Challengers Bangalore    Kolkata Knight Riders     runs
335987    Royal Challengers Bangalore    Kolkata Knight Riders     runs
…                                 …                        …      …
1082650               Mumbai Indians  Rising Pune Supergiants      run
1082650               Mumbai Indians  Rising Pune Supergiants      run
1082650               Mumbai Indians  Rising Pune Supergiants      run
1082650               Mumbai Indians  Rising Pune Supergiants      run
1082650               Mumbai Indians  Rising Pune Supergiants      run

                   match_winner Win_Margin  Season_Year
match_id
```

```
335987    Kolkata Knight Riders      140.0         2008
335987    Kolkata Knight Riders      140.0         2008
335987    Kolkata Knight Riders      140.0         2008
335987    Kolkata Knight Riders      140.0         2008
335987    Kolkata Knight Riders      140.0         2008
…                          …        …           …
1082650          Mumbai Indians        1.0         2017
1082650          Mumbai Indians        1.0         2017
1082650          Mumbai Indians        1.0         2017
1082650          Mumbai Indians        1.0         2017
1082650          Mumbai Indians        1.0         2017

[13992 rows x 6 columns]
```

Sliced the dataset into a new dataframe to include only the columns that are significant to this analysis.

[56]:
```
TeamP_df['Win_Type'] = TeamP_df['Win_Type'].replace(0, "tie or abandoned")
TeamP_df['Win_Type'] = TeamP_df['Win_Type'].replace("run", "runs")
TeamP_df['Win_Margin'] = TeamP_df['Win_Margin'].replace("Match abandoned or␣
 ↪Tied", 0)
# Replacing the values to appropriate values to assist in data analysis process.
```

```
/tmp/ipykernel_55/1285868859.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  TeamP_df['Win_Type'] = TeamP_df['Win_Type'].replace(0, "tie or abandoned")
/tmp/ipykernel_55/1285868859.py:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  TeamP_df['Win_Type'] = TeamP_df['Win_Type'].replace("run", "runs")
/tmp/ipykernel_55/1285868859.py:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  TeamP_df['Win_Margin'] = TeamP_df['Win_Margin'].replace("Match abandoned or
Tied", 0)
```

[57]:
```
team_seasons = TeamP_df.groupby('match_winner')['Season_Year'].nunique().
↪sort_values(ascending=False)
team_seasons # Counts no of unique seasons in which each team won at least 1␣
↪match, sorted in descending order.
```

[57]:
```
match_winner
Delhi Daredevils               10
Kings XI Punjab                10
Kolkata Knight Riders          10
Mumbai Indians                 10
Royal Challengers Bangalore    10
Chennai Super Kings             8
Rajasthan Royals                8
Deccan Chargers                 5
Sunrisers Hyderabad             5
Pune Warriors                   3
Gujarat Lions                   2
Match Abandoned                 2
Rising Pune Supergiants         2
Kochi Tuskers Kerala            1
tied                            1
Name: Season_Year, dtype: int64
```

This is the numbers of seasons that a team has played. In our dataset, we have 10 years ranging from 2008 to 2017. For our analysis, we'll be considering only the teams that have played 8 or more seasons since it makes more sense. The other teams were formed somewhere along these years. Additionalyy, Deccan Chargers and Sunrisers Hyderabad are essentially the same teams. The team's name was changed after playing for a few years. Mentioned below is the reference for it.

https://www.quora.com/Why-was-Hyderabad-IPL-teams-name-changed-from-Deccan-Chargers-to-Sun-Risers-Hyderabad-Which-one-of-these-two-names-do-you-find-more-cool

https://www.business-standard.com/article/companies/deccan-chargers-renamed-as-sunrisers-112122000077_1.html

So, for our analysis, we'll be considering Deccan Chargers and Sunrisers Hyderabad as the same team, and will be making changes into the dataset accordingly.

[58]:
```
TeamP_df['match_winner'] = TeamP_df['match_winner'].replace('Deccan Chargers',␣
↪'Sunrisers Hyderabad')
```

```
/tmp/ipykernel_55/1213798273.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  TeamP_df['match_winner'] = TeamP_df['match_winner'].replace('Deccan Chargers',
```

```
'Sunrisers Hyderabad')
```

[59]:
```
team_seasons1 = TeamP_df.groupby('match_winner')['Season_Year'].nunique().
 ↪sort_values(ascending=False)
team_seasons1 # Counts no of unique seasons in which each team won at least 1␣
 ↪match, sorted in descending order.
```

[59]:
```
match_winner
Delhi Daredevils                10
Kings XI Punjab                 10
Kolkata Knight Riders           10
Mumbai Indians                  10
Royal Challengers Bangalore     10
Sunrisers Hyderabad             10
Chennai Super Kings              8
Rajasthan Royals                 8
Pune Warriors                    3
Gujarat Lions                    2
Match Abandoned                  2
Rising Pune Supergiants          2
Kochi Tuskers Kerala             1
tied                             1
Name: Season_Year, dtype: int64
```

[60]:
```
teams_to_drop = ['Pune Warriors', 'Gujarat Lions', 'Match Abandoned', 'Rising␣
 ↪Pune Supergiants', 'Kochi Tuskers Kerala', 'tied']
filtered_df = TeamP_df[~TeamP_df['match_winner'].isin(teams_to_drop)]
filtered_df # Here we are dropping 4 IPL teams which formed late in time,␣
 ↪filtering data
team_seasons2 = filtered_df.groupby('match_winner')['Season_Year'].nunique().
 ↪sort_values(ascending=False)
team_seasons2 # Displaying how many season have these 8 IPL teams have played.
```

[60]:
```
match_winner
Delhi Daredevils                10
Kings XI Punjab                 10
Kolkata Knight Riders           10
Mumbai Indians                  10
Royal Challengers Bangalore     10
Sunrisers Hyderabad             10
Chennai Super Kings              8
Rajasthan Royals                 8
Name: Season_Year, dtype: int64
```

[62]:
```
# create a function to plot the graph
def plot_team_graph(team):
    # filter the data for the selected team
```

```
    team_data = filtered_df[filtered_df['match_winner'] == team]
    # create a grouped dataframe for the selected team
    grouped_df = team_data.groupby(['Season_Year'])['match_winner'].count().
 ↪reset_index()
    grouped_df['match_winner'] = grouped_df['match_winner']/22
    # create a plot
    fig, ax = plt.subplots()
    ax.plot(grouped_df['Season_Year'], grouped_df['match_winner'])
    ax.set(xlabel='Season Year', ylabel='Number of Wins',
           title=f'{team} Matches Won Per Season')
    ax.grid()
    plt.show()
team_list = filtered_df['match_winner'].unique() # create a list of all unique␣
 ↪teams
# create a dropdown menu with the list of teams
team_dropdown = widgets.Dropdown(options=team_list, value=team_list[0],␣
 ↪description='Team:')
widgets.interact(plot_team_graph,team=team_dropdown) # use interact to display␣
 ↪dropdown & graph
# Creating a function that creates a plot of the number of wins per season for␣
 ↪a selected team
# using a dropdown menu created by the 'widgets' library.
```

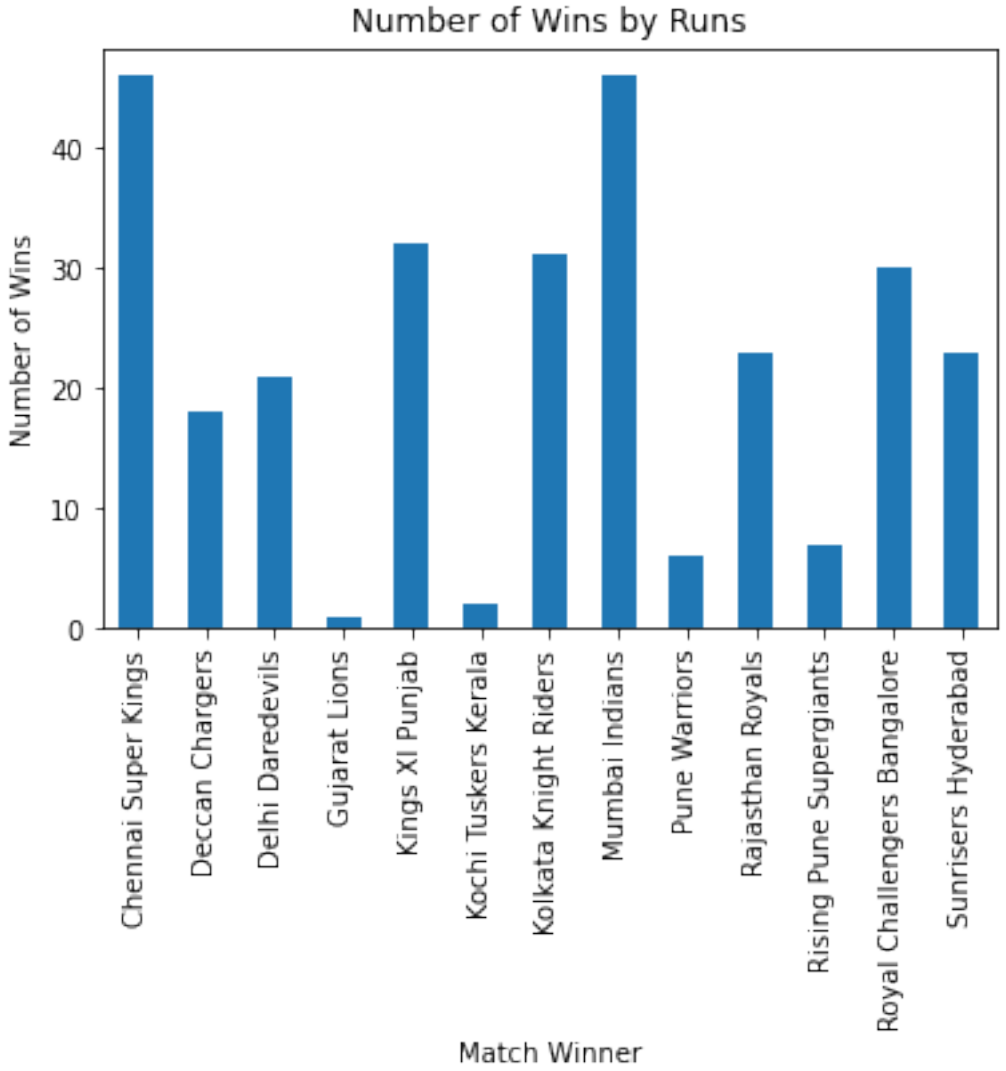
```
interactive(children=(Dropdown(description='Team:', options=('Kolkata Knight Riders', 'Chennai
```

[62]:
```
<function __main__.plot_team_graph(team)>
```

[63]:
```
match_winnerdf1 = match_datadf[match_datadf['Win_Type'] == 'runs'].
 ↪groupby('match_winner')['Win_Type'].count()
match_winnerdf1 # The count of match wins by teams by winning based on runs
```

[63]:
```
match_winner
Chennai Super Kings            46
Deccan Chargers                18
Delhi Daredevils               21
Gujarat Lions                   1
Kings XI Punjab                32
Kochi Tuskers Kerala            2
Kolkata Knight Riders          31
Mumbai Indians                 46
Pune Warriors                   6
Rajasthan Royals               23
Rising Pune Supergiants         7
Royal Challengers Bangalore    30
Sunrisers Hyderabad            23
Name: Win_Type, dtype: int64
```

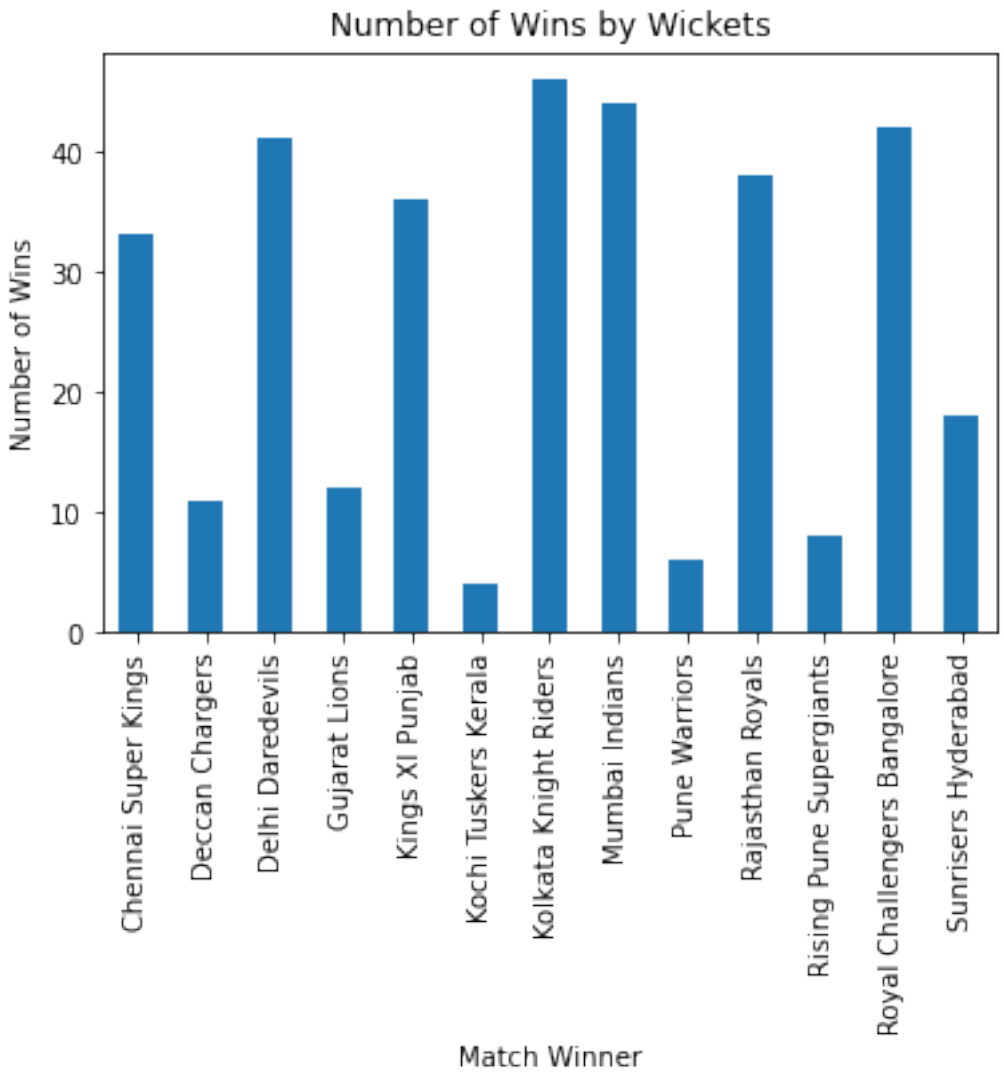
[65]:
```
# Group DataFrame by 'match_winner' & count the number of occurrences of␣
 ↪'Win_Type' where 'Win_Type' is 'runs'
win_count = match_datadf[match_datadf['Win_Type'] == 'runs'].
 ↪groupby('match_winner')['Win_Type'].count()
win_count.plot(kind='bar') # Plot the results as a bar chart
plt.title('Number of Wins by Runs') # Set the chart title and axis labels
plt.xlabel('Match Winner')
plt.ylabel('Number of Wins')
plt.show() # Display the chart
# Counting no of wins by runs for each match winner & visualizes results as a␣
 ↪bar chart.
```



[66]:
```
match_winnerdf2 = match_datadf[match_datadf['Win_Type'] == 'wickets'].
↪groupby('match_winner')['Win_Type'].count()
match_winnerdf2 # Here we count the number of wins by wickets for each match␣
↪winner.
```

[66]:
```
match_winner
Chennai Super Kings            33
Deccan Chargers                11
Delhi Daredevils               41
Gujarat Lions                  12
Kings XI Punjab                36
Kochi Tuskers Kerala            4
Kolkata Knight Riders          46
Mumbai Indians                 44
Pune Warriors                   6
Rajasthan Royals               38
Rising Pune Supergiants         8
Royal Challengers Bangalore    42
Sunrisers Hyderabad            18
Name: Win_Type, dtype: int64
```

[67]:
```
# Group DataFrame by 'match_winner' & count the number of occurrences of␣
↪'Win_Type' where 'Win_Type' is 'wickets'
win_count = match_datadf[match_datadf['Win_Type'] == 'wickets'].
↪groupby('match_winner')['Win_Type'].count()
win_count.plot(kind='bar') # Plot the results as a bar chart
plt.title('Number of Wins by Wickets') # Set the chart title and axis labels
plt.xlabel('Match Winner')
plt.ylabel('Number of Wins')
plt.show() # Display the chart
# Here we counts the number of wins by wickets for each match winner and␣
↪visualizes the results as a bar chart.
```



[68]:
```
def plot_team_win_percentage(team_name):
    team_matches = match_datadf[(match_datadf['Team1'] == team_name) |␣
↪(match_datadf['Team2'] == team_name)]
    total_matches_by_season = team_matches.groupby('Season_Year')['match_id'].
↪count()
    team_wins_by_season = team_matches[team_matches['match_winner'] ==␣
↪team_name].groupby('Season_Year')['match_winner'].count()
    win_percentage_by_season = (team_wins_by_season / total_matches_by_season)␣
↪* 100
    plt.figure(figsize=(10, 6))
    win_percentage_by_season.plot(kind='line', marker='o', color='blue')
    plt.xlabel('Season Year')
    plt.ylabel('Win Percentage')
```

```
    plt.title(f'{team_name} Win Percentage by Season')
    plt.show()
# Get a list of unique team names
team_names = match_datadf['Team1'].append(match_datadf['Team2']).unique()
# Create the dropdown widget
team_dropdown = widgets.Dropdown(options=team_names, description='Select Team:')
# Display the interactive widget
widgets.interact(plot_team_win_percentage, team_name=team_dropdown)
# The code defines a function to plot a selected team's win percentage by␣
 ↪season
# and creates an interactive widget using the dropdown menu for the user to␣
 ↪select the team to visualize.
```

```
interactive(children=(Dropdown(description='Select Team:', options=('Royal Challengers Bangalo
```

[68]:
```
<function __main__.plot_team_win_percentage(team_name)>
```

Based on our analysis, it was observed that Chennai Super Kings, Mumbai Indians, and Sunrisers Hyderabad have the highest percentage of wins, indicating that they win most of the matches they play. Furthermore, these teams tend to win by a margin of runs, which suggests that their batsmen are stronger and more successful.

By examining their performance graphs, it was found that Sunrisers Hyderabad and Chennai Super Kings have more linear graphs compared to other teams, implying that they have a greater chance of winning the 2018 season if we consider the trend.

1.7 Toss analysis

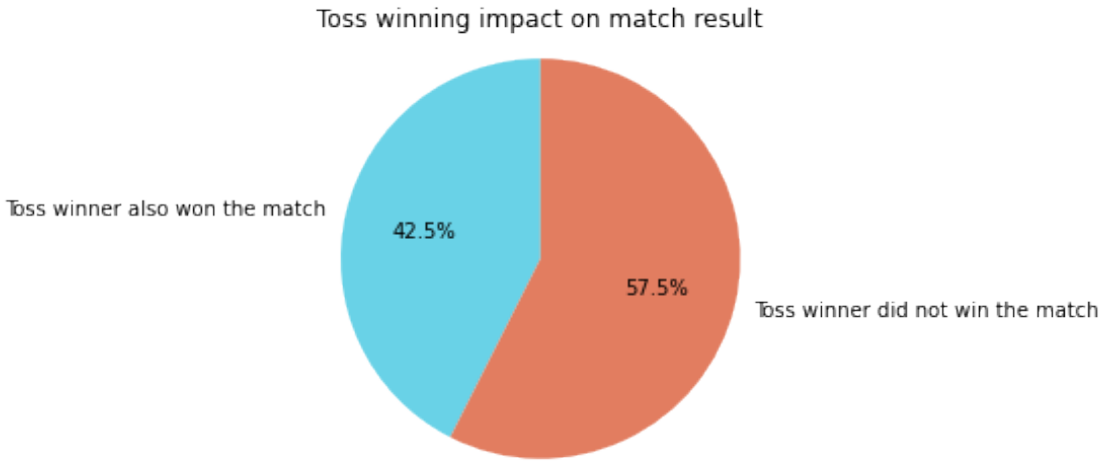
Question : Does winning or losing the toss affect if the team wins the match or not?

[69]:
```
le = LabelEncoder() # create label encoder object
# encode the two columns
match_df["Toss_Winner"] = le.fit_transform(match_df["Toss_Winner"])
match_df["match_winner"] = le.fit_transform(match_df["match_winner"])
# find the correlation between the two columns
correlation = match_df["Toss_Winner"].corr(match_df["match_winner"])
print(f"The correlation between winning a toss and winning a match is:␣
 ↪{correlation}")
```

```
The correlation between winning a toss and winning a match is:
0.4618859210426269
```

[70]:
```
# Calculate the percentage of matches where the toss winner also won the match
toss_and_match_winner = match_df[match_df['Toss_Winner'] ==␣
 ↪match_df['match_winner']].shape[0]
total_matches = match_df.shape[0]
toss_winning_impact = (toss_and_match_winner / total_matches) * 100
# Create the pie chart
```

```
labels = ['Toss winner also won the match', 'Toss winner did not win the match']
sizes = [toss_winning_impact, 100 - toss_winning_impact]
colors = ['#69D2E7', '#E27D60']
plt.pie(sizes, labels=labels, colors=colors, autopct='%1.1f%%', startangle=90)
plt.axis('equal')
plt.title('Toss winning impact on match result')
plt.show() # The code calculates the percentage of matches where the toss␣
 ↪winner also won
# the match and creates a pie chart to visualize the toss winning impact on␣
 ↪match result.
```



According to our analysis, it was observed that teams that win the toss tend to lose the match more often. The implications of this analysis suggest that winning the toss does not necessarily give a team an advantage in winning the match. Other factors such as team performance, player skills, and game strategies may have a greater impact on the outcome of the match.

1.8 Venue analysis

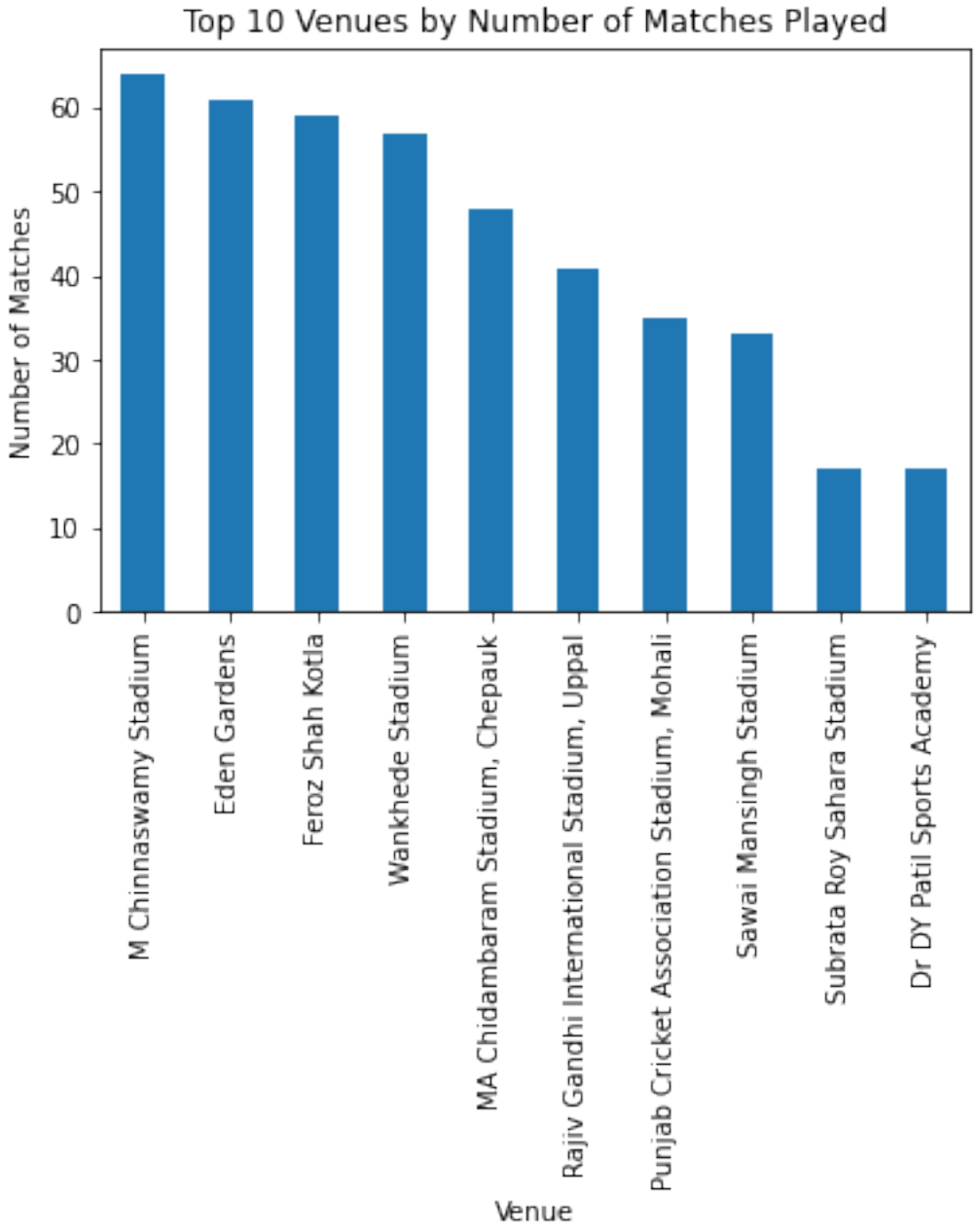
Question : Does venue and location of match affects whether a team wins the match or not?

[71]:
```
match_datadf['Venue_Name'].nunique()
# Counting the number of venue where IPL matches has been played over the␣
 ↪period of time.
```

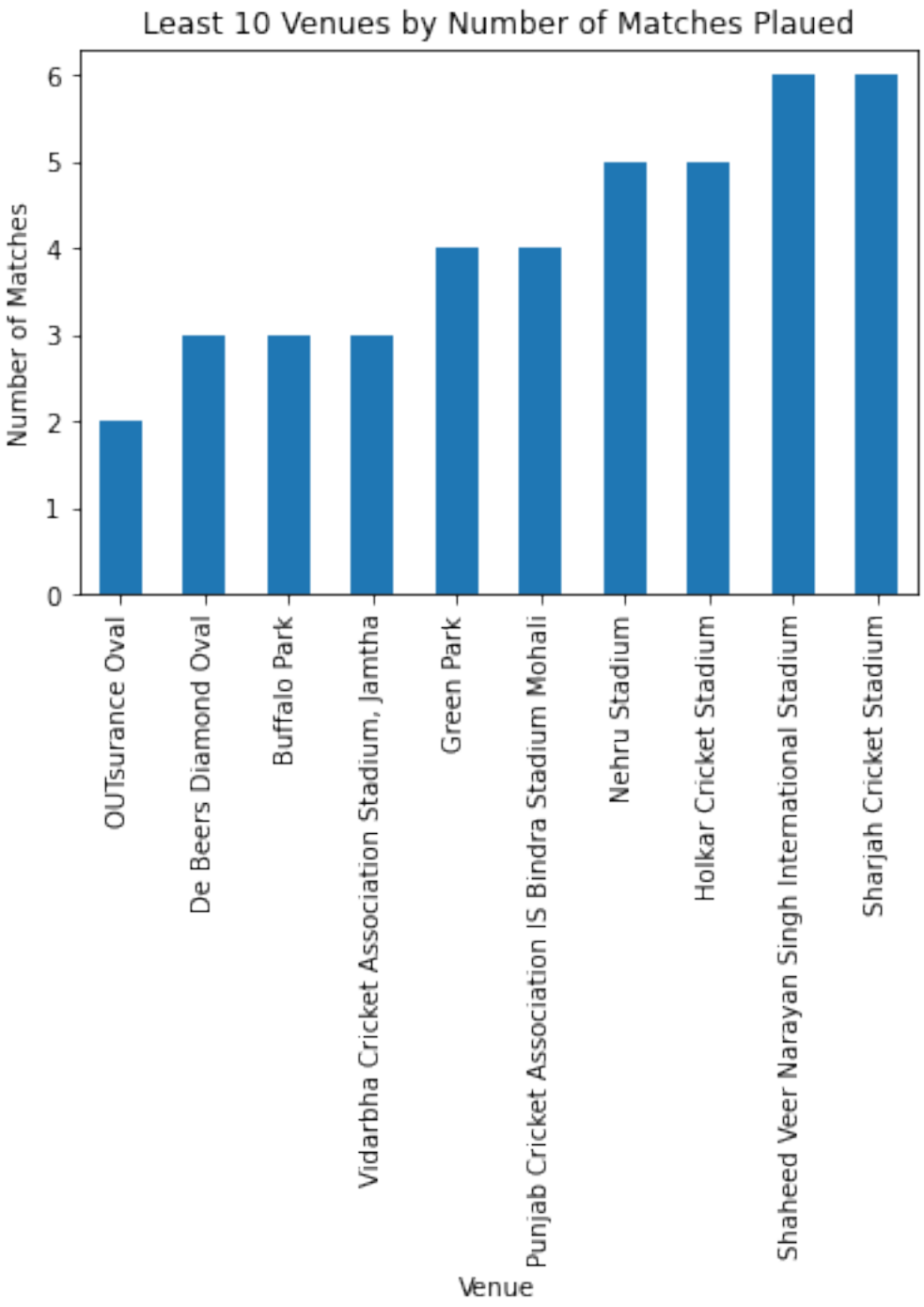
[71]: 37

[72]:
```
# Group the data by venue and count the number of matches won
venue_counts = match_datadf.groupby('Venue_Name')['match_winner'].count()
# Sort the counts in descending order and select the top 10
top_venues = venue_counts.sort_values(ascending=False).nlargest(10)
top_venues.plot(kind='bar') # Plot the results as a histogram
```

```
plt.title('Top 10 Venues by Number of Matches Played')
plt.xlabel('Venue')
plt.ylabel('Number of Matches')
plt.show() # The code groups match data by venue, counts the number of matches␣
 ↪won, selects
# the top 10 venues, and plots the results as a histogram.
```

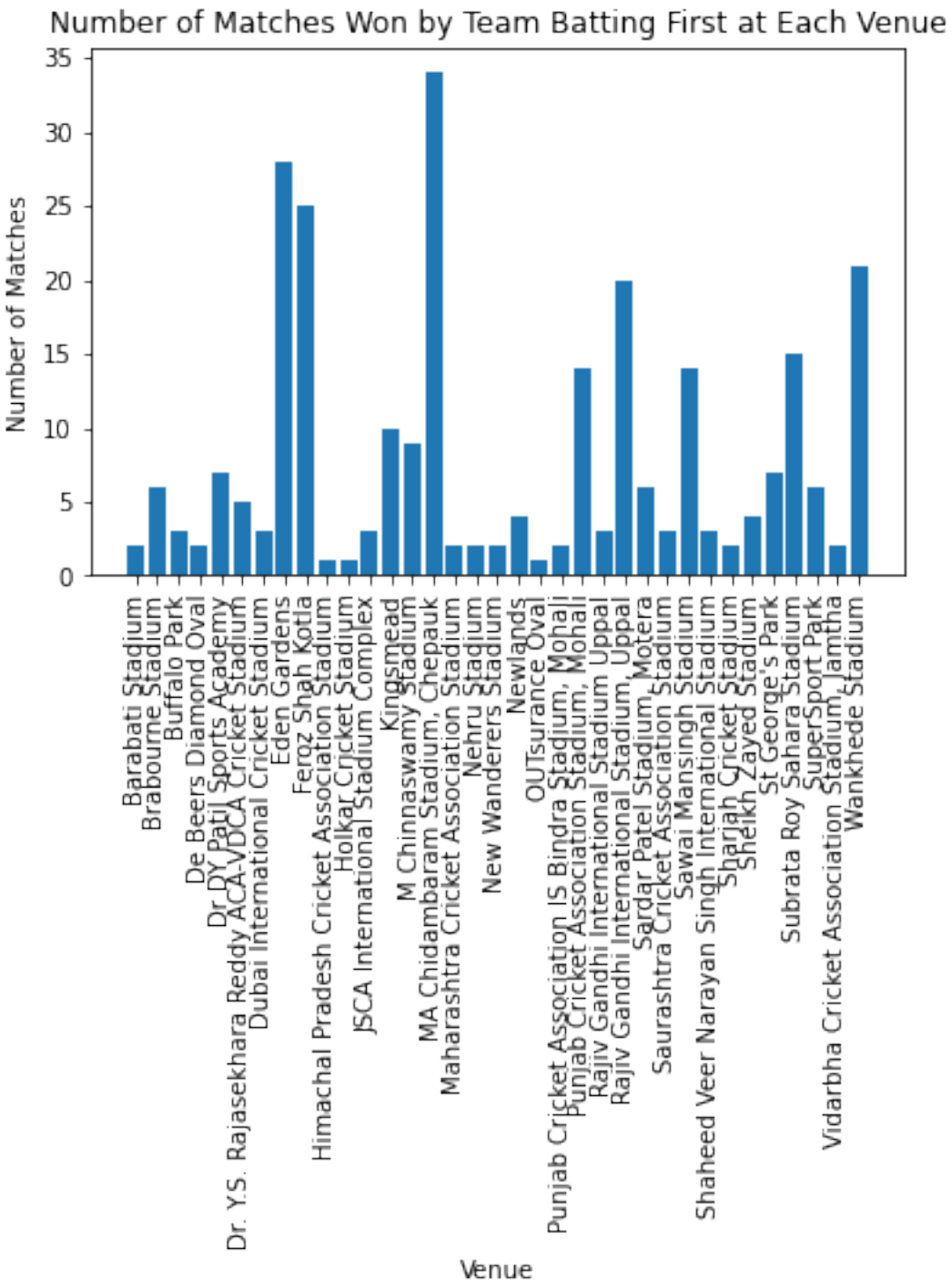


[73]:
```
# Group the data by venue and count the number of matches won
venue_counts = match_datadf.groupby('Venue_Name')['match_winner'].count()
# Sort the counts in ascending order and select the least 10
top_venues = venue_counts.sort_values(ascending=False).nsmallest(10)
top_venues.plot(kind='bar') # Plot the results as a histogram
plt.title('Least 10 Venues by Number of Matches Plaued')
plt.xlabel('Venue')
plt.ylabel('Number of Matches')
plt.show()
# The code groups match data by venue, sorts the number of matches played in␣
 ↪ascending order,
# and then selects the least 10 venues, and displays them in a histogram.
```



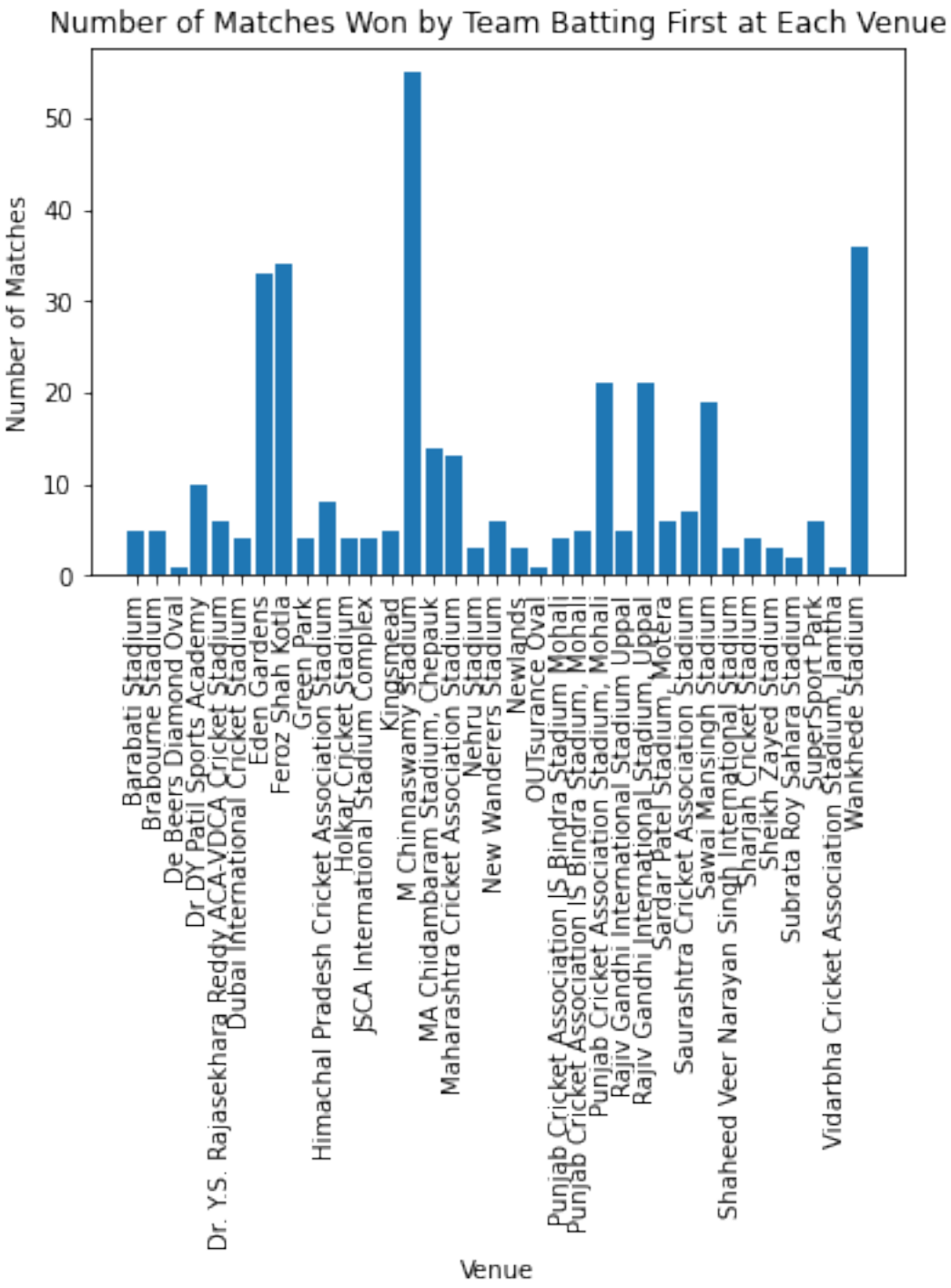
[74]:
```
# Get the count of match winners grouped by venue
venue_counts2 = match_datadf[match_datadf['Toss_Name'] == 'bat'].
 ↪groupby('Venue_Name')['match_winner'].count()
plt.bar(venue_counts2.index, venue_counts2.values) # Create a bar chart
# Set chart title and axis labels
```

```
plt.title("Number of Matches Won by Team Batting First at Each Venue")
plt.xlabel("Venue")
plt.ylabel("Number of Matches")
plt.xticks(rotation=90) # Rotate x-axis labels for better readability
plt.show() # Display the chart
# This code creates a bar chart showing the number of matches won by teams␣
 ↪batting first at each venue.
```



According to the analysis, M Chinnaswamy Stadium is the most favorable stadium for teams that opt to field first after winning the toss. The implications of this analysis suggest that teams can use this information to make better decisions when playing at these stadiums. If a team wins the toss at M Chinnaswamy Stadium, it may be advantageous for them to field first to increase their chances of winning.

[75]:
```
# Get the count of match winners grouped by venue
venue_counts1 = match_datadf[match_datadf['Toss_Name'] == 'field'].
 ↪groupby('Venue_Name')['match_winner'].count()
plt.bar(venue_counts1.index, venue_counts1.values) # Create a bar chart
# Set chart title and axis labels
plt.title("Number of Matches Won by Team Batting First at Each Venue")
plt.xlabel("Venue")
plt.ylabel("Number of Matches")
plt.xticks(rotation=90) # Rotate x-axis labels for better readability
plt.show() # Display the chart
# This creates bar chart displaying no of matches won by team batting first at␣
 ↪each venue
# where toss winner chose to field first.
```



Based on the analysis, it can be concluded that MA Chidambaram Stadium is not an ideal stadium for teams that choose to field first due to their relatively low winning statistics. However, the stadium is the best option for teams that decide to bat first.

The implications of this analysis suggest that teams can use this information to their advantage

when playing at MA Chidambaram Stadium. If a team wins the toss, they may want to consider batting first to increase their chances of winning. This can provide teams with a strategic edge over their opponents and enhance their overall performance at the stadium.

[76]:
```
# Extract and subsetting the necessary columns
venue_data = clean_df[['match_id', 'Season_Year', 'match_winner', 'Venue_Name']]
```

[77]:
```
def plot_grouped_by_team(team):
    top_venue_group = venue_data[venue_data['match_winner']==team].
 ↪groupby(['Venue_Name'])['match_winner'].count().div(22).
 ↪sort_values(ascending=False).head(10)
    plt.bar(top_venue_group.index, top_venue_group.values)
    plt.xticks(rotation=90)
    plt.xlabel('Venue Name')
    plt.ylabel('Number of Match Winners')
    plt.title(f'Top 10 Venues with Most Matches Won for {team}')
    plt.show()
team_list = venue_data['match_winner'].unique().tolist()
team_dropdown = widgets.Dropdown(options=team_list, description='Select a team:
 ↪')
output = widgets.Output()
def dropdown_eventhandler(change):
    output.clear_output()
    with output:
        plot_grouped_by_team(change.new)
team_dropdown.observe(dropdown_eventhandler, names='value')
display(team_dropdown)
display(output)
# This code creates an interactive widget with a dropdown menu that allows the␣
 ↪user to select a cricket team,
# and displays a bar chart of the top 10 venues where the selected team has won␣
 ↪the most matches.
```

```
Dropdown(description='Select a team:', options=('Kolkata Knight Riders', 'Chennai Super Kings'
```

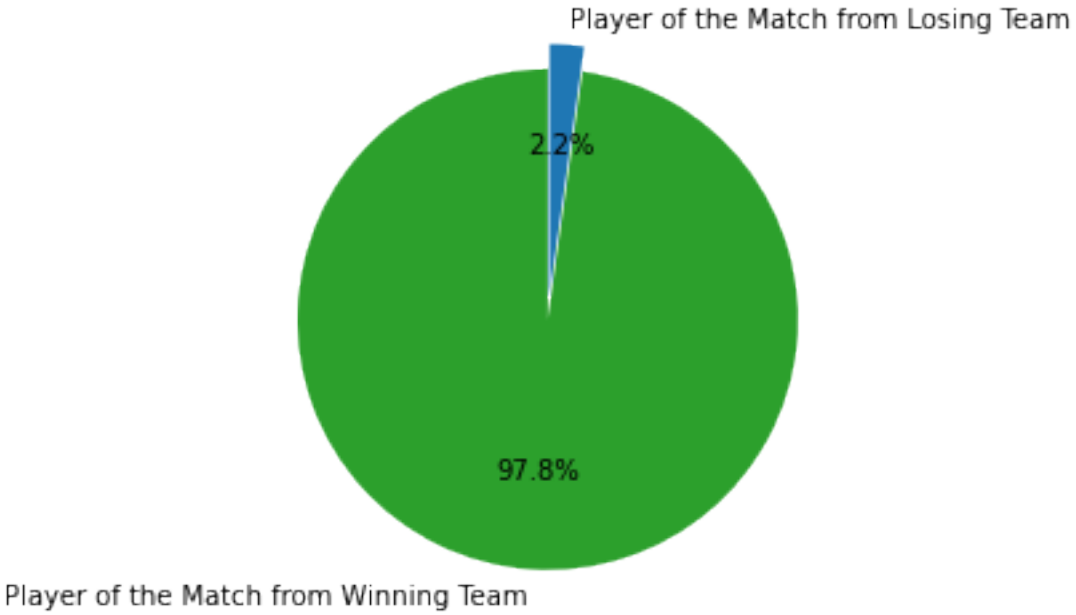
```
Output()
```

This analysis can help us understand the strengths and weaknesses of each team in different playing conditions. Secondly, analyzing the top 10 venues can help teams develop effective match strategies. Teams can use this information to identify the most favorable venues for them and tailor their playing style accordingly. For example, if a team has a high win percentage at a particular venue, they may want to focus on their strengths and play aggressively to increase their chances of winning. Overall, analyzing the top 10 venues for each team where they have won matches can provide valuable insights into team performance, playing conditions, and match strategies

1.9 Player Performance analysis

Question : Which player has what kind of performance, whether the player was man of the match, if yes, for how many matches, also based on whether they are the captain or not?

[78]:
```
# Count the number of occurrences where 'is_manofThematch' is True and␣
 ↪'IsPlayers_Team_won' is True
motm_winning_count = player_match_df.loc[(player_match_df['is_manofThematch']␣
 ↪== True) & (player_match_df['IsPlayers_Team_won'] == True)].shape[0]
# Calculate the total number of times a player of the match was selected
motm_total_count = player_match_df.loc[(player_match_df['is_manofThematch'] ==␣
 ↪True)].shape[0]
# Calculate the percentage of times the player of the match was from the␣
 ↪winning team
motm_winning_percentage = round((motm_winning_count / motm_total_count) * 100,␣
 ↪2)
# Create a pie chart
labels = ['Player of the Match from Winning Team', 'Player of the Match from␣
 ↪Losing Team']
sizes = [motm_winning_percentage, 100 - motm_winning_percentage]
colors = ['tab:green', 'tab:blue']
explode = (0.1, 0)
fig, ax = plt.subplots()
ax.pie(sizes, explode=explode, labels=labels, colors=colors, autopct='%1.1f%%',␣
 ↪startangle=90)
ax.axis('equal')
plt.show()# Displaying a pie chart to show what percentage of player who is␣
 ↪awarded the
# man of the match and this player is from the winning team of the match.
```



[79]:
```
# Get the count of each value in the 'ManOfMach' column
man_of_match_count = match_df['ManOfMach'].value_counts()
top_10 = man_of_match_count.head(10) # Get the top 10 values
print(top_10) # Print the top 10 values
```

```
CH Gayle          18
YK Pathan         16
AB de Villiers    15
DA Warner         15
RG Sharma         14
SK Raina          14
MS Dhoni          13
G Gambhir         13
MEK Hussey        12
AM Rahane         12
Name: ManOfMach, dtype: int64
```

According to the analysis, it is evident that the man of the match award is most often given to a player from the winning team. The implications of this analysis suggest that individual player performance is closely linked to team success. Players who perform exceptionally well and contribute significantly to their team's victory are more likely to receive recognition in the form of the man of the match award. This highlights the importance of teamwork and collective effort in achieving success in cricket. Additionally, teams may want to focus on developing players who can make a significant impact on the game and increase their chances of winning matches.

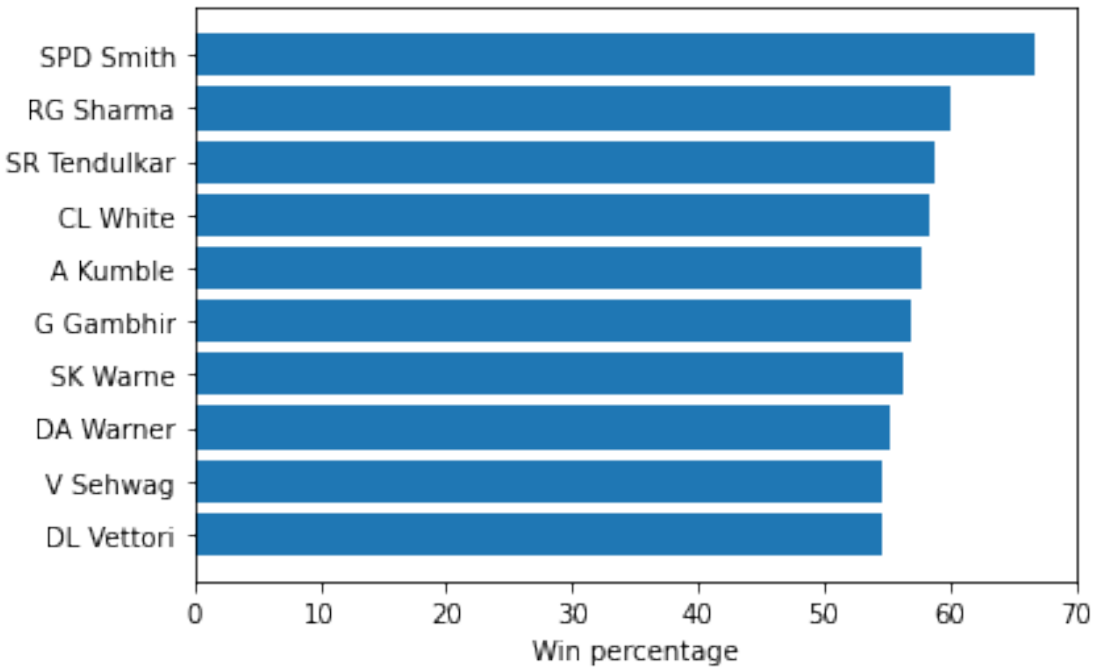
[80]:
```
# Filter the DataFrame to only include matches where the player was a captain
captain_df = player_match_df.loc[player_match_df['Role_Desc'] == 'Captain']
# Group the filtered DataFrame by captain
captain_grouped = captain_df.groupby('Player_Captain')
# Count the number of matches won and lost by each captain
captain_wins = captain_grouped['IsPlayers_Team_won'].sum()
captain_losses = captain_grouped['match_id'].nunique() - captain_wins
# Calculate the win percentage for each captain
captain_win_percentages = captain_wins / (captain_wins + captain_losses) * 100
# Filter the results to only include captains with more than 5 matches
captain_win_percentages_filtered = captain_win_percentages[captain_wins +␣
↪captain_losses > 5]
# Sort the captains by their win percentage in descending order
captain_win_percentages_sorted = captain_win_percentages_filtered.
↪sort_values(ascending=False)
print('Win percentages of every captain with more than 5 matches:')
captain_win_percentages_sorted.head(3) # Print the results
```

```
Win percentages of every captain with more than 5 matches:
```

[80]:
```
Player_Captain
SPD Smith       66.666667
RG Sharma       60.000000
SR Tendulkar    58.823529
dtype: float64
```

The analysis can help us identify the effectiveness of different captains and their leadership styles. Captains who have a higher win percentage may have leadership qualities that positively impact the team's performance, such as effective communication, strategic decision-making, and motivation.

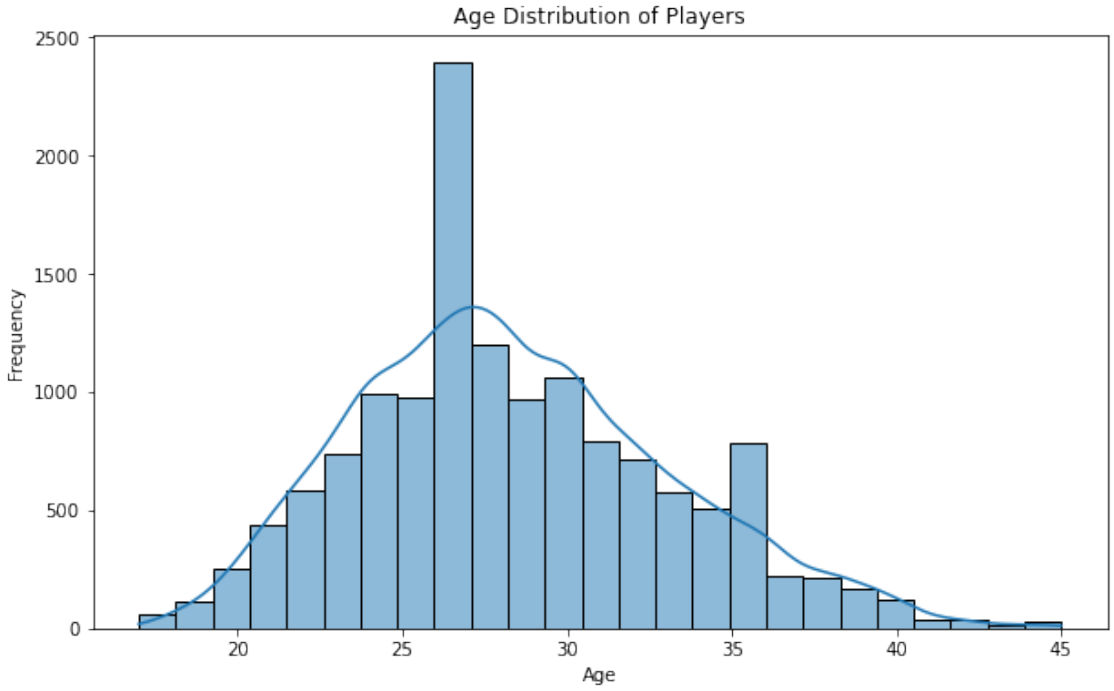
[81]:
```
# Filter the DataFrame to only include matches where the player was a captain
captain_df = player_match_df.loc[player_match_df['Role_Desc'] == 'Captain']
# Group the filtered DataFrame by captain
captain_grouped = captain_df.groupby('Player_Captain')
# Count the number of matches won and lost by each captain
captain_wins = captain_grouped['IsPlayers_Team_won'].sum()
captain_losses = captain_grouped['match_id'].nunique() - captain_wins
# Calculate the win percentage for each captain
captain_win_percentages = captain_wins / (captain_wins + captain_losses) * 100
# Filter the results to only include captains with more than 5 matches
captain_win_percentages_filtered = captain_win_percentages[captain_wins +␣
 ↪captain_losses > 5]
# Sort the captains by their win percentage in descending order
captain_win_percentages_sorted = captain_win_percentages_filtered.
 ↪sort_values(ascending=True).tail(10)
# Create a horizontal bar chart
plt.barh(captain_win_percentages_sorted.index, captain_win_percentages_sorted)
plt.xlabel('Win percentage') # Set the x-axis label
plt.show() # Show the plot
```



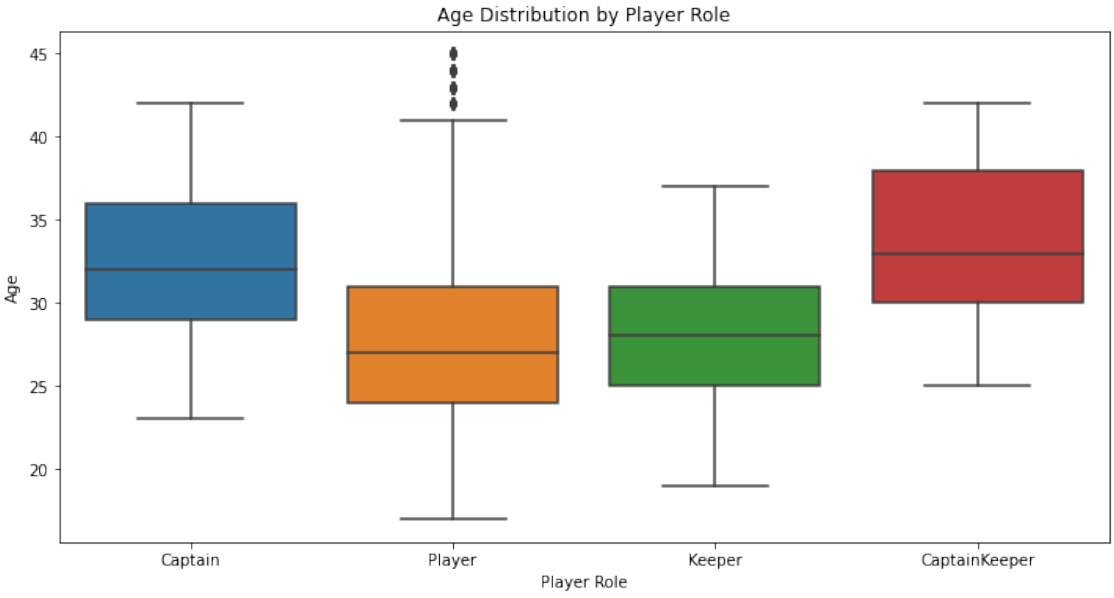
The analysis can also provide insights into the overall team dynamics and how different captains interact with their teammates. Captains who are able to build strong relationships with their team members and foster a positive team culture may be more successful in achieving team goals.

Age distribution of IPL players

[82]:
```
plt.figure(figsize=(10, 6))
sns.histplot(data=player_match_df, x='Age_As_on_match', bins=25, kde=True)
plt.xlabel('Age')
plt.ylabel('Frequency')
plt.title('Age Distribution of Players')
plt.show() # This generates a histogram, which shows distribution of player␣
↪ages.
```



[83]:
```
plt.figure(figsize=(12, 6))
sns.boxplot(data=player_match_df, x='Role_Desc', y='Age_As_on_match')
plt.xlabel('Player Role')
plt.ylabel('Age')
plt.title('Age Distribution by Player Role')
plt.show() # Plotting the age distribution of each player as per their role.
```

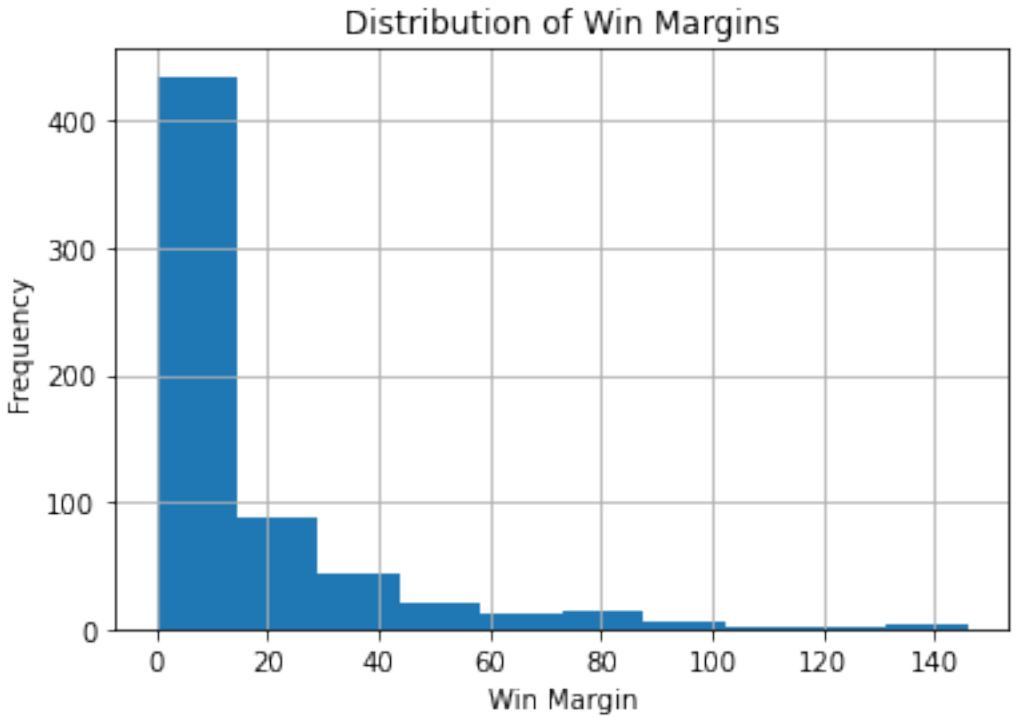


The age distribution can provide insights into the overall experience level of the team. A team with a higher number of older, more experienced players may have an advantage over a team with a younger, less experienced lineup. This experience can translate into better decision-making, better game management, and better leadership. We observe that captains are more than other players, indicating that captains are usually more experienced than others. Meanwhile, players who are not captains come from a younger age group, which means that the team management may be focusing on building a team for the future by recruiting and developing younger players who have the potential to become future leaders.

1.10 Win Margin analysis

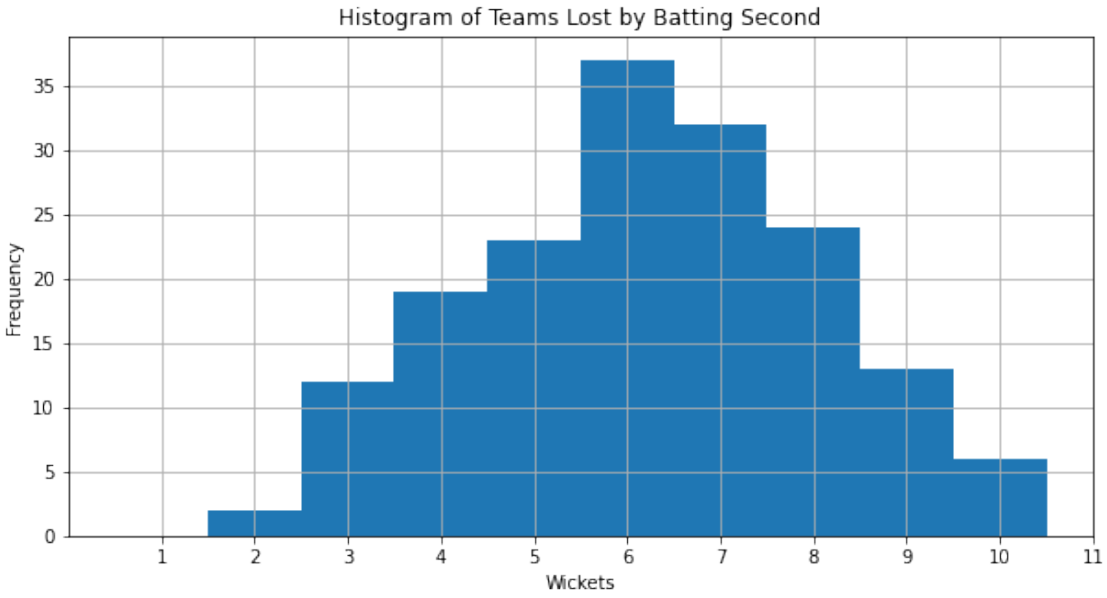
Question : Which factor contributes more to the teams that win matches – runs or wickets?

[84]:
```
match_df['Win_Margin'].hist()
plt.title('Distribution of Win Margins') # Set the chart title and axis labels
plt.xlabel('Win Margin')
plt.ylabel('Frequency')
plt.show() # Plot a histogram of win margin values
```



[85]:
```
wickets_lost_batting_second = match_df[(match_df['Toss_Name'] == 'field') &␣
↪(match_df['Win_Type'] == 'wickets')]['Win_Margin']
plt.figure(figsize=(10, 5))
```

```
plt.hist(wickets_lost_batting_second, bins=range(1,␣
 ↪int(wickets_lost_batting_second.max()) + 2), align='left')
plt.title('Histogram of Teams Lost by Batting Second')
plt.xlabel('Wickets')
plt.ylabel('Frequency')
plt.xticks(range(1, int(wickets_lost_batting_second.max()) + 2))
plt.grid(True)
plt.show() # Plotting a histogram where teams lost by batting second.
```



Conclusion: Analyzing the margin of victory can also provide insights into a team's ability to handle pressure and perform under different circumstances. For example, if a team is consistently winning by a large margin of runs, it may suggest that they are able to perform well under pressure and maintain their dominance throughout the match. On the other hand, if a team is consistently winning by a narrow margin of wickets, it may suggest that they are able to handle pressure situations well and are capable of winning close matches.