Spark Analysis

October 23, 2019

0.1 Most Valuable Player Prediction using IPL Dataset

0.1.1 Importing libraries to be used

```
In [1]: from pyspark.sql import SparkSession
        from pyspark.sql.types import *
        import matplotlib.pyplot as plt
        import seaborn as sns
        import numpy as np
        import pandas as pd
        %matplotlib inline
```

```
In [2]: spark = SparkSession.builder.appName('Ops').getOrCreate()
```

0.1.2 Getting pre-processed data from the csv files

```
In [3]: deliveries = spark.read.csv('Desktop/IPL-MSDR-master/ipldata/Data files after cleaning/n
        matches = spark.read.csv('Desktop/IPL-MSDR-master/ipldata/Data files after cleaning/new_
```

```
In [4]: deliveries.printSchema()
```

```
root
 |-- _c0: integer (nullable = true)
 |-- match_id: integer (nullable = true)
 |-- inning: integer (nullable = true)
 |-- batting_team: string (nullable = true)
 |-- bowling_team: string (nullable = true)
 |-- over: integer (nullable = true)
 |-- ball: integer (nullable = true)
 |-- batsman: string (nullable = true)
 |-- non_striker: string (nullable = true)
 |-- bowler: string (nullable = true)
 |-- is_super_over: integer (nullable = true)
 |-- wide_runs: integer (nullable = true)
 |-- bye_runs: integer (nullable = true)
 |-- legbye_runs: integer (nullable = true)
 |-- noball_runs: integer (nullable = true)
 |-- penalty_runs: integer (nullable = true)
 |-- batsman_runs: integer (nullable = true)
```

```
 |-- extra_runs: integer (nullable = true)
 |-- total_runs: integer (nullable = true)
 |-- player_dismissed: string (nullable = true)
 |-- dismissal_kind: string (nullable = true)
 |-- fielder: string (nullable = true)
```

```
In [5]: matches.printSchema()
```

```
root
 |-- _c0: integer (nullable = true)
 |-- id: integer (nullable = true)
 |-- season: integer (nullable = true)
 |-- city: string (nullable = true)
 |-- team1: string (nullable = true)
 |-- team2: string (nullable = true)
 |-- toss_winner: string (nullable = true)
 |-- toss_decision: string (nullable = true)
 |-- result: string (nullable = true)
 |-- dl_applied: integer (nullable = true)
 |-- winner: string (nullable = true)
 |-- win_by_runs: integer (nullable = true)
 |-- win_by_wickets: integer (nullable = true)
 |-- player_of_match: string (nullable = true)
 |-- venue: string (nullable = true)
```

0.1.3 Total Number of Matches In Each Season

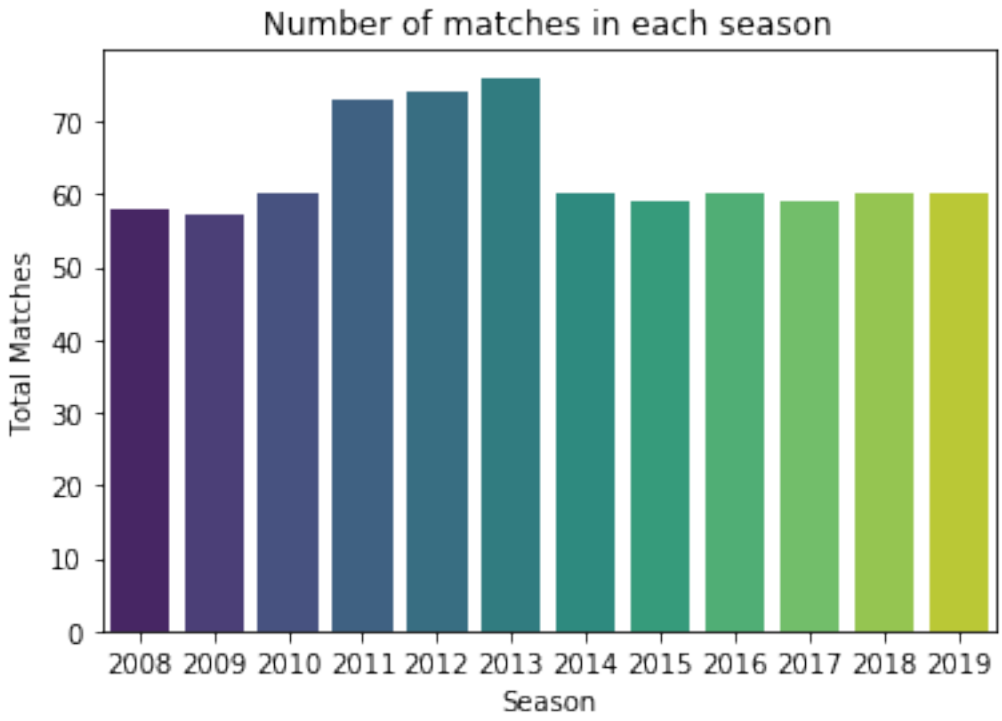
```
In [6]: matches.registerTempTable('seasons')
        seasons = spark.sql('''Select distinct(season),count(*) as total_matches from seasons gr
        seasons.show()
```

```
+------+-------------+
|season|total_matches|
+------+-------------+
|  2018|           60|
|  2015|           59|
|  2013|           76|
|  2014|           60|
|  2019|           60|
|  2012|           74|
|  2009|           57|
|  2016|           60|
|  2010|           60|
|  2011|           73|
|  2008|           58|
```

```
|  2017|           59|
+------+-------------+
```

```
In [7]: fig, a = plt.subplots()
        a = sns.barplot(x ="season", y="total_matches", data=seasons.toPandas(),palette='viridis
        a.set_xlabel('Season')
        a.set_ylabel('Total Matches')
        a.set_title('Number of matches in each season')
```

```
Out[7]: Text(0.5,1,'Number of matches in each season')
```



Summary of the above data

```
In [8]: seasons.describe('total_matches').show()
```

```
+-------+-----------------+
|summary|    total_matches|
+-------+-----------------+
|  count|               12|
|   mean|             63.0|
| stddev|6.928203230275509|
|    min|               57|
```

```
|    max|               76|
+-------+-----------------+
```

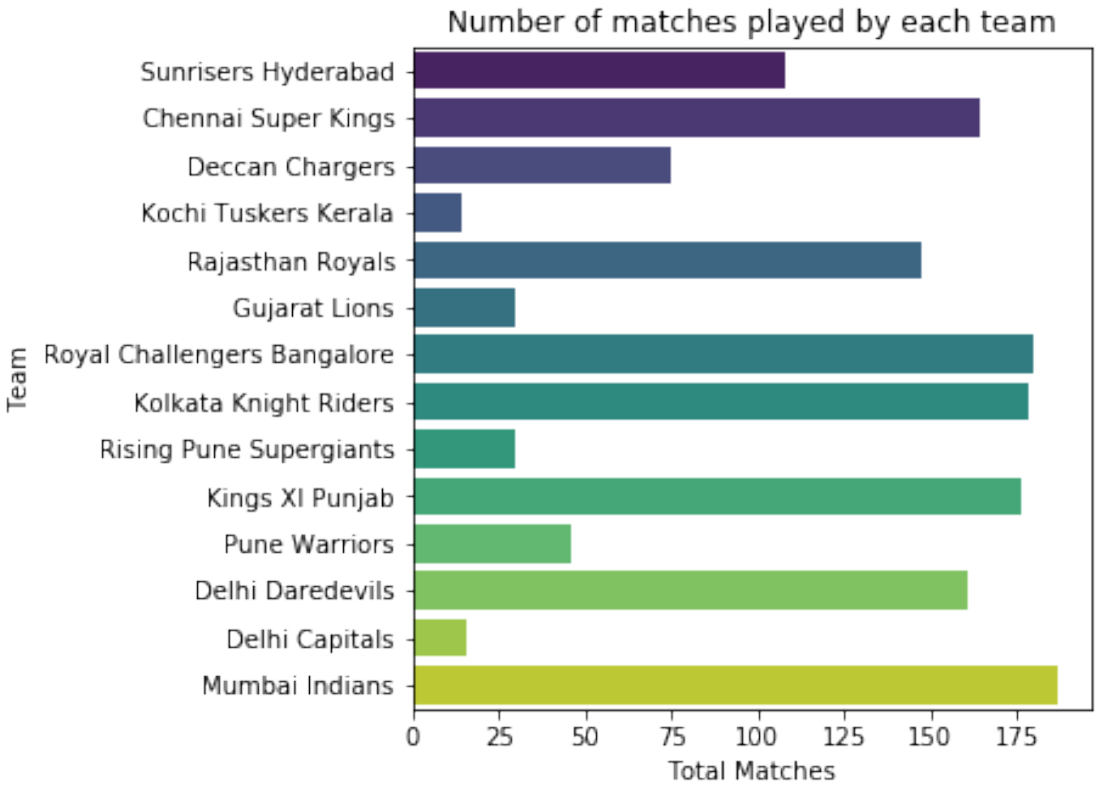
0.1.4 Number of matches played by each team from 2008 to 2019

```
In [9]: matches.registerTempTable('team')
        team = spark.sql('''Select distinct(team), count(*) as total_matches from (Select team1
        team.show()
```

```
+--------------------+-------------+
|                team|total_matches|
+--------------------+-------------+
| Sunrisers Hyderabad|          108|
| Chennai Super Kings|          164|
|     Deccan Chargers|           75|
|Kochi Tuskers Kerala|           14|
|    Rajasthan Royals|          147|
|       Gujarat Lions|           30|
|Royal Challengers...|          180|
|Kolkata Knight Ri...|          178|
|Rising Pune Super...|           30|
|     Kings XI Punjab|          176|
|       Pune Warriors|           46|
|    Delhi Daredevils|          161|
|      Delhi Capitals|           16|
|      Mumbai Indians|          187|
+--------------------+-------------+
```

```
In [10]: fig, a = plt.subplots(figsize = (5,5))
         a = sns.barplot(x ="total_matches", y="team", data=team.toPandas(), palette='viridis')
         a.set_ylabel('Team')
         a.set_xlabel('Total Matches')
         a.set_title('Number of matches played by each team')
```

```
Out[10]: Text(0.5,1,'Number of matches played by each team')
```



0.1.5 Total seasons in which the team has played

```
In [12]: matches.registerTempTable('team_season')
         team_season = spark.sql('''Select team1 as team, min(season) as first_season, max(seaso
         team_season.show()
```

```
+--------------------+------------+-----------+-------------+
|                team|first_season|last_season|total_seasons|
+--------------------+------------+-----------+-------------+
|     Kings XI Punjab|        2008|       2019|           12|
|Royal Challengers...|        2008|       2019|           12|
|      Mumbai Indians|        2008|       2019|           12|
|Kolkata Knight Ri...|        2008|       2019|           12|
|    Delhi Daredevils|        2008|       2018|           11|
|    Rajasthan Royals|        2008|       2019|           10|
| Chennai Super Kings|        2008|       2019|           10|
| Sunrisers Hyderabad|        2013|       2019|            7|
|     Deccan Chargers|        2008|       2012|            5|
|       Pune Warriors|        2011|       2013|            3|
|       Gujarat Lions|        2016|       2017|            2|
|Rising Pune Super...|        2016|       2017|            2|
|Kochi Tuskers Kerala|        2011|       2011|            1|
```

```
|      Delhi Capitals|        2019|       2019|            1|
+--------------------+------------+-----------+-------------+
```

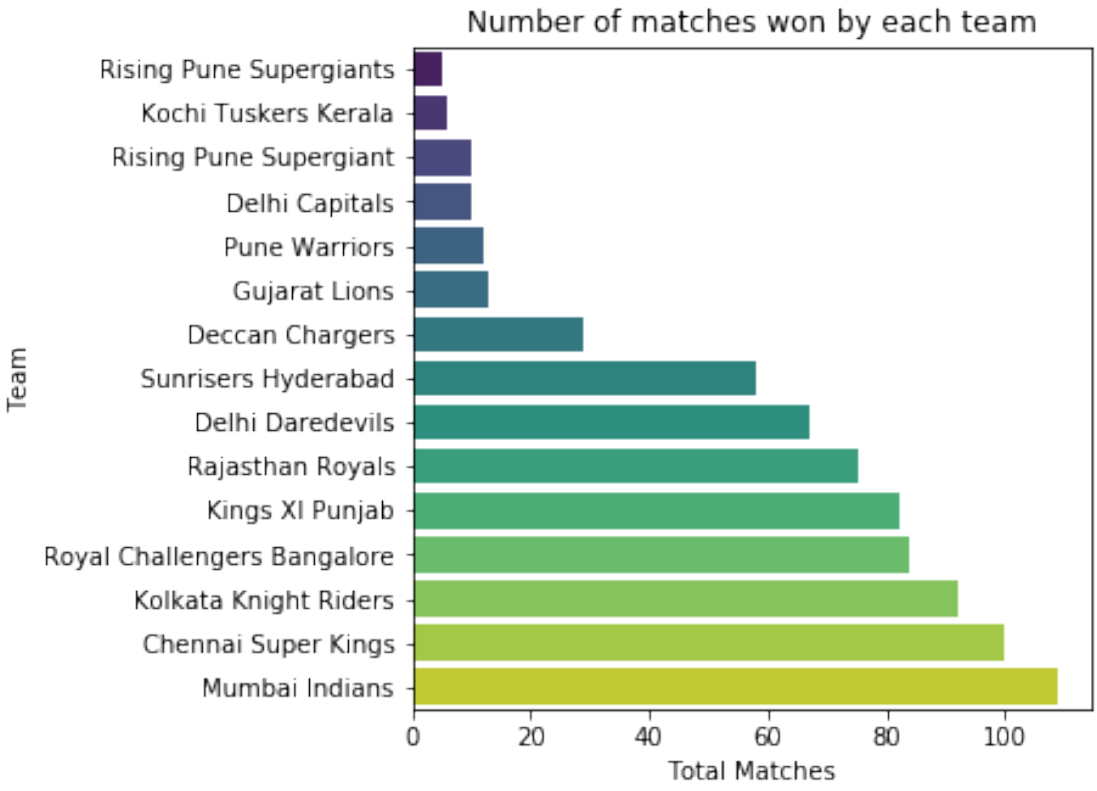
0.1.6 Total number of matches won by the teams

```
In [13]: matches.registerTempTable('most_win')
         most_win = spark.sql('''Select distinct(winner) as team, count(*) as total_matches from
         most_win.show()
```

```
+--------------------+-------------+
|                team|total_matches|
+--------------------+-------------+
|Rising Pune Super...|            5|
|Kochi Tuskers Kerala|            6|
|Rising Pune Super...|           10|
|      Delhi Capitals|           10|
|       Pune Warriors|           12|
|       Gujarat Lions|           13|
|     Deccan Chargers|           29|
| Sunrisers Hyderabad|           58|
|    Delhi Daredevils|           67|
|    Rajasthan Royals|           75|
|     Kings XI Punjab|           82|
|Royal Challengers...|           84|
|Kolkata Knight Ri...|           92|
| Chennai Super Kings|          100|
|      Mumbai Indians|          109|
+--------------------+-------------+
```

```
In [15]: fig, a = plt.subplots(figsize = (5,5))
         a = sns.barplot(x ="total_matches", y="team", data=most_win.toPandas(), palette='viridi
         a.set_ylabel('Team')
         a.set_xlabel('Total Matches')
         a.set_title('Number of matches won by each team')

Out[15]: Text(0.5,1,'Number of matches won by each team')
```



0.1.7 Total matches won by teams in each season

```
In [16]: matches.registerTempTable('most_win_by_season')
         most_win_by_season = spark.sql('''Select season, winner as team, count(*) as total_matc
         most_win_by_season.show()
```

```
+------+--------------------+----------------+
|season|                team|total_matches_won|
+------+--------------------+----------------+
|  2013|      Mumbai Indians|              13|
|  2008|    Rajasthan Royals|              13|
|  2014|     Kings XI Punjab|              12|
|  2013| Chennai Super Kings|              12|
|  2012|Kolkata Knight Ri...|              12|
|  2017|      Mumbai Indians|              12|
|  2018| Chennai Super Kings|              11|
|  2011| Chennai Super Kings|              11|
|  2013|    Rajasthan Royals|              11|
|  2019|      Mumbai Indians|              11|
|  2012|    Delhi Daredevils|              11|
|  2016| Sunrisers Hyderabad|              11|
|  2014|Kolkata Knight Ri...|              11|
```

```
|  2010|      Mumbai Indians|               11|
|  2012| Chennai Super Kings|               10|
|  2014| Chennai Super Kings|               10|
|  2009|    Delhi Daredevils|               10|
|  2017|Rising Pune Super...|               10|
|  2019| Chennai Super Kings|               10|
|  2012|      Mumbai Indians|               10|
+------+--------------------+-----------------+
only showing top 20 rows
```

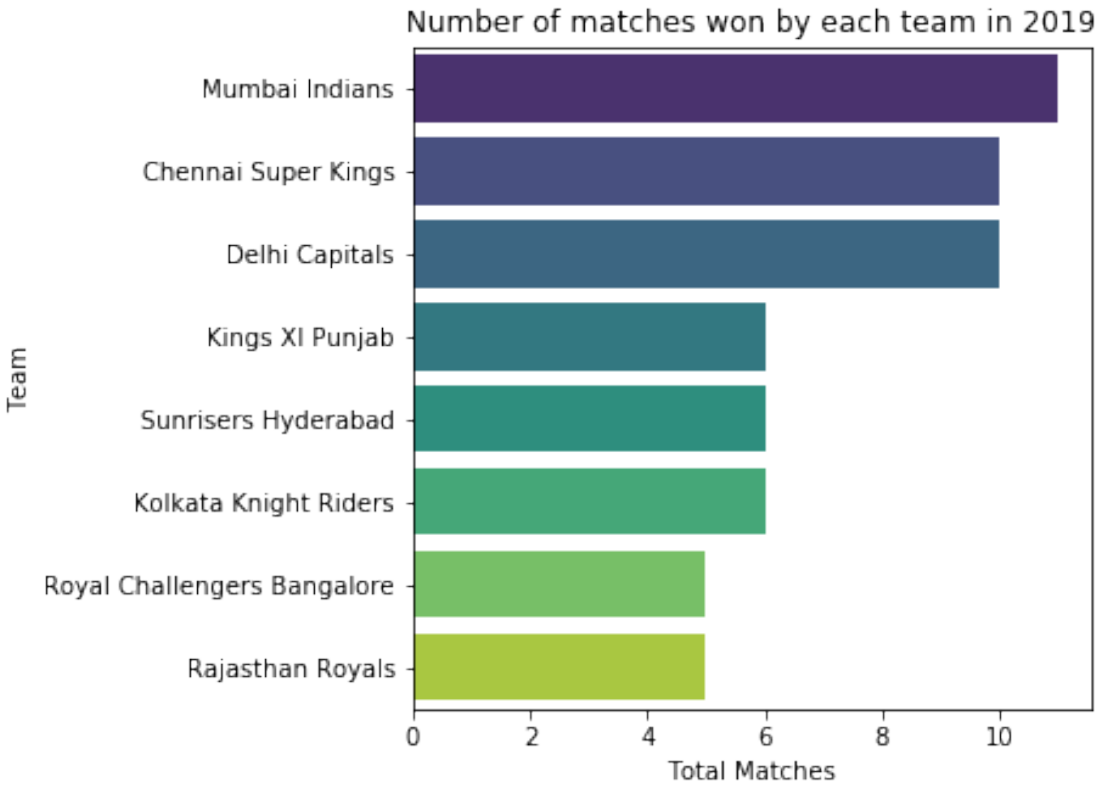
Total matches won by teams in 2019

```
In [17]: matches.registerTempTable('most_win_2019')
         most_win_2019 = spark.sql('''Select season, winner as team, count(*) as total_matches_w
         most_win_2019.show()
```

```
+------+--------------------+-----------------+
|season|                team|total_matches_won|
+------+--------------------+-----------------+
|  2019|      Mumbai Indians|               11|
|  2019| Chennai Super Kings|               10|
|  2019|      Delhi Capitals|               10|
|  2019|     Kings XI Punjab|                6|
|  2019|Kolkata Knight Ri...|                6|
|  2019| Sunrisers Hyderabad|                6|
|  2019|Royal Challengers...|                5|
|  2019|    Rajasthan Royals|                5|
+------+--------------------+-----------------+
```

```
In [18]: fig, a = plt.subplots(figsize = (5,5))
         a = sns.barplot(x ="total_matches_won", y="team", data=most_win_2019.toPandas(), palett
         a.set_ylabel('Team')
         a.set_xlabel('Total Matches')
         a.set_title('Number of matches won by each team in 2019')

Out[18]: Text(0.5,1,'Number of matches won by each team in 2019')
```



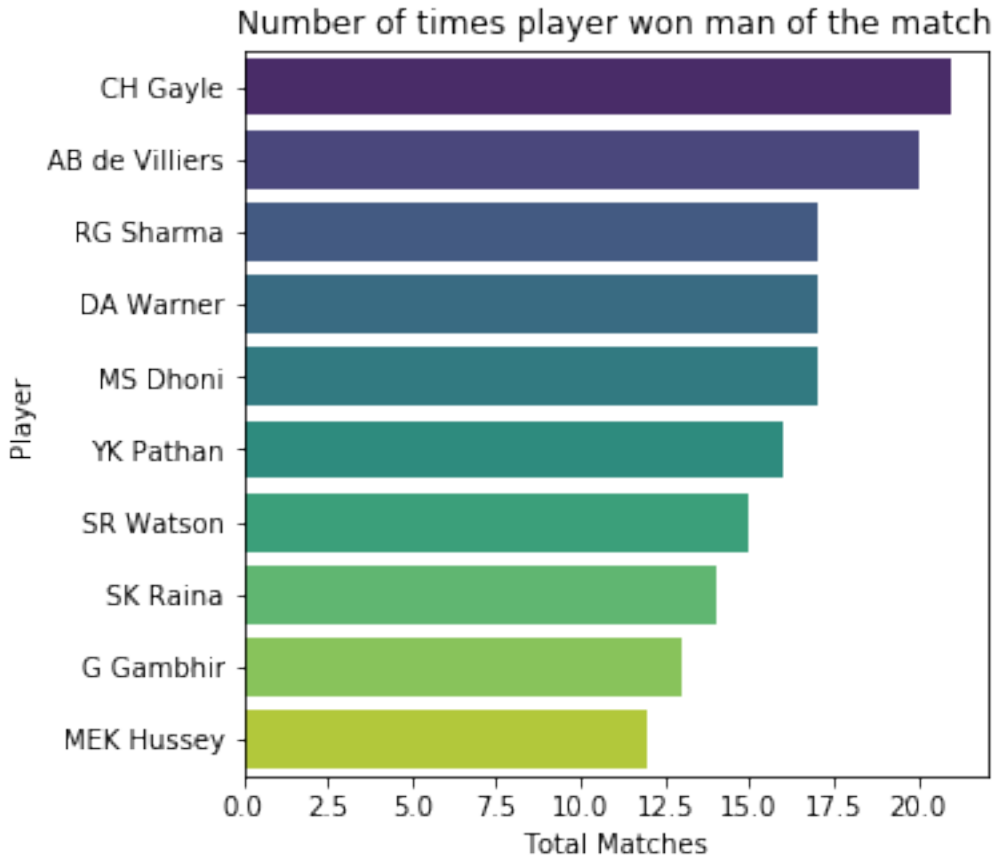
0.1.8 Players of the matches with max matches

```
In [19]: matches.registerTempTable('man_match')
         man_match = spark.sql('''Select distinct(player_of_match), count(*) as total_matches fr
         man_match.show()
```

```
+---------------+-------------+
|player_of_match|total_matches|
+---------------+-------------+
|       CH Gayle|           21|
| AB de Villiers|           20|
|      RG Sharma|           17|
|      DA Warner|           17|
|       MS Dhoni|           17|
|      YK Pathan|           16|
|      SR Watson|           15|
|       SK Raina|           14|
|      G Gambhir|           13|
|      AM Rahane|           12|
+---------------+-------------+
```

```
In [20]: fig, a = plt.subplots(figsize = (5,5))
         a = sns.barplot(x ="total_matches", y="player_of_match", data=man_match.toPandas(), pal
         a.set_xlabel('Total Matches')
         a.set_ylabel('Player')
         a.set_title('Number of times player won man of the match')

Out[20]: Text(0.5,1,'Number of times player won man of the match')
```



0.1.9 Number of matches at each venue

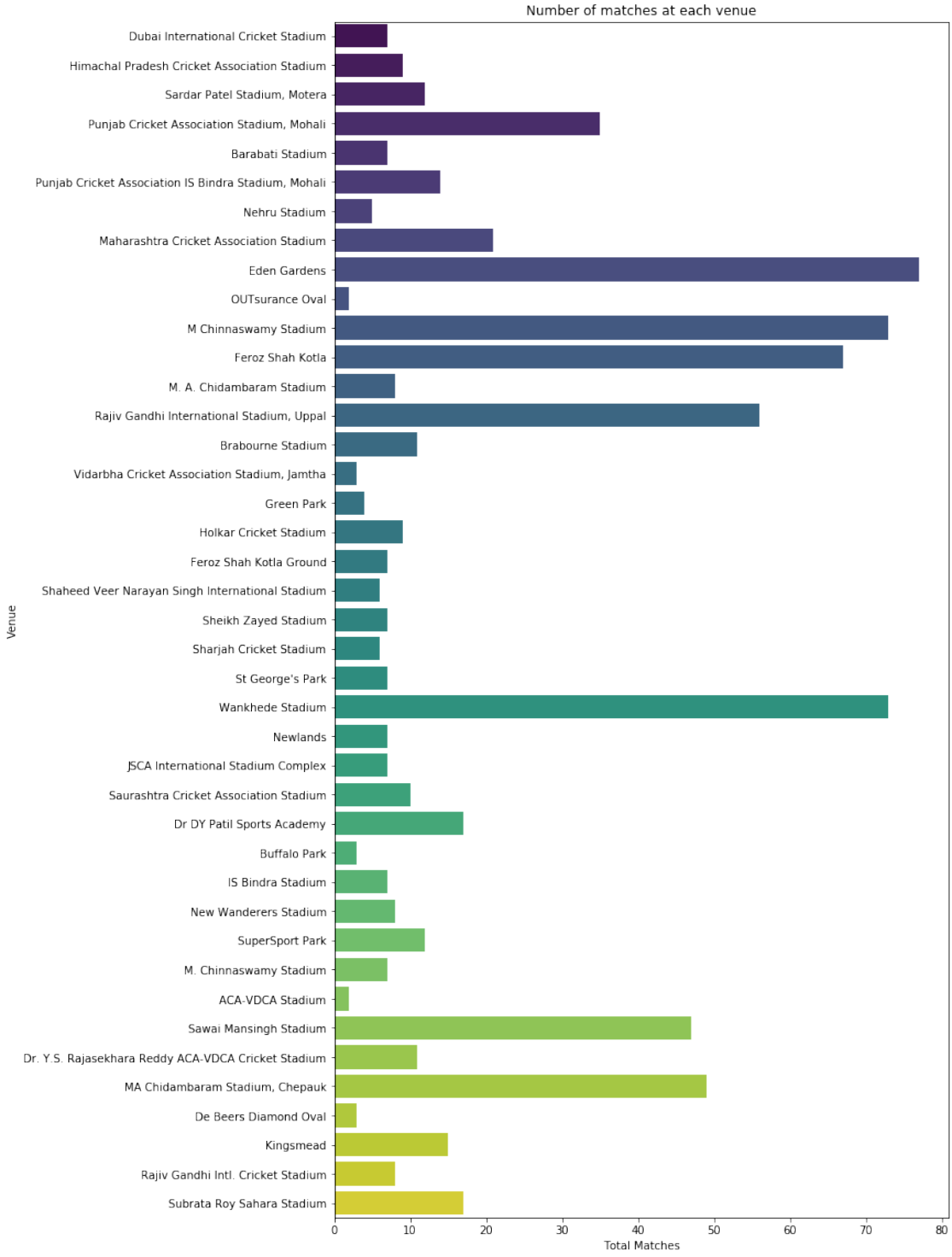
```
In [21]: matches.registerTempTable('venue')
         venue = spark.sql('''Select distinct(venue), count(*) as total_matches from venue group
         venue.show()

+--------------------+-------------+
|               venue|total_matches|
+--------------------+-------------+
|Dubai Internation...|            7|
|Himachal Pradesh ...|            9|
|Sardar Patel Stad...|           12|
```

```
|Punjab Cricket As...|           35|
|    Barabati Stadium|            7|
|Punjab Cricket As...|           14|
|       Nehru Stadium|            5|
|Maharashtra Crick...|           21|
|        Eden Gardens|           77|
|     OUTsurance Oval|            2|
|M Chinnaswamy Sta...|           73|
|    Feroz Shah Kotla|           67|
|M. A. Chidambaram...|            8|
|Rajiv Gandhi Inte...|           56|
|   Brabourne Stadium|           11|
|Vidarbha Cricket ...|            3|
|          Green Park|            4|
|Holkar Cricket St...|            9|
|Feroz Shah Kotla ...|            7|
|Shaheed Veer Nara...|            6|
+--------------------+-------------+
only showing top 20 rows
```

```
In [22]: fig, a = plt.subplots(figsize = (10,20))
         a = sns.barplot(x ="total_matches", y="venue", data=venue.toPandas(), palette='viridis'
         a.set_ylabel('Venue')
         a.set_xlabel('Total Matches')
         a.set_title('Number of matches at each venue')

Out[22]: Text(0.5,1,'Number of matches at each venue')
```


Number of matches at each venue
Dubai International Cricket Stadium
Himachal Pradesh Cricket Association Stadium
Sardar Patel Stadium, Motera
Punjab Cricket Association Stadium, Mohali
Barabati Stadium
Punjab Cricket Association IS Bindra Stadium, Mohali
Nehru Stadium
Maharashtra Cricket Association Stadium
Eden Gardens
OUTsurance Oval
M Chinnaswamy Stadium
Feroz Shah Kotla
M. A. Chidambaram Stadium
Rajiv Gandhi International Stadium, Uppal
Brabourne Stadium
Vidarbha Cricket Association Stadium, Jamtha
Green Park
Holkar Cricket Stadium
Feroz Shah Kotla Ground
Shaheed Veer Narayan Singh International Stadium
Sheikh Zayed Stadium
Sharjah Cricket Stadium
St George's Park
Wankhede Stadium
Newlands
JSCA International Stadium Complex
Saurashtra Cricket Association Stadium
Dr DY Patil Sports Academy
Buffalo Park
IS Bindra Stadium
New Wanderers Stadium
SuperSport Park
M. Chinnaswamy Stadium
ACA-VDCA Stadium
Sawai Mansingh Stadium
Dr. Y.S. Rajasekhara Reddy ACA-VDCA Cricket Stadium
MA Chidambaram Stadium, Chepauk
De Beers Diamond Oval
Kingsmead
Rajiv Gandhi Intl. Cricket Stadium
Subrata Roy Sahara Stadium
Venue
0
10
20
30
40
50
60
70
80
Total Matches

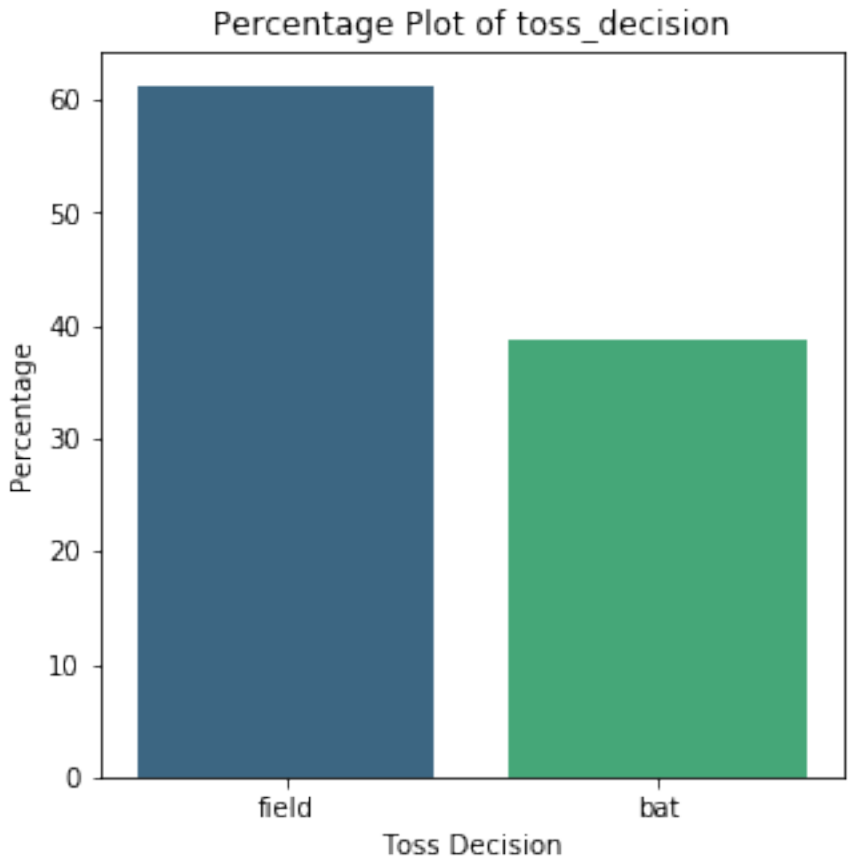
0.1.10 Toss Decision by teams

```
In [23]: matches.registerTempTable('toss')
         toss = spark.sql('''Select distinct(toss_decision), ((count(toss_decision)*100)/ (selec
         toss.show()
```

```
+-------------+-----------------+
|toss_decision| percentage_count|
+-------------+-----------------+
|        field|61.24338624338624|
|          bat|38.75661375661376|
+-------------+-----------------+
```

```
In [24]: fig, a = plt.subplots(figsize = (5,5))
         a = sns.barplot(x ="toss_decision", y="percentage_count", data=toss.toPandas(), palette
         a.set_ylabel('Percentage')
         a.set_xlabel('Toss Decision')
         a.set_title('Percentage Plot of toss_decision')
```

```
Out[24]: Text(0.5,1,'Percentage Plot of toss_decision')
```



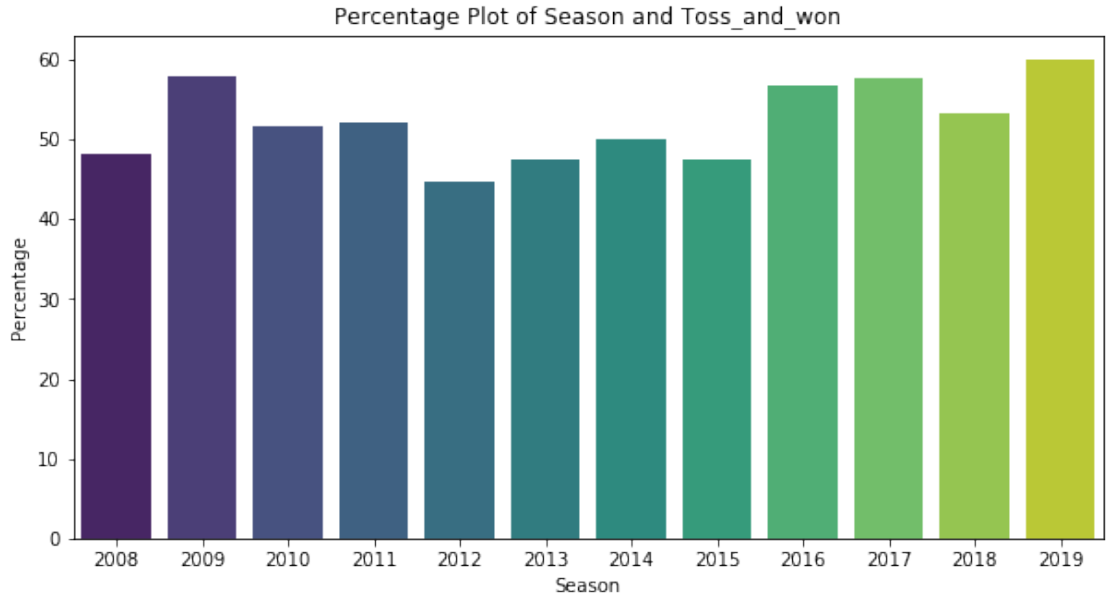
0.1.11 Percentage of teams who won the toss followed by winning the match

```
In [25]: matches.registerTempTable('toss_and_won')
         matches.registerTempTable('toss_won_data')
         toss_won_data = spark.sql('''Select t1.season, t1.total_matches, \
                   t2.count_toss_and_won as count_toss_and_won, \
                   (t2.count_toss_and_won / t1.total_matches * 100) as percent_toss_and_won from
                   (Select distinct(season),count(*) as total_matches from seasons group by seas
                   left join (Select distinct(season), count(*) as count_toss_and_won from toss_
         toss_won_data.show()
```

```
+------+-------------+-----------------+-------------------+
|season|total_matches|count_toss_and_won|percent_toss_and_won|
+------+-------------+-----------------+-------------------+
|  2008|           58|               28|  48.275862068965516|
|  2009|           57|               33|   57.89473684210527|
|  2010|           60|               31|   51.66666666666667|
|  2011|           73|               38|  52.054794520547944|
|  2012|           74|               33|    44.5945945945946|
|  2013|           76|               36|  47.368421052631575|
|  2014|           60|               30|                50.0|
|  2015|           59|               28|   47.45762711864407|
|  2016|           60|               34|  56.666666666666664|
|  2017|           59|               34|    57.6271186440678|
|  2018|           60|               32|  53.333333333333336|
|  2019|           60|               36|                60.0|
+------+-------------+-----------------+-------------------+
```

```
In [26]: fig, a = plt.subplots(figsize = (10,5))
         a = sns.barplot(x ="season", y="percent_toss_and_won", data=toss_won_data.toPandas(), p
         a.set_ylabel('Percentage')
         a.set_xlabel('Season')
         a.set_title('Percentage Plot of Season and Toss_and_won')
```

```
Out[26]: Text(0.5,1,'Percentage Plot of Season and Toss_and_won')
```



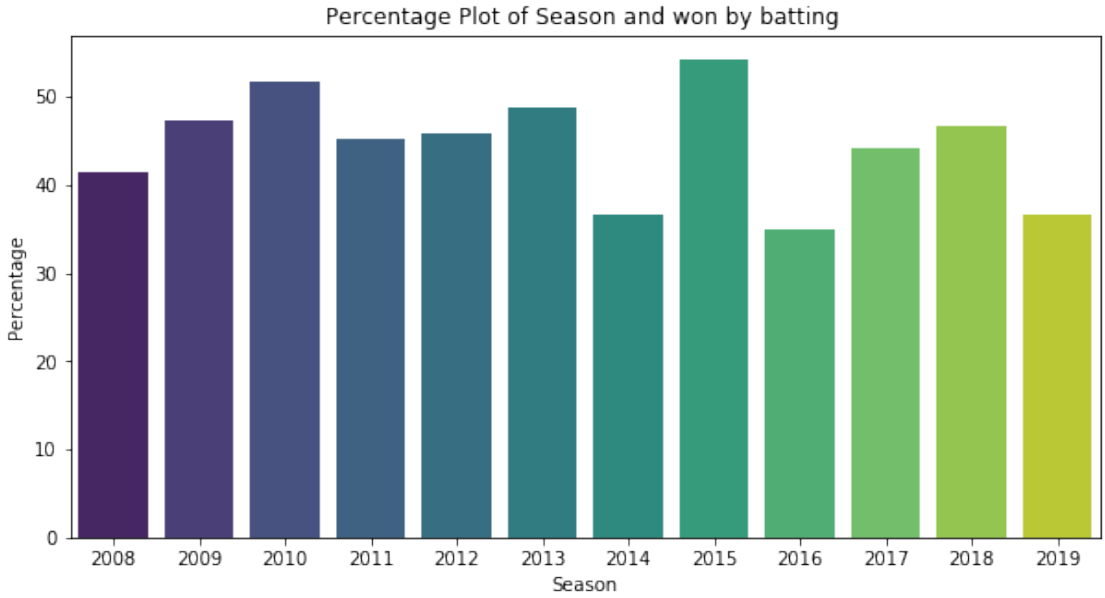
0.1.12 Percentage of matches won by batting first

```
In [27]: win_batting_first = spark.sql('''Select t1.season, t1.total_matches, \
                    t2.win_batting_first as win_batting_first, \
                    (t2.win_batting_first/ t1.total_matches * 100) as percent_win_batting_first f
                    (Select distinct(season),count(*) as total_matches from seasons group by seas
                    left join (Select distinct(season), count(*) as win_batting_first from season
         win_batting_first.show()
```

```
+------+-------------+-----------------+------------------------+
|season|total_matches|win_batting_first|percent_win_batting_first|
+------+-------------+-----------------+------------------------+
|  2008|           58|               24|       41.37931034482759|
|  2009|           57|               27|      47.368421052631575|
|  2010|           60|               31|       51.66666666666667|
|  2011|           73|               33|       45.20547945205479|
|  2012|           74|               34|       45.94594594594595|
|  2013|           76|               37|       48.68421052631579|
|  2014|           60|               22|      36.666666666666664|
|  2015|           59|               32|       54.23728813559322|
|  2016|           60|               21|                    35.0|
|  2017|           59|               26|       44.06779661016949|
|  2018|           60|               28|      46.666666666666664|
|  2019|           60|               22|      36.666666666666664|
+------+-------------+-----------------+------------------------+
```

```
In [28]: fig, a = plt.subplots(figsize = (10,5))
         a = sns.barplot(x ="season", y="percent_win_batting_first", data=win_batting_first.toPa
         a.set_ylabel('Percentage')
         a.set_xlabel('Season')
         a.set_title('Percentage Plot of Season and won by batting ')
```

```
Out[28]: Text(0.5,1,'Percentage Plot of Season and won by batting ')
```



0.1.13 Percentage of matches won by bowling/ fielding first

```
In [29]: win_bowling_first = spark.sql('''Select t1.season, t1.total_matches, \
                  t2.win_bowling_first as win_bowling_first, \
                  (t2.win_bowling_first/ t1.total_matches * 100) as percent_win_bowling_first f
                  (Select distinct(season),count(*) as total_matches from seasons group by seas
                  left join (Select distinct(season), count(*) as win_bowling_first from season
         win_bowling_first.show()
```

```
+------+-------------+-----------------+------------------------+
|season|total_matches|win_bowling_first|percent_win_bowling_first|
+------+-------------+-----------------+------------------------+
|  2008|           58|               34|       58.620689655172406|
|  2009|           57|               29|       50.877192982456144|
|  2010|           60|               28|       46.666666666666664|
|  2011|           73|               39|        53.42465753424658|
|  2012|           74|               40|       54.054054054054056|
|  2013|           76|               37|        48.68421052631579|
|  2014|           60|               37|        61.66666666666667|
```

```
|  2015|           59|                24|        40.67796610169492|
|  2016|           60|                39|                    65.0|
|  2017|           59|                32|        54.23728813559322|
|  2018|           60|                32|       53.333333333333336|
|  2019|           60|                35|       58.333333333333336|
+------+-------------+-----------------+-------------------------+
```

```
In [30]: fig, a = plt.subplots(figsize = (10,5))
         a = sns.barplot(x ="season", y="percent_win_bowling_first", data=win_bowling_first.toPa
         a.set_ylabel('Percentage')
         a.set_xlabel('Season')
         a.set_title('Percentage Plot of Season and won by wickets ')
```

```
Out[30]: Text(0.5,1,'Percentage Plot of Season and won by wickets ')
```