Task 5 - Exploratory Data Analysis : Sports (Indian Premier League)

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Dataset : https://bit.ly/34SRn3b

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
import warnings
warnings.filterwarnings('ignore')
```

In [2]:
```
#importing data
Match_Data = pd.read_csv('matches.csv')
Match_Data.head()
```

Out[2]:

	id	season	city	date	team1	team2	toss_winner	toss_decision	result	dl_app
0	1	2017	Hyderabad	2017-04-05	Sunrisers Hyderabad	Royal Challengers Bangalore	Royal Challengers Bangalore	field	normal	
1	2	2017	Pune	2017-04-06	Mumbai Indians	Rising Pune Supergiant	Rising Pune Supergiant	field	normal	
2	3	2017	Rajkot	2017-04-07	Gujarat Lions	Kolkata Knight Riders	Kolkata Knight Riders	field	normal	
3	4	2017	Indore	2017-04-08	Rising Pune Supergiant	Kings XI Punjab	Kings XI Punjab	field	normal	
4	5	2017	Bangalore	2017-04-08	Royal Challengers Bangalore	Delhi Daredevils	Royal Challengers Bangalore	bat	normal	

In [3]:
```
#Understanding the data
```

In [4]:
```
Match_Data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 756 entries, 0 to 755
Data columns (total 18 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   id               756 non-null    int64
```

```
 1   season           756 non-null    int64
 2   city             749 non-null    object
 3   date             756 non-null    object
 4   team1            756 non-null    object
 5   team2            756 non-null    object
 6   toss_winner      756 non-null    object
 7   toss_decision    756 non-null    object
 8   result           756 non-null    object
 9   dl_applied       756 non-null    int64
 10  winner           752 non-null    object
 11  win_by_runs      756 non-null    int64
 12  win_by_wickets   756 non-null    int64
 13  player_of_match  752 non-null    object
 14  venue            756 non-null    object
 15  umpire1          754 non-null    object
 16  umpire2          754 non-null    object
 17  umpire3          119 non-null    object
dtypes: int64(5), object(13)
memory usage: 106.4+ KB
```

In [5]:
```
Match_Data.describe()
```

Out[5]:

	id	season	dl_applied	win_by_runs	win_by_wickets
count	756.000000	756.000000	756.000000	756.000000	756.000000
mean	1792.178571	2013.444444	0.025132	13.283069	3.350529
std	3464.478148	3.366895	0.156630	23.471144	3.387963
min	1.000000	2008.000000	0.000000	0.000000	0.000000
25%	189.750000	2011.000000	0.000000	0.000000	0.000000
50%	378.500000	2013.000000	0.000000	0.000000	4.000000
75%	567.250000	2016.000000	0.000000	19.000000	6.000000
max	11415.000000	2019.000000	1.000000	146.000000	10.000000

In [6]:
```
Match_Data.isnull().any()
```

Out[6]:
```
id                False
season            False
city               True
date              False
team1             False
team2             False
toss_winner       False
toss_decision     False
result            False
dl_applied        False
winner             True
win_by_runs       False
win_by_wickets    False
player_of_match    True
venue             False
umpire1            True
umpire2            True
umpire3            True
dtype: bool
```

In [7]:
```
#getting count of null values
print(Match_Data['city'].isnull().sum())
print(Match_Data['winner'].isnull().sum())
```

```
print(Match_Data['player_of_match'].isnull().sum())
print(Match_Data['umpire1'].isnull().sum())
print(Match_Data['umpire2'].isnull().sum())
print(Match_Data['umpire3'].isnull().sum())
```

```
7
4
4
2
2
637
```

In [8]:

```
#dropping 'umpire 3' column because it have approximately 90% of null data
Match_Data = Match_Data.drop(columns=["umpire3"],axis=1)
Match_Data.head()
```

Out[8]:

	id	season	city	date	team1	team2	toss_winner	toss_decision	result	dl_app
0	1	2017	Hyderabad	2017-04-05	Sunrisers Hyderabad	Royal Challengers Bangalore	Royal Challengers Bangalore	field	normal	
1	2	2017	Pune	2017-04-06	Mumbai Indians	Rising Pune Supergiant	Rising Pune Supergiant	field	normal	
2	3	2017	Rajkot	2017-04-07	Gujarat Lions	Kolkata Knight Riders	Kolkata Knight Riders	field	normal	
3	4	2017	Indore	2017-04-08	Rising Pune Supergiant	Kings XI Punjab	Kings XI Punjab	field	normal	
4	5	2017	Bangalore	2017-04-08	Royal Challengers Bangalore	Delhi Daredevils	Royal Challengers Bangalore	bat	normal	

In [9]:

```
#importing deliveries data
Deliveries_Data = pd.read_csv('deliveries.csv')
Deliveries_Data.head()
```

Out[9]:

	match_id	inning	batting_team	bowling_team	over	ball	batsman	non_striker	bowler	is_supe
0	1	1	Sunrisers Hyderabad	Royal Challengers Bangalore	1	1	DA Warner	S Dhawan	TS Mills	
1	1	1	Sunrisers Hyderabad	Royal Challengers Bangalore	1	2	DA Warner	S Dhawan	TS Mills	
2	1	1	Sunrisers Hyderabad	Royal Challengers Bangalore	1	3	DA Warner	S Dhawan	TS Mills	
3	1	1	Sunrisers Hyderabad	Royal Challengers Bangalore	1	4	DA Warner	S Dhawan	TS Mills	

	match_id	inning	batting_team	bowling_team	over	ball	batsman	non_striker	bowler	is_supe
4	1	1	Sunrisers Hyderabad	Royal Challengers Bangalore	1	5	DA Warner	S Dhawan	TS Mills	

5 rows × 21 columns

In [10]:
```
Deliveries_Data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 179078 entries, 0 to 179077
Data columns (total 21 columns):
 #   Column            Non-Null Count   Dtype
---  ------            --------------   -----
 0   match_id          179078 non-null  int64
 1   inning            179078 non-null  int64
 2   batting_team      179078 non-null  object
 3   bowling_team      179078 non-null  object
 4   over              179078 non-null  int64
 5   ball              179078 non-null  int64
 6   batsman           179078 non-null  object
 7   non_striker       179078 non-null  object
 8   bowler            179078 non-null  object
 9   is_super_over     179078 non-null  int64
 10  wide_runs         179078 non-null  int64
 11  bye_runs          179078 non-null  int64
 12  legbye_runs       179078 non-null  int64
 13  noball_runs       179078 non-null  int64
 14  penalty_runs      179078 non-null  int64
 15  batsman_runs      179078 non-null  int64
 16  extra_runs        179078 non-null  int64
 17  total_runs        179078 non-null  int64
 18  player_dismissed  8834 non-null    object
 19  dismissal_kind    8834 non-null    object
 20  fielder           6448 non-null    object
dtypes: int64(13), object(8)
memory usage: 28.7+ MB
```

In [11]:
```
Deliveries_Data.describe()
```

Out[11]:

	match_id	inning	over	ball	is_super_over	wide_runs
count	179078.000000	179078.000000	179078.000000	179078.000000	179078.000000	179078.000000
mean	1802.252957	1.482952	10.162488	3.615587	0.000452	0.036721
std	3472.322805	0.502074	5.677684	1.806966	0.021263	0.251161
min	1.000000	1.000000	1.000000	1.000000	0.000000	0.000000
25%	190.000000	1.000000	5.000000	2.000000	0.000000	0.000000
50%	379.000000	1.000000	10.000000	4.000000	0.000000	0.000000
75%	567.000000	2.000000	15.000000	5.000000	0.000000	0.000000
max	11415.000000	5.000000	20.000000	9.000000	1.000000	5.000000

In [12]:
```
Deliveries_Data.isnull().any()
```

Out[12]:
```
match_id            False
inning              False
batting_team        False
bowling_team        False
over                False
ball                False
batsman             False
non_striker         False
bowler              False
is_super_over       False
wide_runs           False
bye_runs            False
legbye_runs         False
noball_runs         False
penalty_runs        False
batsman_runs        False
extra_runs          False
total_runs          False
player_dismissed     True
dismissal_kind       True
fielder              True
dtype: bool
```

In [13]:
```
#combining data
season_data=Match_Data[['id','season','winner']]
complete_data=Deliveries_Data.merge(season_data,how='inner',left_on='match_id',right
complete_data.head()
```

Out[13]:

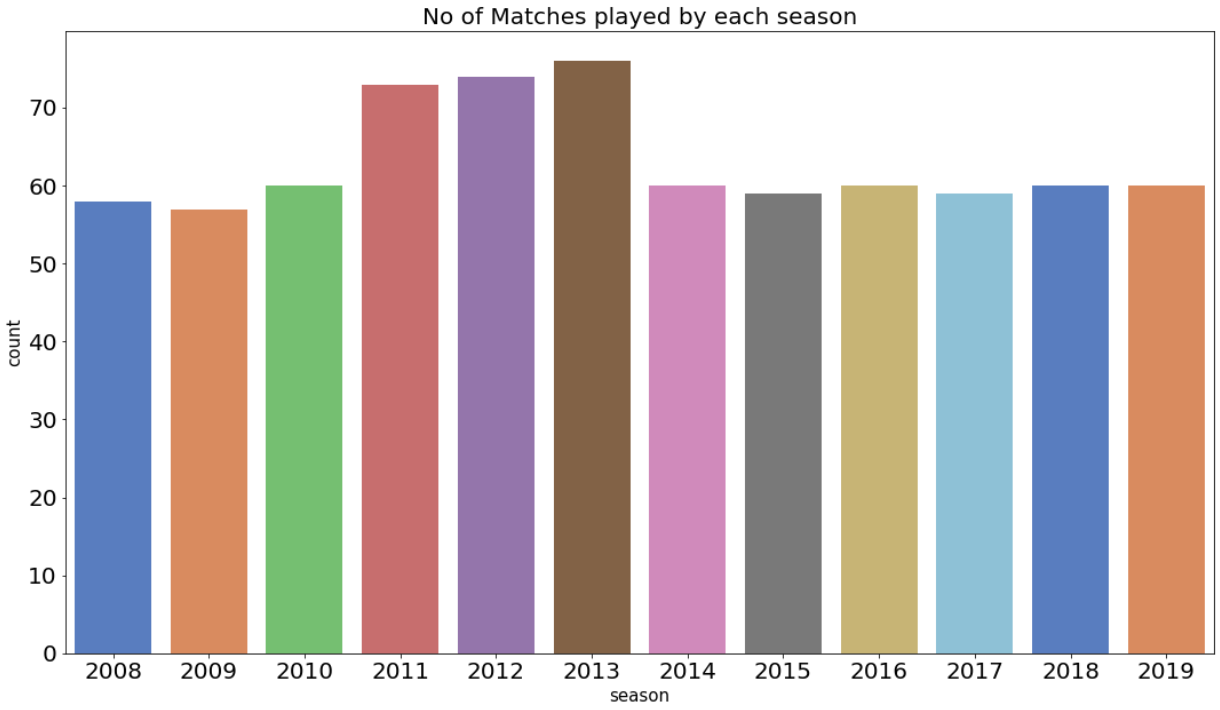
	match_id	inning	batting_team	bowling_team	over	ball	batsman	non_striker	bowler	is_supe
0	1	1	Sunrisers Hyderabad	Royal Challengers Bangalore	1	1	DA Warner	S Dhawan	TS Mills	
1	1	1	Sunrisers Hyderabad	Royal Challengers Bangalore	1	2	DA Warner	S Dhawan	TS Mills	
2	1	1	Sunrisers Hyderabad	Royal Challengers Bangalore	1	3	DA Warner	S Dhawan	TS Mills	
3	1	1	Sunrisers Hyderabad	Royal Challengers Bangalore	1	4	DA Warner	S Dhawan	TS Mills	
4	1	1	Sunrisers Hyderabad	Royal Challengers Bangalore	1	5	DA Warner	S Dhawan	TS Mills	

5 rows × 24 columns

Exploratory Data Analysis

In [17]:
```
#we will print number of matches played in each season
plt.figure(figsize=(18,10))
sns.countplot('season',data=Match_Data, palette='muted')
plt.title('No of Matches played by each season',fontsize=20)
plt.xlabel('season',fontsize=15)
plt.ylabel('count',fontsize=15)
plt.xticks(size=20)
plt.yticks(size=20)
```

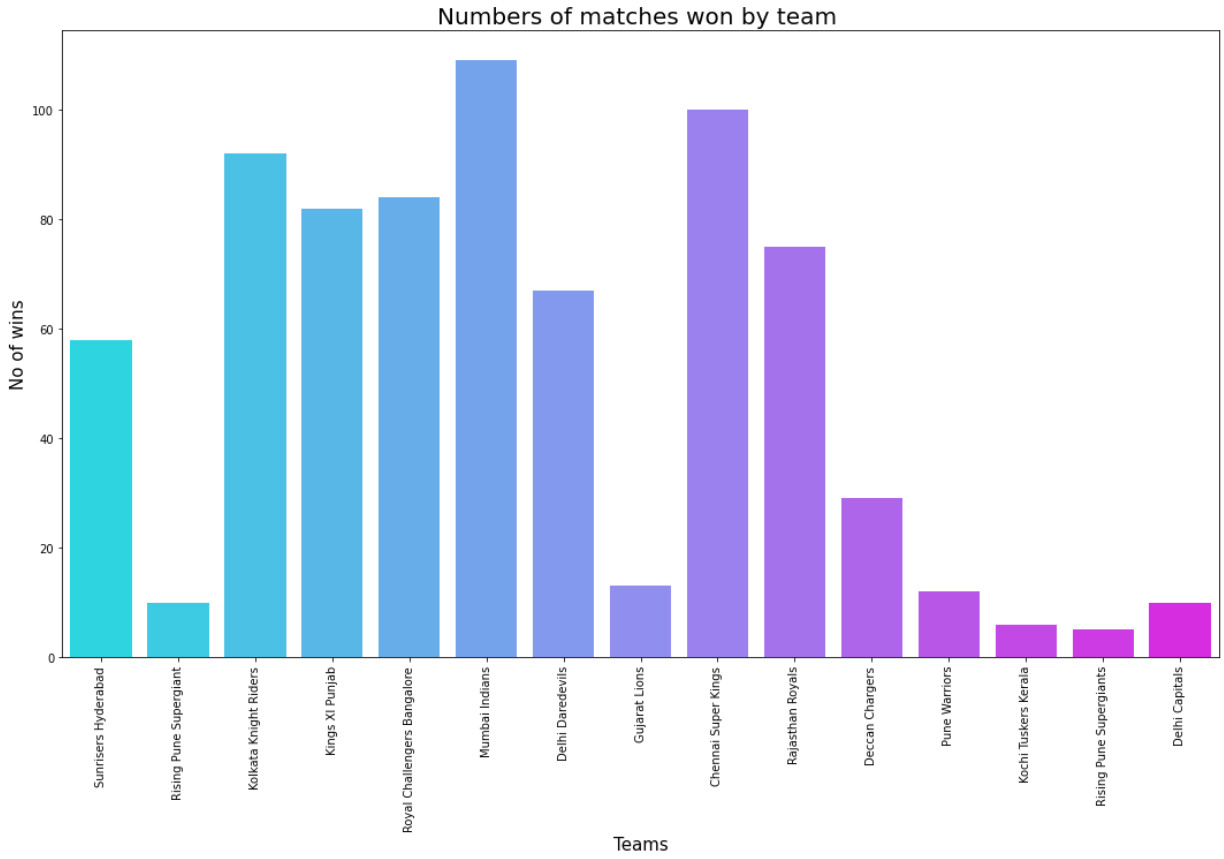
Out[17]:
```
(array([ 0., 10., 20., 30., 40., 50., 60., 70., 80.]),
 [Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, '')])
```



In [20]:
```
# The Teams wins IPL trophy
winning_teams_per_season = Match_Data.groupby('season')['winner'].value_counts()
winning_teams_per_season
```

Out[20]:
```
season  winner
2008    Rajasthan Royals               13
        Kings XI Punjab                10
        Chennai Super Kings             9
        Delhi Daredevils                7
        Mumbai Indians                  7
                                       ..
2019    Kings XI Punjab                 6
        Kolkata Knight Riders           6
        Sunrisers Hyderabad             6
        Rajasthan Royals                5
        Royal Challengers Bangalore     5
Name: winner, Length: 100, dtype: int64
```

In [21]:
```
plt.figure(figsize = (18,10))
sns.countplot(x='winner',data=Match_Data, palette='cool')
plt.title("Numbers of matches won by team ",fontsize=20)
plt.xticks(rotation=90)
plt.xlabel("Teams",fontsize=15)
plt.ylabel("No of wins",fontsize=15)
plt.show()
```



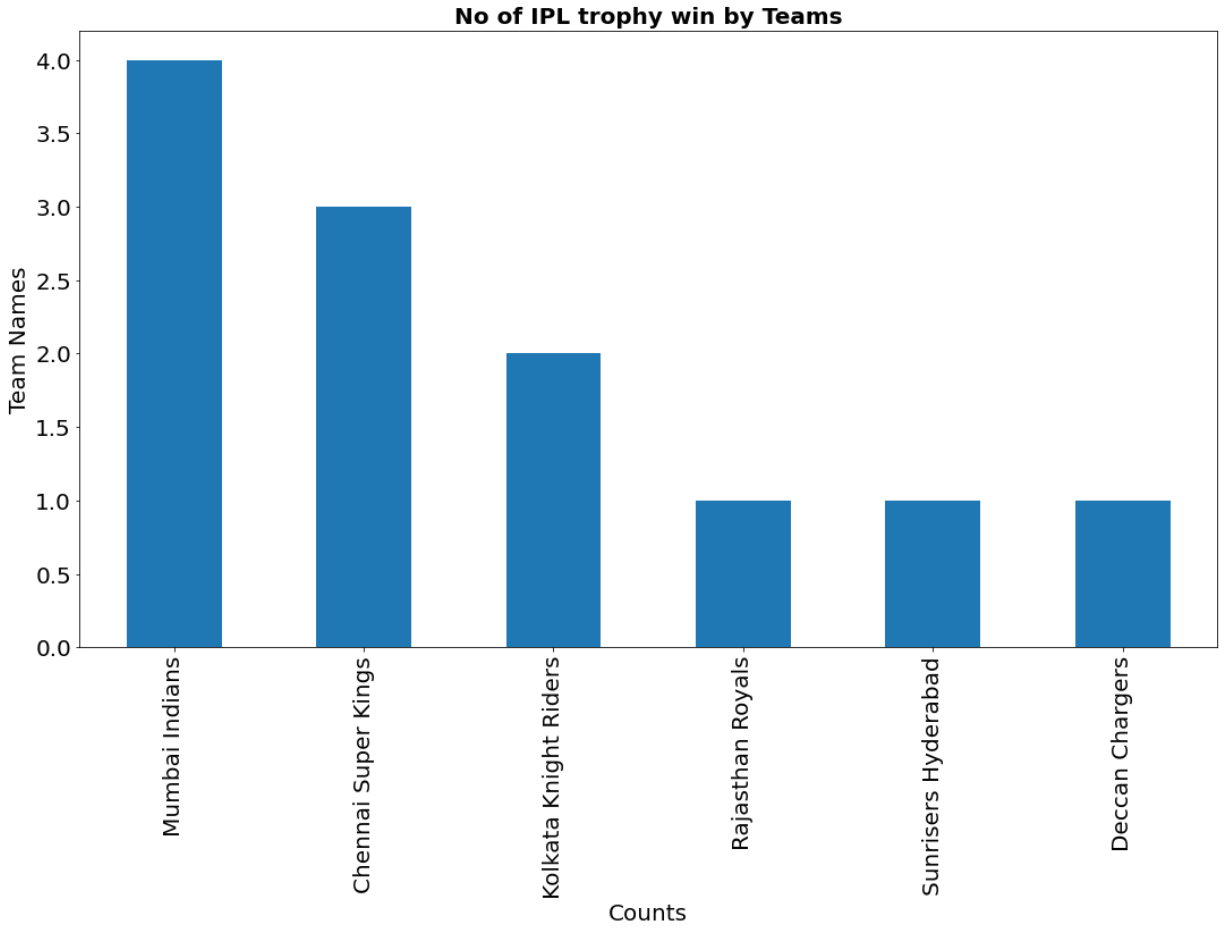
In [22]:
```
winning_teams = Match_Data[['season','winner']]
```

In [23]:
```
winners_team = {}
for i in sorted(winning_teams.season.unique()):
    winners_team[i] = winning_teams[winning_teams.season == i]['winner'].tail(1).val

winners_of_IPL = pd.Series(winners_team)
winners_of_IPL = pd.DataFrame(winners_of_IPL, columns=['team'])
```

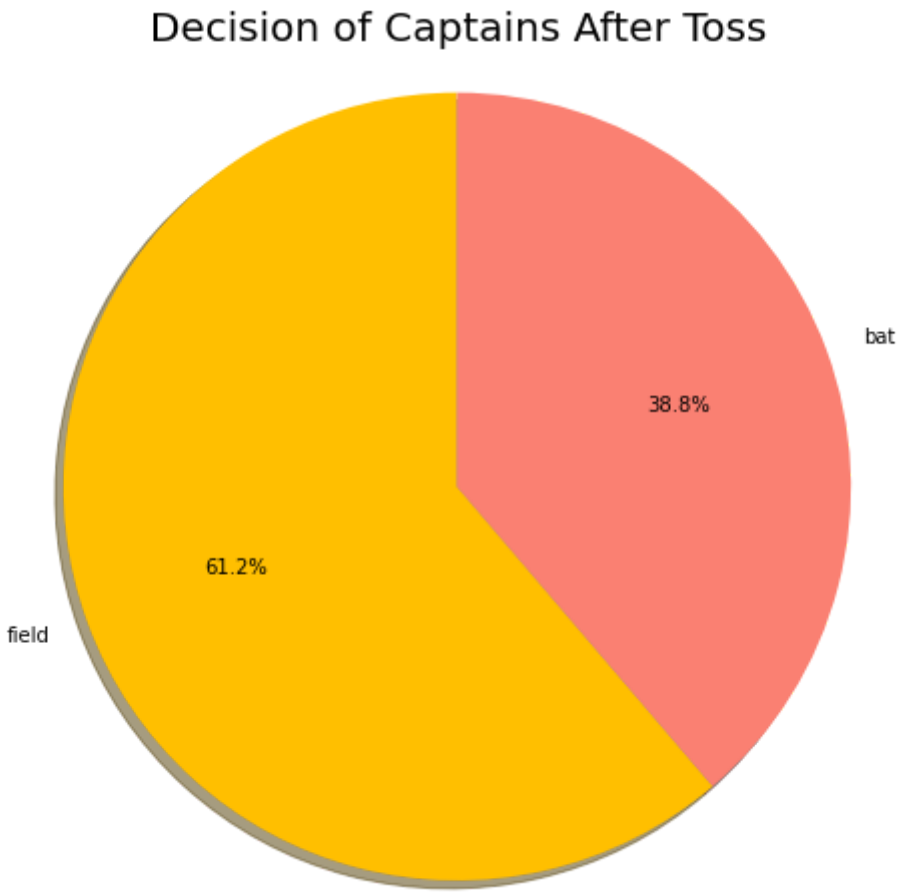
In [24]:
```
winners_of_IPL['team'].value_counts().plot(kind='bar',figsize=(18,10),fontsize=20)
plt.xlabel('Counts',size=20)
plt.ylabel('Team Names',size=20)
plt.title('No of IPL trophy win by Teams',fontsize=20,fontweight='bold')
```

Out[24]:
```
Text(0.5, 1.0, 'No of IPL trophy win by Teams')
```



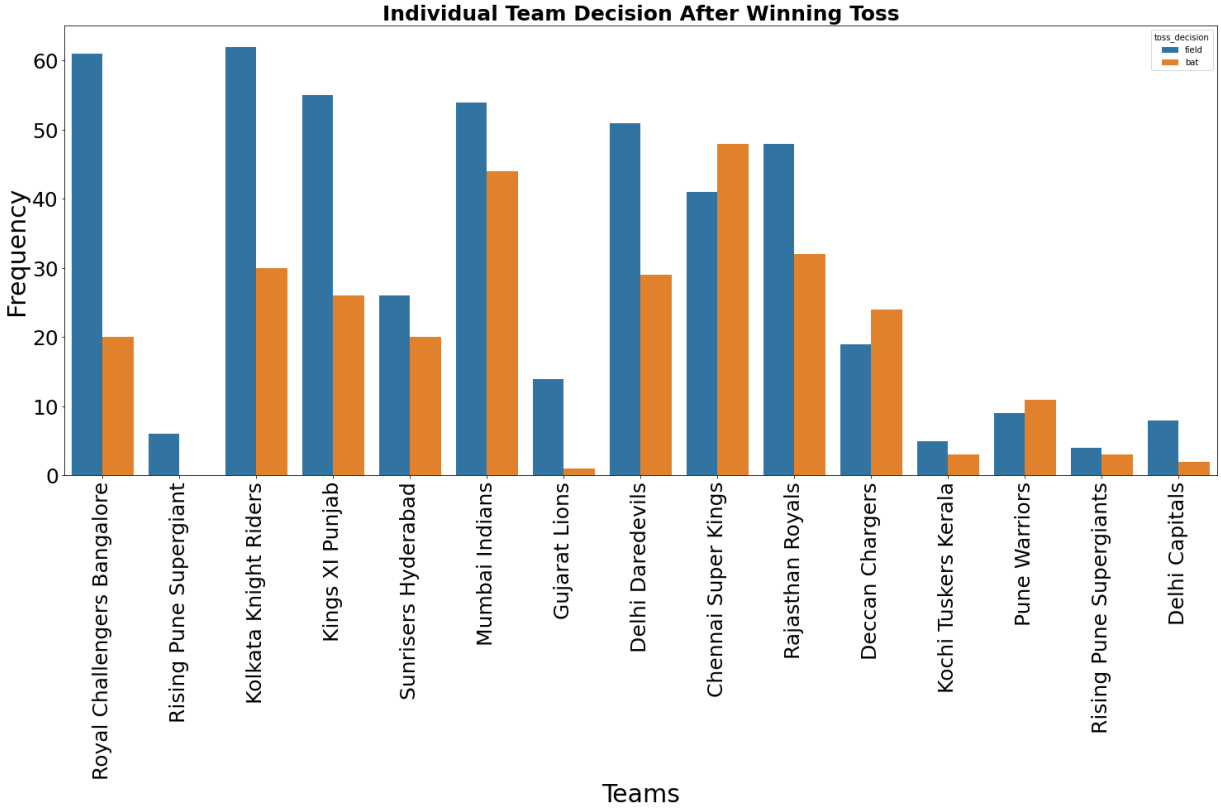
In [25]:

```
# we will plot pie chart on Toss decision
Toss=Match_Data.toss_decision.value_counts()
labels=np.array(Toss.index)
sizes = Toss.values
colors = ['#FFBF00', '#FA8072']
plt.figure(figsize = (10,8))
plt.pie(sizes, labels=labels, colors=colors,
        autopct='%2.1f%%', shadow=True,startangle=90)
plt.title('Decision of Captains After Toss',fontsize=20)
plt.axis('equal')
plt.show()
```



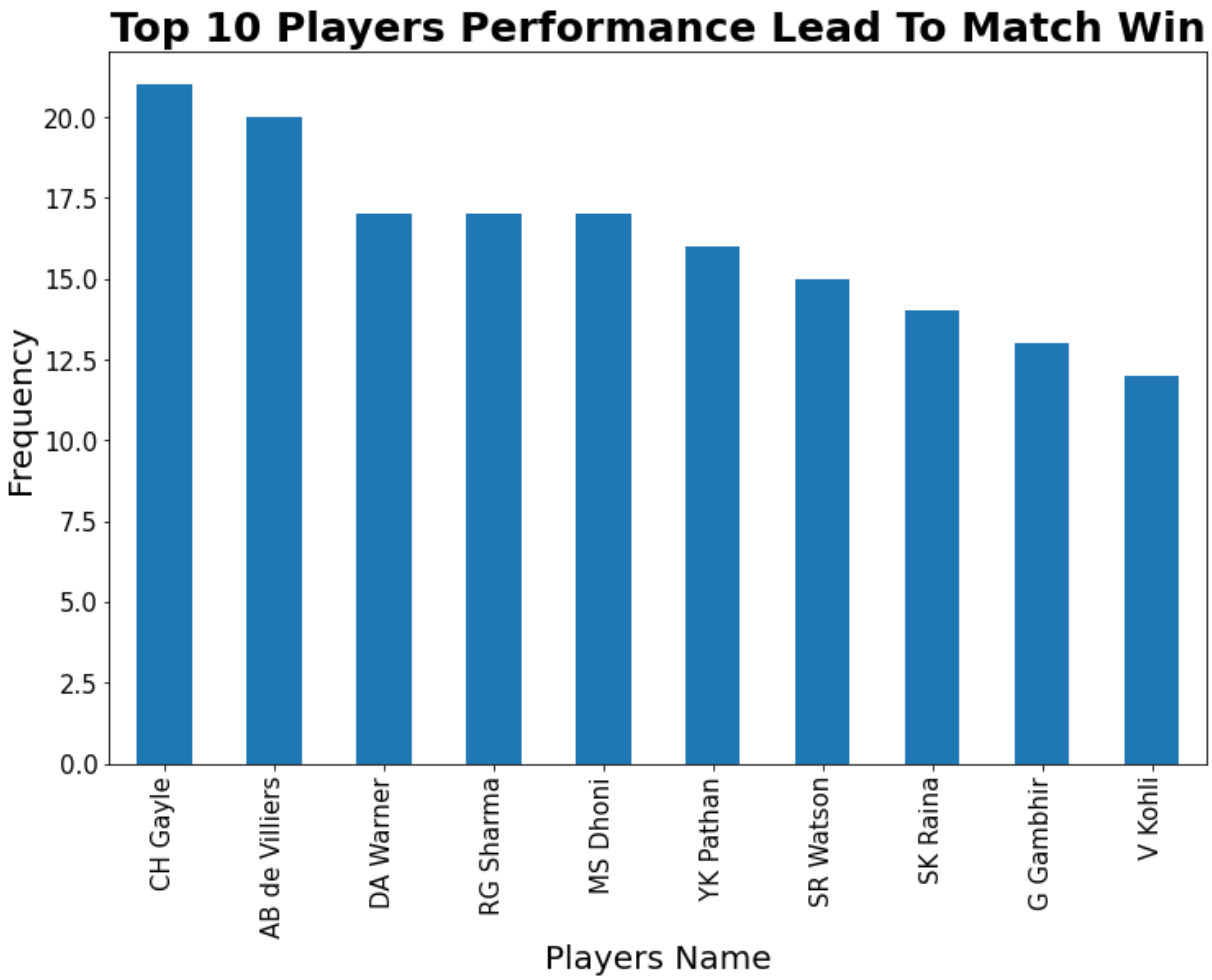
In [45]:
```
# Individual team decision decision after winning toss
plt.figure(figsize=(25,10))
sns.countplot('toss_winner',data=Match_Data,hue='toss_decision')
plt.title('Individual Team Decision After Winning Toss',fontsize=25,fontweight='bold
plt.xticks(size=25)
plt.yticks(size=25)
plt.xlabel('Teams',fontsize=30)
plt.ylabel('Frequency',fontsize=30)
plt.xticks(rotation=90)
```

Out[45]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14]),
 [Text(0, 0, 'Royal Challengers Bangalore'),
  Text(1, 0, 'Rising Pune Supergiant'),
  Text(2, 0, 'Kolkata Knight Riders'),
  Text(3, 0, 'Kings XI Punjab'),
  Text(4, 0, 'Sunrisers Hyderabad'),
  Text(5, 0, 'Mumbai Indians'),
  Text(6, 0, 'Gujarat Lions'),
  Text(7, 0, 'Delhi Daredevils'),
  Text(8, 0, 'Chennai Super Kings'),
  Text(9, 0, 'Rajasthan Royals'),
  Text(10, 0, 'Deccan Chargers'),
  Text(11, 0, 'Kochi Tuskers Kerala'),
  Text(12, 0, 'Pune Warriors'),
  Text(13, 0, 'Rising Pune Supergiants'),
  Text(14, 0, 'Delhi Capitals')])
```



In [47]:
```
# Top 10 players performace lead to match win
player=Match_Data['player_of_match'].value_counts()
player.head(10).plot(kind='bar',figsize=(12,8),fontsize=15)
plt.title('Top 10 Players Performance Lead To Match Win',fontsize=25,fontweight='bol
plt.xlabel('Players Name',fontsize=20)
plt.ylabel('Frequency',fontsize=20)
```

Out[47]:
```
Text(0, 0.5, 'Frequency')
```



In [82]:
```
# We will print the top 10 leading run scorer in IPL
batsman_score=Deliveries_Data.groupby('batsman')['batsman_runs'].agg(['sum']).reset_
batsman_score=batsman_score.rename(columns={'sum':'batsman_runs'})
print("*** Top 10 Leading Run Scorer in IPL ***")
batsman_score.iloc[:10,:]
```

```
*** Top 10 Leading Run Scorer in IPL ***
```

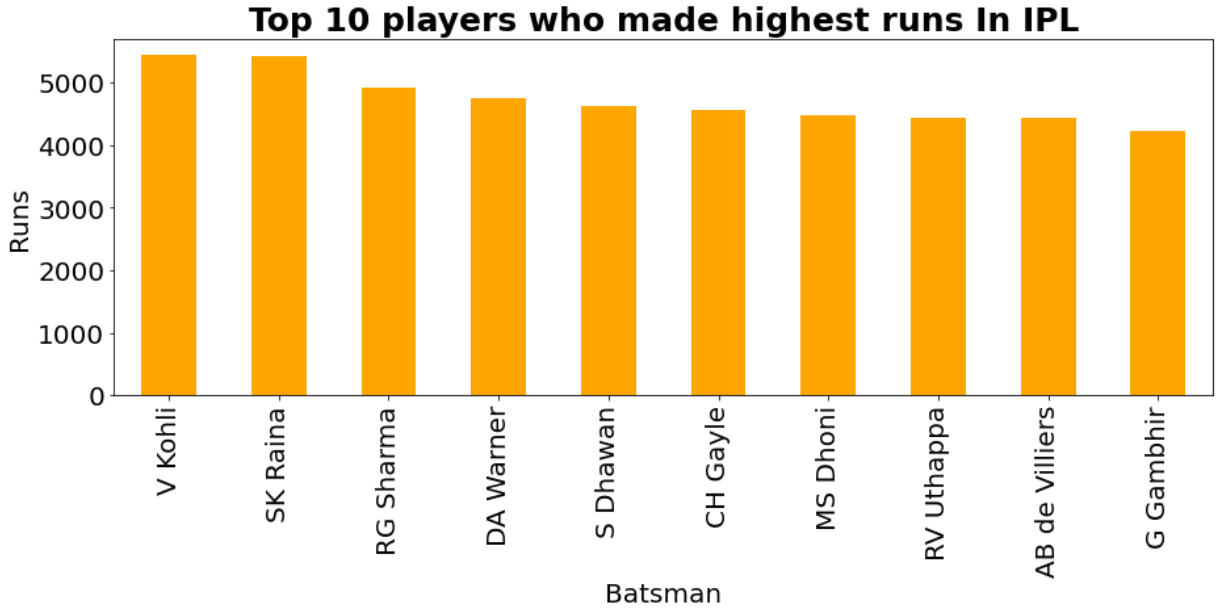
Out[82]:

	batsman	batsman_runs
0	V Kohli	5434
1	SK Raina	5415
2	RG Sharma	4914
3	DA Warner	4741
4	S Dhawan	4632
5	CH Gayle	4560
6	MS Dhoni	4477
7	RV Uthappa	4446
8	AB de Villiers	4428
9	G Gambhir	4223

In [83]:
```
#Top 10 players having highest runa in IPL
complete_data.groupby('batsman')['batsman_runs'].sum().sort_values(ascending=False).
plt.title('Top 10 players who made highest runs In IPL',fontsize=25,fontweight='bold
```

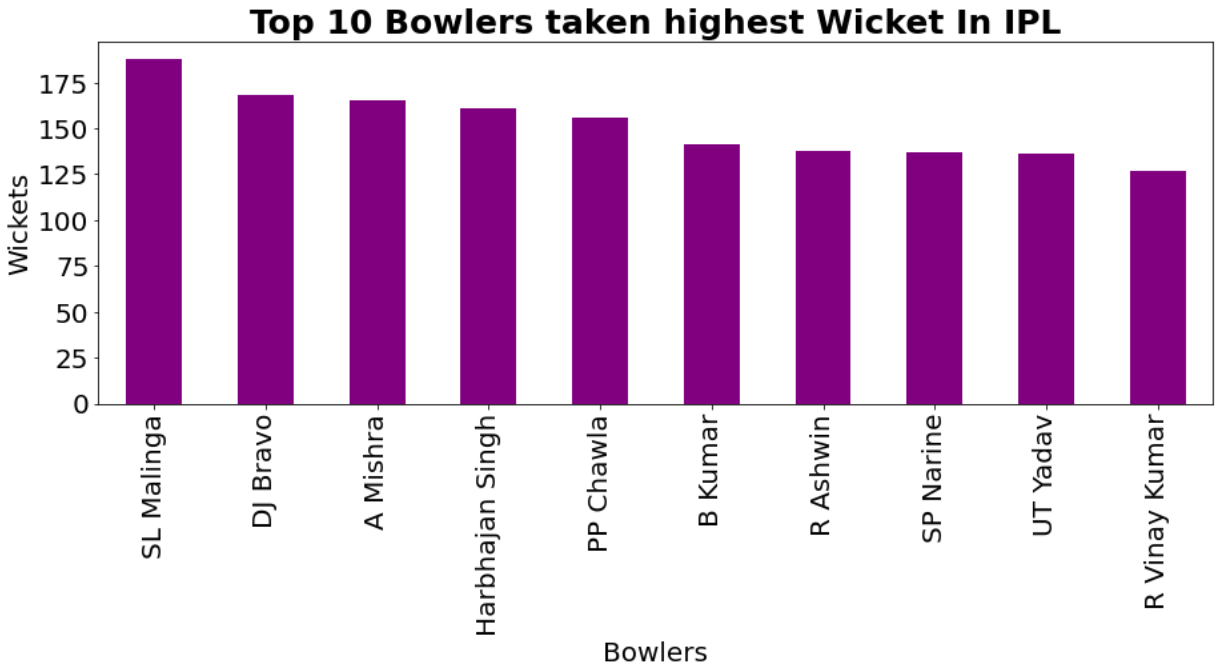
```
plt.xlabel('Batsman',fontsize=20)
plt.ylabel('Runs',fontsize=20)
plt.xticks(size=20)
plt.yticks(size=20)
```

Out[83]:
```
(array([   0., 1000., 2000., 3000., 4000., 5000., 6000.]),
 [Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, '')])
```



In [55]:
```
# Top Wicket Taker Bowlers In IPL
complete_data.groupby('bowler')['player_dismissed'].count().sort_values(ascending=Fa
plt.title('Top 10 Bowlers taken highest Wicket In IPL',fontsize=25,fontweight='bold'
plt.xlabel('Bowlers',fontsize=20)
plt.ylabel('Wickets',fontsize=20)
plt.yticks(size=20)
plt.xticks(size=20)
```

Out[55]:
```
(array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9]),
 [Text(0, 0, 'SL Malinga'),
  Text(1, 0, 'DJ Bravo'),
  Text(2, 0, 'A Mishra'),
  Text(3, 0, 'Harbhajan Singh'),
  Text(4, 0, 'PP Chawla'),
  Text(5, 0, 'B Kumar'),
  Text(6, 0, 'R Ashwin'),
  Text(7, 0, 'SP Narine'),
  Text(8, 0, 'UT Yadav'),
  Text(9, 0, 'R Vinay Kumar')])
```



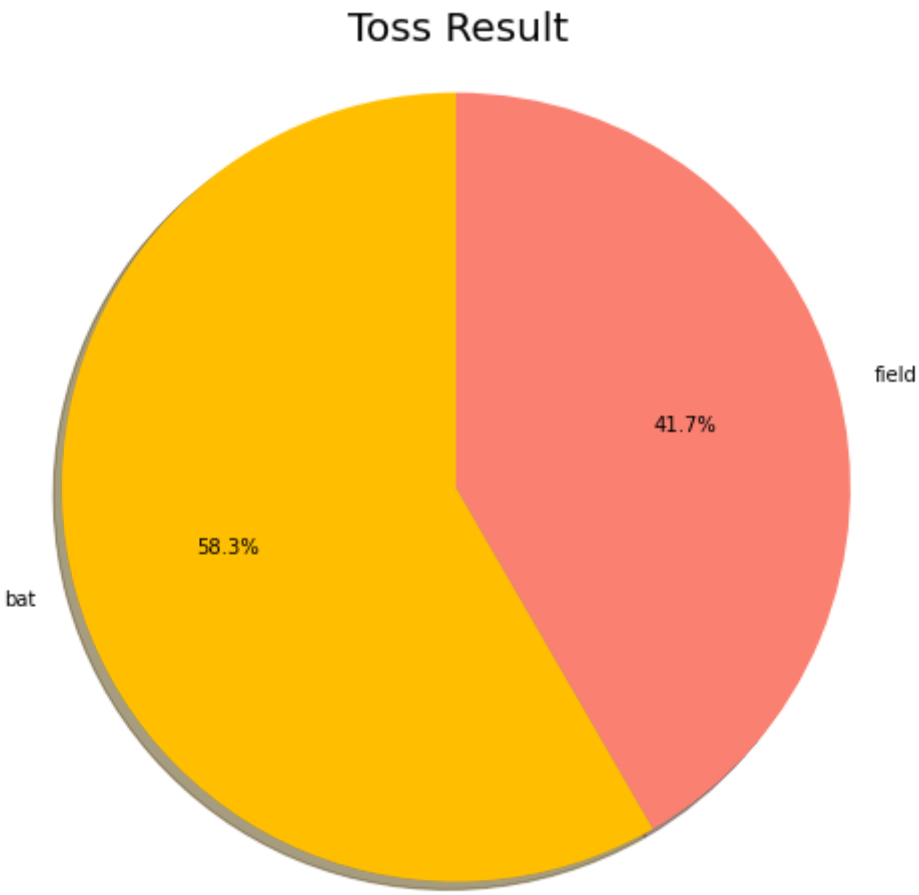
In [56]:
```
# we will print winner season wise
final_matches=Match_Data.drop_duplicates(subset=['season'], keep='last')

final_matches[['season','winner']].reset_index(drop=True).sort_values('season')
```

Out[56]:

	season	winner
1	2008	Rajasthan Royals
2	2009	Deccan Chargers
3	2010	Chennai Super Kings
4	2011	Chennai Super Kings
5	2012	Kolkata Knight Riders
6	2013	Mumbai Indians
7	2014	Kolkata Knight Riders
8	2015	Mumbai Indians
9	2016	Sunrisers Hyderabad
0	2017	Mumbai Indians
10	2018	Chennai Super Kings
11	2019	Mumbai Indians

In [58]:
```
Toss=final_matches.toss_decision.value_counts()
labels=np.array(Toss.index)
sizes = Toss.values
colors = ['#FFBF00', '#FA8072']
plt.figure(figsize = (10,8))
plt.pie(sizes, labels=labels, colors=colors,
        autopct='%1.1f%%', shadow=True,startangle=90)
plt.title('Toss Result',fontsize=20)
plt.axis('equal')
plt.show()
```



In [66]:
```
# we will print man of the match
final_matches[['winner','player_of_match']].reset_index(drop=True)
```

Out[66]:

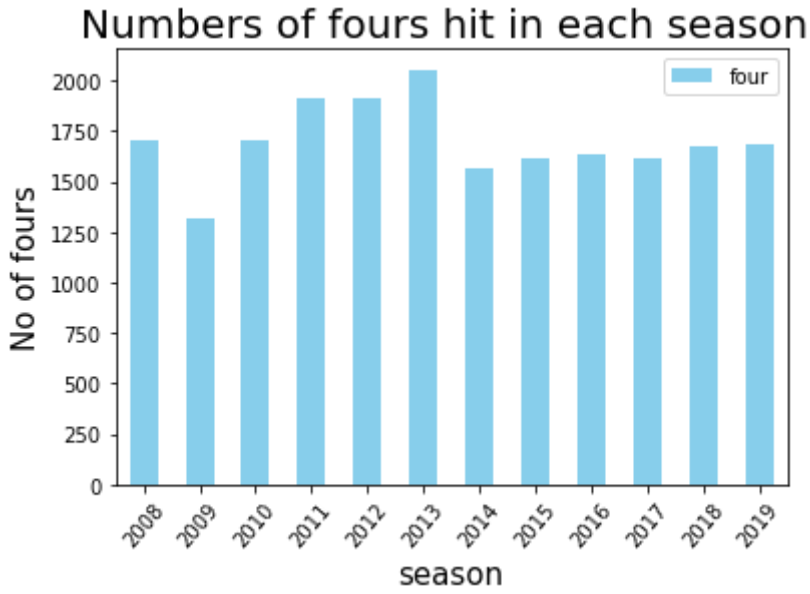
	winner	player_of_match
0	Mumbai Indians	KH Pandya
1	Rajasthan Royals	YK Pathan
2	Deccan Chargers	A Kumble
3	Chennai Super Kings	SK Raina
4	Chennai Super Kings	M Vijay
5	Kolkata Knight Riders	MS Bisla
6	Mumbai Indians	KA Pollard
7	Kolkata Knight Riders	MK Pandey
8	Mumbai Indians	RG Sharma
9	Sunrisers Hyderabad	BCJ Cutting
10	Chennai Super Kings	SR Watson
11	Mumbai Indians	JJ Bumrah

In [67]:
```
#we will print numbers of fours hit by team
four_hitten_data=complete_data[complete_data['batsman_runs']==4]
four_hitten_data.groupby('batting_team')['batsman_runs'].agg([('runs by fours','sum'
```

Out[67]:

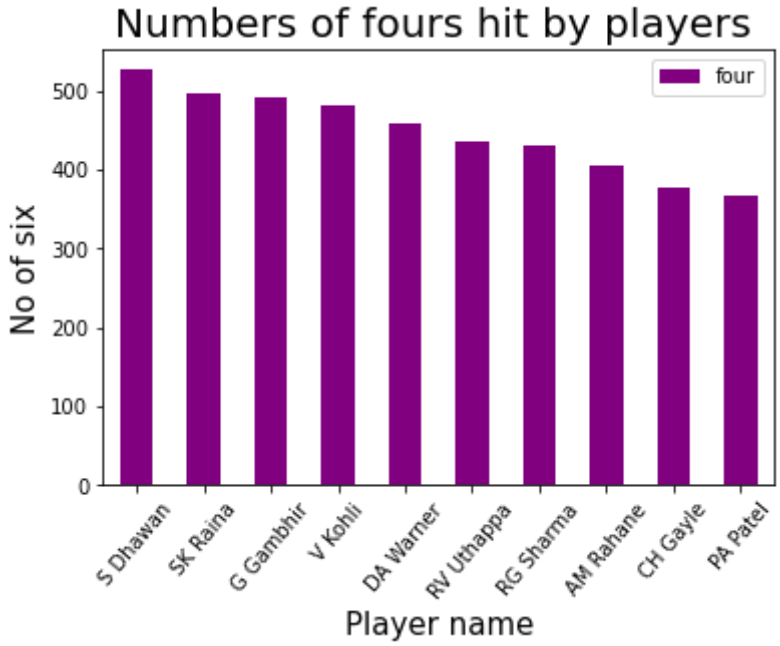
batting_team	runs by fours	fours
Chennai Super Kings	8772	2193
Deccan Chargers	3828	957
Delhi Capitals	968	242
Delhi Daredevils	8632	2158
Gujarat Lions	1840	460
Kings XI Punjab	9832	2458
Kochi Tuskers Kerala	680	170
Kolkata Knight Riders	9736	2434
Mumbai Indians	10352	2588
Pune Warriors	2100	525
Rajasthan Royals	8140	2035
Rising Pune Supergiant	788	197
Rising Pune Supergiants	684	171
Royal Challengers Bangalore	9440	2360
Sunrisers Hyderabad	5776	1444

In [73]:
```
# we will plot graph on no of four hit in each season
ax=four_hitten_data.groupby('season')['batsman_runs'].agg([('four','count')]).reset_
plt.title("Numbers of fours hit in each season ",fontsize=20)
plt.xticks(rotation=50)
plt.xlabel("season",fontsize=15)
plt.ylabel("No of fours",fontsize=15)
plt.show()
```



In [79]:
```
batsman_four=four_hitten_data.groupby('batsman')['batsman_runs'].agg([('four','count
ax=batsman_four.iloc[:10,:].plot('batsman','four',kind='bar',color='purple')
plt.title("Numbers of fours hit by players ",fontsize=20)
plt.xticks(rotation=50)
```

```
plt.xlabel("Player name",fontsize=15)
plt.ylabel("No of six",fontsize=15)
plt.show()
```



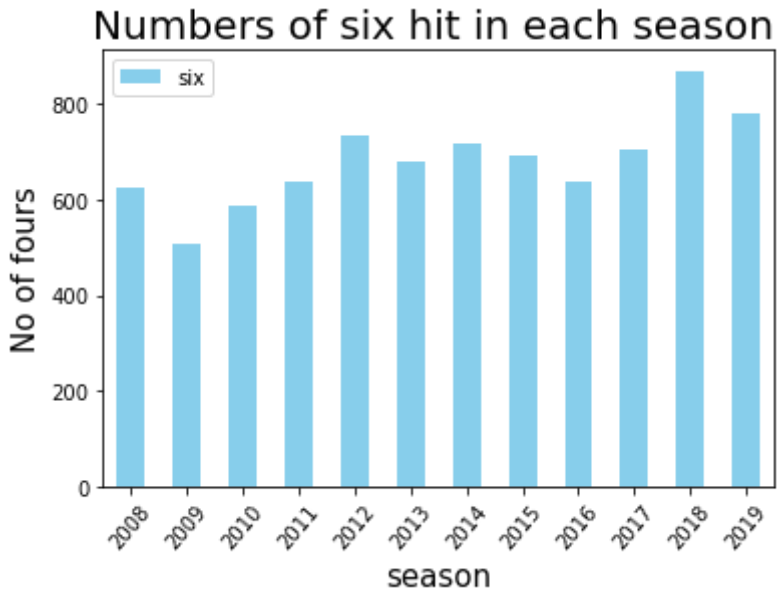
In [74]:
```
# we will print no of sixes hit by team
six_hitten_data=complete_data[complete_data['batsman_runs']==6]
six_hitten_data.groupby('batting_team')['batsman_runs'].agg([('runs by six','sum'),(
```

Out[74]:

batting_team	runs by six	sixes
Chennai Super Kings	5838	973
Deccan Chargers	2400	400
Delhi Capitals	522	87
Delhi Daredevils	4806	801
Gujarat Lions	930	155
Kings XI Punjab	5856	976
Kochi Tuskers Kerala	318	53
Kolkata Knight Riders	5580	930
Mumbai Indians	6576	1096
Pune Warriors	1176	196
Rajasthan Royals	4086	681
Rising Pune Supergiant	534	89
Rising Pune Supergiants	408	68
Royal Challengers Bangalore	6792	1132
Sunrisers Hyderabad	3198	533

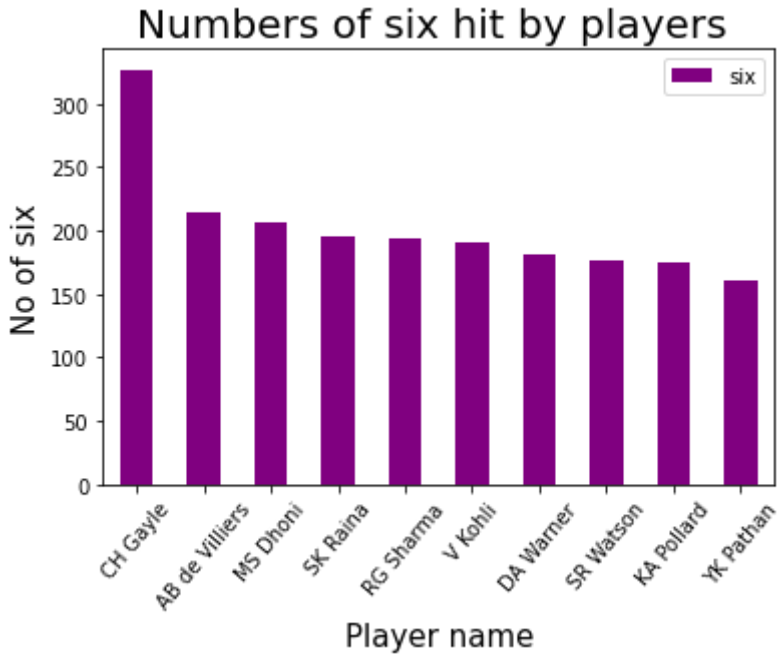
In [80]:
```
# we will plot graph on no of four hit in each season
ax=six_hitten_data.groupby('season')['batsman_runs'].agg([('six','count')]).reset_in
```

```
plt.title("Numbers of six hit in each season ",fontsize=20)
plt.xticks(rotation=50)
plt.xlabel("season",fontsize=15)
plt.ylabel("No of fours",fontsize=15)
plt.show()
```



In [81]:

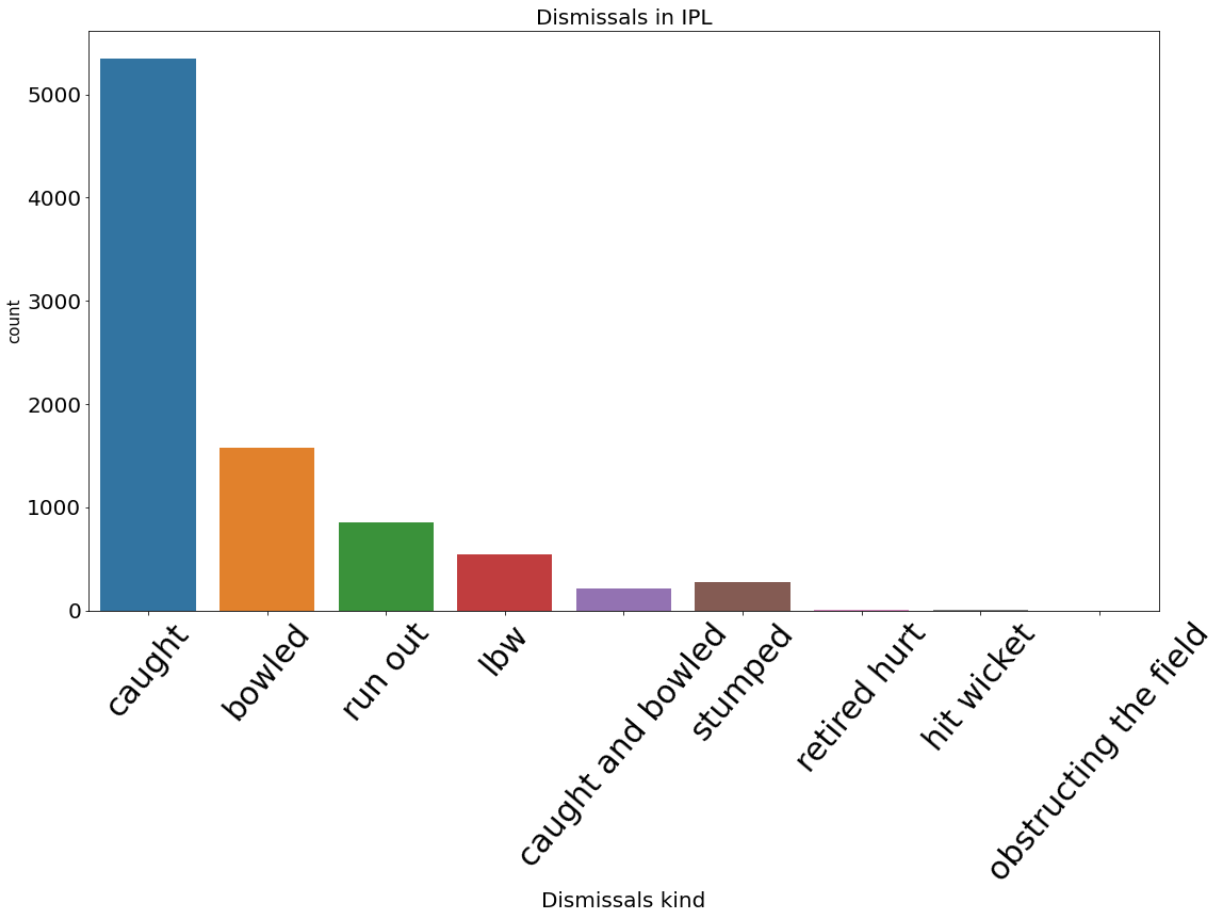
```
# we will plot graph of six hit by players
batsman_six=six_hitten_data.groupby('batsman')['batsman_runs'].agg([('six','count')]
ax=batsman_six.iloc[:10,:].plot('batsman','six',kind='bar',color='purple')
plt.title("Numbers of six hit by players ",fontsize=20)
plt.xticks(rotation=50)
plt.xlabel("Player name",fontsize=15)
plt.ylabel("No of six",fontsize=15)
plt.show()
```



In [87]:

```
# Dismissals in IPL
plt.figure(figsize=(18,10))
ax=sns.countplot(Deliveries_Data.dismissal_kind)
plt.yticks(size=20)
plt.xticks(size=30)
plt.title("Dismissals in IPL",fontsize=20)
```

```
plt.xlabel("Dismissals kind",fontsize=20)
plt.ylabel("count",fontsize=15)
plt.xticks(rotation=50)
plt.show()
```



Conclusion

• Matches are played in seasons 2011,2012,2013 are more than other season

• In seasons 2011,2012,2013 aproximatly 73 matches were played.

• And other seasons aproximately 60 matches were played.

• Conclusion on the base of team:

• Mumbai indians won 4 ipl trophy.

• Chennai super kings won 3 ipl trophy.

• Kolkata knight riders won 2 ipl trophy.

• Rajasthan royals,deccan chargers,sunrisers hydrabad were won 1 ipl trophy each.

• Captain choose fielding after wining toss is nearly about 60%

• From above countplot it has been clear that the team which choose field after winning toss has won maximum time than who choose bat after winning toss.

• Ch gayle and ab de villiers performance won most matches than others

- **Except ms dhoni all the batsmans are openers or came hitten for batting 2nd and 3rd number**
- **Suresh raina have highest runs in ipl.**
- **Sl malinga is the highest wicket taker in ipl.**
- **In top 10 bowlers 5 are pacers and 5 are spinners.**
- **In 5 pacers all are right arm pacers**
- **In 5 spinners 3 are right arm and 2 are left arm spinners**
- **Most of the fours are hit in 2013 season.**
- **Shikhar dhawan have hit more fours than others.**
- **Most of the six are hit in 2018 season.**
- **Ch gayle have hit most six than others.**
- **Dismissals in ipl was most by catch out .**

In [ ]: