# pandas

May 26, 2025

```python
import numpy as np
import pandas as pd
```

```python
num=np.array([1,2,np.nan])
```

```python
name=np.array(['sifat','faruk',np.nan,'jui','joly','joti'])
```

```python
data=pd.Series(name,index=['a','b','c','d','e','f'],name='Sifat fn name')
data
```

```
a    sifat
b    faruk
c      nan
d      jui
e     joly
f     joti
Name: Sifat fn name, dtype: object
```

```python
data.head(2)
```

```
a    sifat
b    faruk
Name: Sifat fn name, dtype: object
```

```python
data.name
```

```
'Sifat fn name'
```

```python
data.values
```

```
array(['sifat', 'faruk', 'nan', 'jui', 'joly', 'joti'], dtype=object)
```

```python

```

```python
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
[ ]: data=pd.read_csv('/content/subs.csv')
     type(data.squeeze())
```

[ ]: pandas.core.series.Series

```
[ ]: data
```

```
[ ]:      Subscribers gained
     0                    48
     1                    57
     2                    40
     3                    43
     4                    44
     ..                  ...
     360                 231
     361                 226
     362                 155
     363                 144
     364                 172

     [365 rows x 1 columns]
```

```
[ ]: ipl=pd.read_csv('/content/kohli_ipl.csv')
     ipl
```

```
[ ]:      match_no  runs
     0           1     1
     1           2    23
     2           3    13
     3           4    12
     4           5     1
     ..        ...   ...
     210       211     0
     211       212    20
     212       213    73
     213       214    25
     214       215     7

     [215 rows x 2 columns]
```

```
[ ]: type(ipl['runs'])
```

[ ]: pandas.core.series.Series

```
[ ]: type(ipl)
```

[ ]: pandas.core.frame.DataFrame

```
ipl.sample(10).sort_values('runs')
```

```
     match_no  runs
206       207     0
134       135     0
154       155     4
113       114    12
35         36    14
104       105    35
64         65    36
29         30    38
156       157    46
151       152    70
```

```
movie=pd.read_csv("/content/bollywood.csv")
movie
```

```
                                     movie                 lead
0              Uri: The Surgical Strike         Vicky Kaushal
1                         Battalion 609           Vicky Ahuja
2      The Accidental Prime Minister (film)       Anupam Kher
3                       Why Cheat India        Emraan Hashmi
4                       Evening Shadows     Mona Ambegaonkar
...                                  ...                  ...
1495            Hum Tumhare Hain Sanam       Shah Rukh Khan
1496              Aankhen (2002 film)    Amitabh Bachchan
1497                  Saathiya (film)        Vivek Oberoi
1498                  Company (film)           Ajay Devgn
1499             Awara Paagal Deewana        Akshay Kumar

[1500 rows x 2 columns]
```

```
movie.sample(4)['movie']
```

```
601       Aurangzeb (film)
907     Ramaa: The Saviour
543              Tamanchey
207              G Kutta Se
Name: movie, dtype: object
```

```
movie['lead'].value_counts()
```

```
lead
Akshay Kumar        48
Amitabh Bachchan    45
Ajay Devgn          38
Salman Khan         31
```

```
Sanjay Dutt              26
                         ..
Seema Azmi                1
Akanksha Puri             1
Charanpreet Insan         1
Jaideep Ahlawat           1
Monali Thakur             1
Name: count, Length: 566, dtype: int64
```

[ ]: df=pd.read_csv('/content/matches.csv')
     df

[ ]:       id  season     city       date                       team1  \
     0      1    2017  Hyderabad  2017-04-05         Sunrisers Hyderabad
     1      2    2017       Pune  2017-04-06              Mumbai Indians
     2      3    2017     Rajkot  2017-04-07               Gujarat Lions
     3      4    2017     Indore  2017-04-08       Rising Pune Supergiant
     4      5    2017  Bangalore  2017-04-08  Royal Challengers Bangalore
     ..   ...     ...        ...         ...                         ...
     631  632    2016     Raipur  2016-05-22             Delhi Daredevils
     632  633    2016  Bangalore  2016-05-24               Gujarat Lions
     633  634    2016      Delhi  2016-05-25         Sunrisers Hyderabad
     634  635    2016      Delhi  2016-05-27               Gujarat Lions
     635  636    2016  Bangalore  2016-05-29         Sunrisers Hyderabad

                                team2                  toss_winner toss_decision  \
     0    Royal Challengers Bangalore  Royal Challengers Bangalore         field
     1         Rising Pune Supergiant       Rising Pune Supergiant         field
     2          Kolkata Knight Riders        Kolkata Knight Riders         field
     3                Kings XI Punjab              Kings XI Punjab         field
     4               Delhi Daredevils  Royal Challengers Bangalore           bat
     ..                           ...                          ...           ...
     631  Royal Challengers Bangalore  Royal Challengers Bangalore         field
     632  Royal Challengers Bangalore  Royal Challengers Bangalore         field
     633        Kolkata Knight Riders        Kolkata Knight Riders         field
     634          Sunrisers Hyderabad          Sunrisers Hyderabad         field
     635  Royal Challengers Bangalore          Sunrisers Hyderabad           bat

          result  dl_applied                       winner  win_by_runs  \
     0    normal           0          Sunrisers Hyderabad           35
     1    normal           0       Rising Pune Supergiant            0
     2    normal           0        Kolkata Knight Riders            0
     3    normal           0              Kings XI Punjab            0
     4    normal           0  Royal Challengers Bangalore           15
     ..      ...         ...                          ...          ...
     631  normal           0  Royal Challengers Bangalore            0
     632  normal           0  Royal Challengers Bangalore            0
```

```
633  normal          0        Sunrisers Hyderabad           22
634  normal          0        Sunrisers Hyderabad            0
635  normal          0        Sunrisers Hyderabad            8

     win_by_wickets player_of_match  \
0                 0     Yuvraj Singh
1                 7        SPD Smith
2                10          CA Lynn
3                 6       GJ Maxwell
4                 0        KM Jadhav
..              ...              ...
631               6          V Kohli
632               4  AB de Villiers
633               0     MC Henriques
634               4        DA Warner
635               0       BCJ Cutting

                                                 venue           umpire1  \
0             Rajiv Gandhi International Stadium, Uppal        AY Dandekar
1               Maharashtra Cricket Association Stadium    A Nand Kishore
2               Saurashtra Cricket Association Stadium       Nitin Menon
3                             Holkar Cricket Stadium        AK Chaudhary
4                            M Chinnaswamy Stadium                  NaN
..                                                 ...               ...
631  Shaheed Veer Narayan Singh International Stadium    A Nand Kishore
632                            M Chinnaswamy Stadium       AK Chaudhary
633                               Feroz Shah Kotla          M Erasmus
634                               Feroz Shah Kotla          M Erasmus
635                            M Chinnaswamy Stadium   HDPK Dharmasena

            umpire2  umpire3
0          NJ Llong      NaN
1            S Ravi      NaN
2         CK Nandan      NaN
3     C Shamshuddin      NaN
4               NaN      NaN
..              ...      ...
631     BNJ Oxenford      NaN
632  HDPK Dharmasena      NaN
633    C Shamshuddin      NaN
634        CK Nandan      NaN
635     BNJ Oxenford      NaN

[636 rows x 18 columns]
```

```
[ ]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 636 entries, 0 to 635
Data columns (total 18 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   id              636 non-null    int64
 1   season          636 non-null    int64
 2   city            629 non-null    object
 3   date            636 non-null    object
 4   team1           636 non-null    object
 5   team2           636 non-null    object
 6   toss_winner     636 non-null    object
 7   toss_decision   636 non-null    object
 8   result          636 non-null    object
 9   dl_applied      636 non-null    int64
 10  winner          633 non-null    object
 11  win_by_runs     636 non-null    int64
 12  win_by_wickets  636 non-null    int64
 13  player_of_match 633 non-null    object
 14  venue           636 non-null    object
 15  umpire1         635 non-null    object
 16  umpire2         635 non-null    object
 17  umpire3         0 non-null      float64
dtypes: float64(1), int64(5), object(12)
memory usage: 89.6+ KB
```

[ ]: df.describe()

[ ]:
|       | id         | season      | dl_applied | win_by_runs | win_by_wickets \ |
|-------|------------|-------------|------------|-------------|------------------|
| count | 636.000000 | 636.000000  | 636.000000 | 636.000000  | 636.000000       |
| mean  | 318.500000 | 2012.490566 | 0.025157   | 13.682390   | 3.372642         |
| std   | 183.741666 | 2.773026    | 0.156726   | 23.908877   | 3.420338         |
| min   | 1.000000   | 2008.000000 | 0.000000   | 0.000000    | 0.000000         |
| 25%   | 159.750000 | 2010.000000 | 0.000000   | 0.000000    | 0.000000         |
| 50%   | 318.500000 | 2012.000000 | 0.000000   | 0.000000    | 4.000000         |
| 75%   | 477.250000 | 2015.000000 | 0.000000   | 20.000000   | 7.000000         |
| max   | 636.000000 | 2017.000000 | 1.000000   | 146.000000  | 10.000000        |

|       | umpire3 |
|-------|---------|
| count | 0.0     |
| mean  | NaN     |
| std   | NaN     |
| min   | NaN     |
| 25%   | NaN     |
| 50%   | NaN     |
| 75%   | NaN     |
| max   | NaN     |

```
[ ]: df.columns
```

```
[ ]: Index(['id', 'season', 'city', 'date', 'team1', 'team2', 'toss_winner',
             'toss_decision', 'result', 'dl_applied', 'winner', 'win_by_runs',
             'win_by_wickets', 'player_of_match', 'venue', 'umpire1', 'umpire2',
             'umpire3'],
            dtype='object')
```

```
[ ]: df[['id','city']].sample(10).sort_values('city')
```

```
[ ]:          id          city
     125     126     Cape Town
     283     284    Chandigarh
     320     321    Chandigarh
     508     509    Chandigarh
     224     225    Dharamsala
     405     406       Kolkata
     523     524        Mumbai
     531     532          Pune
     323     324          Pune
     618     619  Visakhapatnam
```

```
[ ]: df.head()
```

```
[ ]:    id  season      city        date                         team1  \
     0   1    2017  Hyderabad  2017-04-05           Sunrisers Hyderabad
     1   2    2017       Pune  2017-04-06                Mumbai Indians
     2   3    2017     Rajkot  2017-04-07                 Gujarat Lions
     3   4    2017     Indore  2017-04-08         Rising Pune Supergiant
     4   5    2017  Bangalore  2017-04-08  Royal Challengers Bangalore

                              team2                   toss_winner toss_decision  \
     0  Royal Challengers Bangalore  Royal Challengers Bangalore         field
     1       Rising Pune Supergiant       Rising Pune Supergiant         field
     2        Kolkata Knight Riders        Kolkata Knight Riders         field
     3              Kings XI Punjab              Kings XI Punjab         field
     4             Delhi Daredevils  Royal Challengers Bangalore           bat

        result  dl_applied                       winner  win_by_runs  \
     0  normal           0          Sunrisers Hyderabad           35
     1  normal           0       Rising Pune Supergiant            0
     2  normal           0        Kolkata Knight Riders            0
     3  normal           0              Kings XI Punjab            0
     4  normal           0  Royal Challengers Bangalore           15

        win_by_wickets player_of_match                                      venue  \
     0               0    Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal
```

```
        1            7         SPD Smith    Maharashtra Cricket Association Stadium
        2           10           CA Lynn    Saurashtra Cricket Association Stadium
        3            6        GJ Maxwell                       Holkar Cricket Stadium
        4            0         KM Jadhav                     M Chinnaswamy Stadium


              umpire1          umpire2   umpire3
    0    AY Dandekar         NJ Llong       NaN
    1  A Nand Kishore          S Ravi       NaN
    2     Nitin Menon       CK Nandan       NaN
    3   AK Chaudhary   C Shamshuddin        NaN
    4            NaN             NaN        NaN
```

[ ]: ```python
df.iloc[::2,:10:2]
```

[ ]:
```
         id         city                          team1  \
    0     1    Hyderabad         Sunrisers Hyderabad
    2     3       Rajkot                 Gujarat Lions
    4     5    Bangalore  Royal Challengers Bangalore
    6     7       Mumbai         Kolkata Knight Riders
    8     9         Pune              Delhi Daredevils
    ..   ...          ...                           ...
    626  627      Kanpur         Kolkata Knight Riders
    628  629  Visakhapatnam            Kings XI Punjab
    630  631      Kolkata         Kolkata Knight Riders
    632  633    Bangalore                 Gujarat Lions
    634  635        Delhi                 Gujarat Lions


                        toss_winner   result
    0    Royal Challengers Bangalore   normal
    2          Kolkata Knight Riders   normal
    4    Royal Challengers Bangalore   normal
    6                Mumbai Indians    normal
    8          Rising Pune Supergiant  normal
    ..                          ...      ...
    626                Gujarat Lions   normal
    628              Kings XI Punjab   normal
    630          Sunrisers Hyderabad  normal
    632  Royal Challengers Bangalore  normal
    634          Sunrisers Hyderabad  normal

    [318 rows x 5 columns]
```

[ ]: ```python
mask=df['city']=='Rajkot'
df[mask]
```

[ ]:
```
        id  season    city        date                        team1  \
    2    3    2017  Rajkot  2017-04-07              Gujarat Lions
```

```
12     13    2017   Rajkot  2017-04-14          Rising Pune Supergiant
19     20    2017   Rajkot  2017-04-18   Royal Challengers Bangalore
25     26    2017   Rajkot  2017-04-23             Kings XI Punjab
33     34    2017   Rajkot  2017-04-29               Gujarat Lions
581    582   2016   Rajkot  2016-04-14        Rising Pune Supergiants
590    591   2016   Rajkot  2016-04-21               Gujarat Lions
594    595   2016   Rajkot  2016-04-24   Royal Challengers Bangalore
603    604   2016   Rajkot  2016-05-01             Kings XI Punjab
606    607   2016   Rajkot  2016-05-03               Gujarat Lions

                      team2                      toss_winner toss_decision  result  \
2     Kolkata Knight Riders        Kolkata Knight Riders         field  normal
12            Gujarat Lions                Gujarat Lions         field  normal
19            Gujarat Lions                Gujarat Lions         field  normal
25            Gujarat Lions                Gujarat Lions         field  normal
33           Mumbai Indians                Gujarat Lions           bat     tie
581           Gujarat Lions      Rising Pune Supergiants           bat  normal
590      Sunrisers Hyderabad          Sunrisers Hyderabad         field  normal
594           Gujarat Lions  Royal Challengers Bangalore           bat  normal
603           Gujarat Lions                Gujarat Lions         field  normal
606          Delhi Daredevils            Delhi Daredevils         field  normal

     dl_applied                       winner  win_by_runs  win_by_wickets  \
2             0        Kolkata Knight Riders            0              10
12            0                Gujarat Lions            0               7
19            0  Royal Challengers Bangalore           21               0
25            0              Kings XI Punjab           26               0
33            0               Mumbai Indians            0               0
581           0                Gujarat Lions            0               7
590           0          Sunrisers Hyderabad            0              10
594           0                Gujarat Lions            0               6
603           0              Kings XI Punjab           23               0
606           0             Delhi Daredevils            0               8

     player_of_match                                venue         umpire1  \
2            CA Lynn  Saurashtra Cricket Association Stadium      Nitin Menon
12            AJ Tye  Saurashtra Cricket Association Stadium   A Nand Kishore
19           CH Gayle  Saurashtra Cricket Association Stadium           S Ravi
25            HM Amla  Saurashtra Cricket Association Stadium      AK Chaudhary
33          KH Pandya  Saurashtra Cricket Association Stadium      AK Chaudhary
581          AJ Finch  Saurashtra Cricket Association Stadium      VA Kulkarni
590           B Kumar  Saurashtra Cricket Association Stadium        K Bharatan
594           V Kohli  Saurashtra Cricket Association Stadium        K Bharatan
603           AR Patel  Saurashtra Cricket Association Stadium     BNJ Oxenford
606            RR Pant  Saurashtra Cricket Association Stadium      CB Gaffaney

            umpire2  umpire3
```

```
2          CK Nandan     NaN
12            S Ravi     NaN
19         VK Sharma     NaN
25         M Erasmus     NaN
33        CB Gaffaney    NaN
581        CK Nandan     NaN
590   HDPK Dharmasena    NaN
594       BNJ Oxenford   NaN
603        VK Sharma     NaN
606       BNJ Oxenford   NaN
```

[ ]: `df.head(10)`

```
[ ]:    id  season      city        date                          team1  \
     0   1    2017  Hyderabad  2017-04-05            Sunrisers Hyderabad
     1   2    2017       Pune  2017-04-06                 Mumbai Indians
     2   3    2017     Rajkot  2017-04-07                  Gujarat Lions
     3   4    2017     Indore  2017-04-08          Rising Pune Supergiant
     4   5    2017  Bangalore  2017-04-08  Royal Challengers Bangalore
     5   6    2017  Hyderabad  2017-04-09                  Gujarat Lions
     6   7    2017     Mumbai  2017-04-09          Kolkata Knight Riders
     7   8    2017     Indore  2017-04-10  Royal Challengers Bangalore
     8   9    2017       Pune  2017-04-11                Delhi Daredevils
     9  10    2017     Mumbai  2017-04-12            Sunrisers Hyderabad

                              team2                   toss_winner toss_decision  \
     0  Royal Challengers Bangalore  Royal Challengers Bangalore         field
     1       Rising Pune Supergiant        Rising Pune Supergiant         field
     2        Kolkata Knight Riders         Kolkata Knight Riders         field
     3             Kings XI Punjab               Kings XI Punjab         field
     4             Delhi Daredevils  Royal Challengers Bangalore           bat
     5          Sunrisers Hyderabad           Sunrisers Hyderabad         field
     6               Mumbai Indians                Mumbai Indians         field
     7             Kings XI Punjab   Royal Challengers Bangalore           bat
     8       Rising Pune Supergiant        Rising Pune Supergiant         field
     9               Mumbai Indians                Mumbai Indians         field

        result  dl_applied                       winner  win_by_runs  \
     0  normal           0          Sunrisers Hyderabad           35
     1  normal           0       Rising Pune Supergiant            0
     2  normal           0        Kolkata Knight Riders            0
     3  normal           0              Kings XI Punjab            0
     4  normal           0  Royal Challengers Bangalore           15
     5  normal           0          Sunrisers Hyderabad            0
     6  normal           0               Mumbai Indians            0
     7  normal           0              Kings XI Punjab            0
     8  normal           0             Delhi Daredevils           97
```

```
9  normal            0              Mumbai Indians             0
```

```
   win_by_wickets player_of_match                                      venue  \
0               0    Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal
1               7       SPD Smith    Maharashtra Cricket Association Stadium
2              10         CA Lynn      Saurashtra Cricket Association Stadium
3               6      GJ Maxwell                      Holkar Cricket Stadium
4               0       KM Jadhav                      M Chinnaswamy Stadium
5               9     Rashid Khan  Rajiv Gandhi International Stadium, Uppal
6               4          N Rana                           Wankhede Stadium
7               8        AR Patel                      Holkar Cricket Stadium
8               0       SV Samson    Maharashtra Cricket Association Stadium
9               4       JJ Bumrah                           Wankhede Stadium
```

```
         umpire1        umpire2  umpire3
0     AY Dandekar       NJ Llong      NaN
1  A Nand Kishore        S Ravi      NaN
2     Nitin Menon      CK Nandan      NaN
3    AK Chaudhary  C Shamshuddin      NaN
4             NaN            NaN      NaN
5      A Deshmukh       NJ Llong      NaN
6     Nitin Menon      CK Nandan      NaN
7    AK Chaudhary  C Shamshuddin      NaN
8     AY Dandekar        S Ravi      NaN
9     Nitin Menon      CK Nandan      NaN
```

```python
#after season 2011,winner aginist  Kolkata Knight Riders by more than or equal
 30 runs

mask1=df['team1']=="Kolkata Knight Riders"
mask2=df['team2']=="Kolkata Knight Riders"
mask3=df['season']>=2012
mask4=df['winner']!='Kolkata Knight Riders'
mask5=df['win_by_runs']>=30

df[(mask1 | mask2)& mask3 & mask4 & mask5]['winner']
```

```
35      Sunrisers Hyderabad
433         Mumbai Indians
477     Chennai Super Kings
Name: winner, dtype: object
```

```python
#count each team as winner
df['winner'].value_counts()
```

```
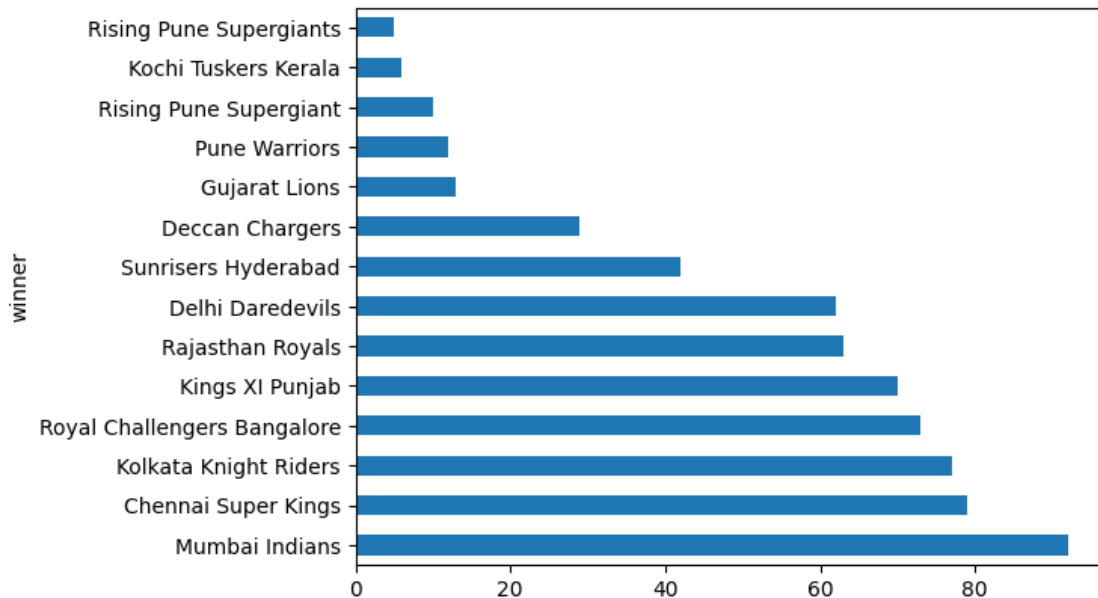winner
Mumbai Indians                    92
```

11

```
Chennai Super Kings           79
Kolkata Knight Riders         77
Royal Challengers Bangalore   73
Kings XI Punjab               70
Rajasthan Royals              63
Delhi Daredevils              62
Sunrisers Hyderabad           42
Deccan Chargers               29
Gujarat Lions                 13
Pune Warriors                 12
Rising Pune Supergiant        10
Kochi Tuskers Kerala           6
Rising Pune Supergiants        5
Name: count, dtype: int64
```

[ ]: 
```python
#plot series data(indexs,values) by matplotlib
import matplotlib.pyplot as plt
df['winner'].value_counts().plot(kind='barh')
```

[ ]: <Axes: ylabel='winner'>



[ ]: 
```python
df.head(4)
```

[ ]: 
```
   id  season      city        date                  team1  \
0   1    2017  Hyderabad  2017-04-05   Sunrisers Hyderabad
1   2    2017       Pune  2017-04-06        Mumbai Indians
2   3    2017     Rajkot  2017-04-07         Gujarat Lions
```

```
3   4    2017     Indore  2017-04-08  Rising Pune Supergiant
```

```
                        team2                    toss_winner toss_decision  \
0  Royal Challengers Bangalore  Royal Challengers Bangalore         field
1       Rising Pune Supergiant       Rising Pune Supergiant         field
2        Kolkata Knight Riders        Kolkata Knight Riders         field
3              Kings XI Punjab              Kings XI Punjab         field
```

```
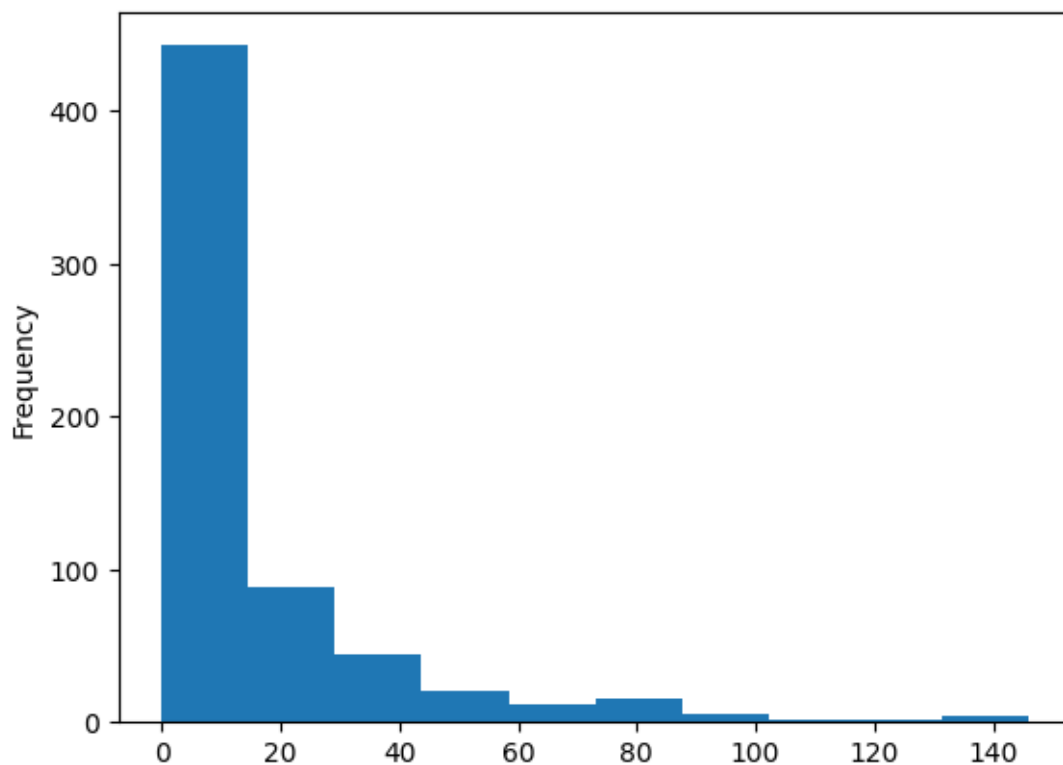   result  dl_applied               winner  win_by_runs  win_by_wickets  \
0  normal           0    Sunrisers Hyderabad           35               0
1  normal           0  Rising Pune Supergiant           0               7
2  normal           0    Kolkata Knight Riders           0              10
3  normal           0           Kings XI Punjab           0               6
```

```
  player_of_match                                venue          umpire1  \
0    Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal     AY Dandekar
1       SPD Smith    Maharashtra Cricket Association Stadium  A Nand Kishore
2        CA Lynn      Saurashtra Cricket Association Stadium     Nitin Menon
3     GJ Maxwell                       Holkar Cricket Stadium    AK Chaudhary
```

```
         umpire2  umpire3
0      NJ Llong      NaN
1        S Ravi      NaN
2     CK Nandan      NaN
3  C Shamshuddin      NaN
```

[ ]: `df['win_by_runs'].plot(kind='hist')`

[ ]: <Axes: ylabel='Frequency'>

```
[ ]: df.shape[0]
```

```
[ ]: 636
```

```
[ ]: df['team1'].value_counts()+df['team2'].value_counts()
```

```
[ ]: Chennai Super Kings           131
     Deccan Chargers                75
     Delhi Daredevils              147
     Gujarat Lions                  30
     Kings XI Punjab               148
     Kochi Tuskers Kerala           14
     Kolkata Knight Riders         148
     Mumbai Indians                157
     Pune Warriors                  46
     Rajasthan Royals              118
     Rising Pune Supergiant         16
     Rising Pune Supergiants        14
     Royal Challengers Bangalore   152
     Sunrisers Hyderabad            76
     Name: count, dtype: int64
```

```python
col_stack=pd.concat([df['team1'],df['team2']],ignore_index=True)
```

```python
col_stack.value_counts()
```

```
Mumbai Indians                 157
Royal Challengers Bangalore    152
Kolkata Knight Riders          148
Kings XI Punjab                148
Delhi Daredevils               147
Chennai Super Kings            131
Rajasthan Royals               118
Sunrisers Hyderabad             76
Deccan Chargers                 75
Pune Warriors                   46
Gujarat Lions                   30
Rising Pune Supergiant          16
Kochi Tuskers Kerala            14
Rising Pune Supergiants         14
Name: count, dtype: int64
```

```python
df.head(3)
```

```
   id  season      city        date                       team1  \
0   1    2017  Hyderabad  2017-04-05         Sunrisers Hyderabad
1   2    2017       Pune  2017-04-06              Mumbai Indians
2   3    2017     Rajkot  2017-04-07               Gujarat Lions

                         team2                  toss_winner toss_decision  \
0  Royal Challengers Bangalore  Royal Challengers Bangalore         field
1       Rising Pune Supergiant       Rising Pune Supergiant         field
2        Kolkata Knight Riders        Kolkata Knight Riders         field

   result  dl_applied                  winner  win_by_runs  win_by_wickets  \
0  normal           0     Sunrisers Hyderabad           35               0
1  normal           0  Rising Pune Supergiant            0               7
2  normal           0   Kolkata Knight Riders            0              10

   player_of_match                                           venue        umpire1  \
0    Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal      AY Dandekar
1        SPD Smith   Maharashtra Cricket Association Stadium  A Nand Kishore
2         CA Lynn     Saurashtra Cricket Association Stadium     Nitin Menon

     umpire2  umpire3
0   NJ Llong      NaN
1     S Ravi      NaN
2  CK Nandan      NaN
```

```
[ ]: df.sort_values('city')
```

```
[ ]:      id  season       city        date                           team1  \
     460  461    2014  Abu Dhabi  2014-04-18             Sunrisers Hyderabad
     471  472    2014  Abu Dhabi  2014-04-26                  Kings XI Punjab
     470  471    2014  Abu Dhabi  2014-04-26  Royal Challengers Bangalore
     464  465    2014  Abu Dhabi  2014-04-21             Chennai Super Kings
     459  460    2014  Abu Dhabi  2014-04-18             Chennai Super Kings
     ..   ...     ...        ...         ...                             ...
     466  467    2014        NaN  2014-04-23             Chennai Super Kings
     468  469    2014        NaN  2014-04-25             Sunrisers Hyderabad
     469  470    2014        NaN  2014-04-25                   Mumbai Indians
     474  475    2014        NaN  2014-04-28  Royal Challengers Bangalore
     476  477    2014        NaN  2014-04-30             Sunrisers Hyderabad

                        team2             toss_winner toss_decision  result  \
     460        Rajasthan Royals        Rajasthan Royals         field  normal
     471  Kolkata Knight Riders  Kolkata Knight Riders         field  normal
     470        Rajasthan Royals        Rajasthan Royals         field  normal
     464        Delhi Daredevils     Chennai Super Kings           bat  normal
     459          Kings XI Punjab     Chennai Super Kings           bat  normal
     ..                    ...                     ...           ...     ...
     466        Rajasthan Royals        Rajasthan Royals         field  normal
     468        Delhi Daredevils     Sunrisers Hyderabad           bat  normal
     469  Chennai Super Kings          Mumbai Indians           bat  normal
     474          Kings XI Punjab       Kings XI Punjab         field  normal
     476          Mumbai Indians          Mumbai Indians         field  normal

          dl_applied               winner  win_by_runs  win_by_wickets  \
     460           0        Rajasthan Royals            0               4
     471           0          Kings XI Punjab           23               0
     470           0        Rajasthan Royals            0               6
     464           0  Chennai Super Kings           93               0
     459           0          Kings XI Punjab            0               6
     ..          ...                   ...          ...             ...
     466           0  Chennai Super Kings            7               0
     468           0  Sunrisers Hyderabad            4               0
     469           0  Chennai Super Kings            0               7
     474           0          Kings XI Punjab            0               5
     476           0  Sunrisers Hyderabad           15               0

          player_of_match                   venue        umpire1  \
     460        AM Rahane         Sheikh Zayed Stadium         BF Bowden
     471  Sandeep Sharma         Sheikh Zayed Stadium  HDPK Dharmasena
     470        PV Tambe         Sheikh Zayed Stadium  HDPK Dharmasena
     464        SK Raina         Sheikh Zayed Stadium   RK Illingworth
     459        GJ Maxwell         Sheikh Zayed Stadium   RK Illingworth
```

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```
..             …                                …              …
466    RA Jadeja  Dubai International Cricket Stadium  HDPK Dharmasena
468     AJ Finch  Dubai International Cricket Stadium       M Erasmus
469    MM Sharma  Dubai International Cricket Stadium       BF Bowden
474 Sandeep Sharma  Dubai International Cricket Stadium       BF Bowden
476      B Kumar  Dubai International Cricket Stadium  HDPK Dharmasena


            umpire2  umpire3
460  RK Illingworth      NaN
471  RK Illingworth      NaN
470   C Shamshuddin      NaN
464   C Shamshuddin      NaN
459   C Shamshuddin      NaN
..              …        …
466  RK Illingworth      NaN
468         S Ravi      NaN
469       M Erasmus      NaN
474         S Ravi      NaN
476       M Erasmus      NaN

[636 rows x 18 columns]
```

```python
df.sort_values(['season','win_by_runs'],ascending=[True,False])
```

```
     id  season       city        date                team1  \
59   60    2008  Bangalore  2008-04-18  Kolkata Knight Riders
114 115    2008     Mumbai  2008-05-30        Rajasthan Royals
68   69    2008  Chandigarh  2008-04-25         Kings XI Punjab
100 101    2008     Jaipur  2008-05-17        Rajasthan Royals
77   78    2008     Jaipur  2008-05-01        Rajasthan Royals
..   …      …         …          …                   …
48   49    2017     Kanpur  2017-05-10          Gujarat Lions
51   52    2017     Kanpur  2017-05-13          Gujarat Lions
53   54    2017       Pune  2017-05-14         Kings XI Punjab
56   57    2017  Bangalore  2017-05-17     Sunrisers Hyderabad
57   58    2017  Bangalore  2017-05-19  Kolkata Knight Riders

                         team2                 toss_winner toss_decision  \
59   Royal Challengers Bangalore  Royal Challengers Bangalore         field
114           Delhi Daredevils             Delhi Daredevils         field
68             Mumbai Indians               Mumbai Indians         field
100  Royal Challengers Bangalore  Royal Challengers Bangalore         field
77         Kolkata Knight Riders          Rajasthan Royals           bat
..              …                            …                    …
48             Delhi Daredevils             Delhi Daredevils         field
51           Sunrisers Hyderabad          Sunrisers Hyderabad         field
53           Rising Pune Supergiant     Rising Pune Supergiant         field
```

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```
56          Kolkata Knight Riders         Kolkata Knight Riders         field
57                Mumbai Indians               Mumbai Indians         field

     result  dl_applied                winner  win_by_runs  win_by_wickets  \
59   normal           0  Kolkata Knight Riders          140               0
114  normal           0        Rajasthan Royals          105               0
68   normal           0          Kings XI Punjab           66               0
100  normal           0        Rajasthan Royals           65               0
77   normal           0        Rajasthan Royals           45               0
..      …          …                     …            …              …
48   normal           0         Delhi Daredevils            0               2
51   normal           0      Sunrisers Hyderabad            0               8
53   normal           0  Rising Pune Supergiant            0               9
56   normal           1  Kolkata Knight Riders            0               7
57   normal           0          Mumbai Indians            0               6

         player_of_match                                   venue  \
59           BB McCullum                   M Chinnaswamy Stadium
114            SR Watson                       Wankhede Stadium
68       KC Sangakkara  Punjab Cricket Association Stadium, Mohali
100            GC Smith                  Sawai Mansingh Stadium
77           SA Asnodkar                  Sawai Mansingh Stadium
..                   …                                      …
48               SS Iyer                             Green Park
51       Mohammed Siraj                             Green Park
53           JD Unadkat    Maharashtra Cricket Association Stadium
56      NM Coulter-Nile                   M Chinnaswamy Stadium
57             KV Sharma                   M Chinnaswamy Stadium

            umpire1         umpire2  umpire3
59        Asad Rauf     RE Koertzen      NaN
114       BF Bowden     RE Koertzen      NaN
68        Aleem Dar       AM Saheba      NaN
100       BF Bowden       SL Shastri      NaN
77      RE Koertzen  GA Pratapkumar      NaN
..              …              …       …
48         YC Barde     AK Chaudhary      NaN
51     AK Chaudhary     Nitin Menon      NaN
53       AY Dandekar       A Deshmukh      NaN
56     AK Chaudhary     Nitin Menon      NaN
57         NJ Llong     Nitin Menon      NaN

[636 rows x 18 columns]
```

```
[ ]: df.head(3)
```

```
[ ]:    id  season       city       date                team1  \
     0   1   2017   Hyderabad  2017-04-05  Sunrisers Hyderabad
     1   2   2017       Pune  2017-04-06        Mumbai Indians
     2   3   2017     Rajkot  2017-04-07         Gujarat Lions

                            team2                   toss_winner toss_decision  \
     0  Royal Challengers Bangalore  Royal Challengers Bangalore         field
     1        Rising Pune Supergiant        Rising Pune Supergiant         field
     2        Kolkata Knight Riders        Kolkata Knight Riders         field

         result  dl_applied                  winner  win_by_runs  win_by_wickets  \
     0  normal           0     Sunrisers Hyderabad           35               0
     1  normal           0    Rising Pune Supergiant          0               7
     2  normal           0     Kolkata Knight Riders          0              10

       player_of_match                                      venue        umpire1  \
     0    Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal     AY Dandekar
     1        SPD Smith   Maharashtra Cricket Association Stadium  A Nand Kishore
     2         CA Lynn      Saurashtra Cricket Association Stadium     Nitin Menon

         umpire2  umpire3
     0  NJ Llong      NaN
     1    S Ravi      NaN
     2  CK Nandan      NaN
```

```
[ ]: #played ipl how much citys?
     df.drop_duplicates('city').shape
```

```
[ ]: (31, 18)
```

```
[ ]: #how much ipl game palyed in each season at different cities
     df.drop_duplicates(['city','season'])
```

```
[ ]:        id  season           city       date                        team1  \
     0       1   2017       Hyderabad  2017-04-05         Sunrisers Hyderabad
     1       2   2017           Pune  2017-04-06              Mumbai Indians
     2       3   2017         Rajkot  2017-04-07               Gujarat Lions
     3       4   2017         Indore  2017-04-08      Rising Pune Supergiant
     4       5   2017      Bangalore  2017-04-08  Royal Challengers Bangalore
     ..    ...    ...            ...         ...                         ...
     583   584   2016       Hyderabad  2016-04-16         Sunrisers Hyderabad
     591   592   2016           Pune  2016-04-22  Royal Challengers Bangalore
     612   613   2016  Visakhapatnam  2016-05-08         Sunrisers Hyderabad
     626   627   2016         Kanpur  2016-05-19        Kolkata Knight Riders
     627   628   2016         Raipur  2016-05-20         Sunrisers Hyderabad

                             team2                   toss_winner toss_decision  \
```

```
0      Royal Challengers Bangalore  Royal Challengers Bangalore        field
1         Rising Pune Supergiant       Rising Pune Supergiant          field
2          Kolkata Knight Riders        Kolkata Knight Riders          field
3               Kings XI Punjab              Kings XI Punjab           field
4              Delhi Daredevils  Royal Challengers Bangalore            bat
..                           …                            …              …
583        Kolkata Knight Riders          Sunrisers Hyderabad           bat
591      Rising Pune Supergiants      Rising Pune Supergiants         field
612              Mumbai Indians               Mumbai Indians          field
626               Gujarat Lions                Gujarat Lions          field
627            Delhi Daredevils             Delhi Daredevils          field

     result  dl_applied                      winner  win_by_runs  \
0    normal           0          Sunrisers Hyderabad           35
1    normal           0       Rising Pune Supergiant            0
2    normal           0        Kolkata Knight Riders            0
3    normal           0              Kings XI Punjab            0
4    normal           0  Royal Challengers Bangalore           15
..      …           …                            …            …
583  normal           0        Kolkata Knight Riders            0
591  normal           0  Royal Challengers Bangalore           13
612  normal           0          Sunrisers Hyderabad           85
626  normal           0                Gujarat Lions            0
627  normal           0             Delhi Daredevils            0

     win_by_wickets player_of_match  \
0                 0     Yuvraj Singh
1                 7        SPD Smith
2                10          CA Lynn
3                 6        GJ Maxwell
4                 0        KM Jadhav
..               …                …
583               8         G Gambhir
591               0    AB de Villiers
612               0          A Nehra
626               6          DR Smith
627               6          KK Nair

                                               venue         umpire1  \
0           Rajiv Gandhi International Stadium, Uppal     AY Dandekar
1             Maharashtra Cricket Association Stadium   A Nand Kishore
2              Saurashtra Cricket Association Stadium      Nitin Menon
3                              Holkar Cricket Stadium     AK Chaudhary
4                              M Chinnaswamy Stadium             NaN
..                                                 …               …
583         Rajiv Gandhi International Stadium, Uppal     AK Chaudhary
591           Maharashtra Cricket Association Stadium      CB Gaffaney
```

```
612  Dr. Y.S. Rajasekhara Reddy ACA-VDCA Cricket St…          S Ravi
626                                            Green Park   AK Chaudhary
627    Shaheed Veer Narayan Singh International Stadium  A Nand Kishore


           umpire2  umpire3
0          NJ Llong      NaN
1           S Ravi      NaN
2         CK Nandan      NaN
3    C Shamshuddin      NaN
4              NaN      NaN
..             …        …
583       CK Nandan      NaN
591       VK Sharma      NaN
612   C Shamshuddin      NaN
626       CK Nandan      NaN
627     BNJ Oxenford      NaN

[107 rows x 18 columns]
```

```
[ ]: #how much ipl game played in different cities at season 2017
     df.drop_duplicates(['city','season'])['season']==2017
     df.drop_duplicates(['city','season'])[df.
       ↪drop_duplicates(['city','season'])['season']==2017]
```

```
[ ]:    id  season       city        date                      team1  \
     0   1    2017  Hyderabad  2017-04-05        Sunrisers Hyderabad
     1   2    2017       Pune  2017-04-06             Mumbai Indians
     2   3    2017     Rajkot  2017-04-07              Gujarat Lions
     3   4    2017     Indore  2017-04-08      Rising Pune Supergiant
     4   5    2017  Bangalore  2017-04-08  Royal Challengers Bangalore
     6   7    2017     Mumbai  2017-04-09        Kolkata Knight Riders
     10  11   2017    Kolkata  2017-04-13            Kings XI Punjab
     14  15   2017      Delhi  2017-04-15            Delhi Daredevils
     31  32   2017  Chandigarh  2017-04-28       Sunrisers Hyderabad
     48  49   2017     Kanpur  2017-05-10              Gujarat Lions


                           team2                  toss_winner toss_decision  \
     0   Royal Challengers Bangalore  Royal Challengers Bangalore         field
     1        Rising Pune Supergiant       Rising Pune Supergiant         field
     2        Kolkata Knight Riders        Kolkata Knight Riders         field
     3             Kings XI Punjab             Kings XI Punjab         field
     4             Delhi Daredevils  Royal Challengers Bangalore          bat
     6             Mumbai Indians             Mumbai Indians         field
     10       Kolkata Knight Riders        Kolkata Knight Riders         field
     14            Kings XI Punjab             Delhi Daredevils          bat
     31            Kings XI Punjab             Kings XI Punjab         field
     48            Delhi Daredevils             Delhi Daredevils         field
```

```
    result  dl_applied                      winner  win_by_runs  \
0   normal           0         Sunrisers Hyderabad           35
1   normal           0         Rising Pune Supergiant         0
2   normal           0         Kolkata Knight Riders          0
3   normal           0              Kings XI Punjab           0
4   normal           0   Royal Challengers Bangalore         15
6   normal           0               Mumbai Indians           0
10  normal           0         Kolkata Knight Riders          0
14  normal           0             Delhi Daredevils          51
31  normal           0         Sunrisers Hyderabad           26
48  normal           0             Delhi Daredevils           0

    win_by_wickets player_of_match  \
0                0     Yuvraj Singh
1                7        SPD Smith
2               10          CA Lynn
3                6       GJ Maxwell
4                0        KM Jadhav
6                4           N Rana
10               8        SP Narine
14               0       CJ Anderson
31               0       Rashid Khan
48               2           SS Iyer

                                               venue          umpire1  \
0          Rajiv Gandhi International Stadium, Uppal      AY Dandekar
1            Maharashtra Cricket Association Stadium   A Nand Kishore
2            Saurashtra Cricket Association Stadium      Nitin Menon
3                          Holkar Cricket Stadium      AK Chaudhary
4                          M Chinnaswamy Stadium               NaN
6                             Wankhede Stadium        Nitin Menon
10                              Eden Gardens          A Deshmukh
14                           Feroz Shah Kotla           YC Barde
31  Punjab Cricket Association IS Bindra Stadium, …     Nitin Menon
48                                Green Park           YC Barde

          umpire2 umpire3
0       NJ Llong      NaN
1         S Ravi      NaN
2      CK Nandan      NaN
3   C Shamshuddin      NaN
4            NaN      NaN
6      CK Nandan      NaN
10      NJ Llong      NaN
14    Nitin Menon      NaN
31     CK Nandan      NaN
```

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```
48    AK Chaudhary        NaN
```

```
[ ]: #find champions for each season
     df.drop_duplicates('season',keep='last')[['season','winner']].
     ↪sort_values('season')
```

```
[ ]:      season                winner
     116    2008        Rajasthan Royals
     173    2009        Deccan Chargers
     233    2010      Chennai Super Kings
     306    2011      Chennai Super Kings
     380    2012  Kolkata Knight Riders
     456    2013          Mumbai Indians
     516    2014  Kolkata Knight Riders
     575    2015          Mumbai Indians
     635    2016      Sunrisers Hyderabad
     58     2017          Mumbai Indians
```

```
[ ]: #groupby
     df.head(3)
```

```
[ ]:    id  season      city        date                      team1  \
     0   1    2017  Hyderabad  2017-04-05  Sunrisers Hyderabad
     1   2    2017       Pune  2017-04-06        Mumbai Indians
     2   3    2017     Rajkot  2017-04-07        Gujarat Lions

                              team2                   toss_winner toss_decision  \
     0  Royal Challengers Bangalore  Royal Challengers Bangalore         field
     1        Rising Pune Supergiant         Rising Pune Supergiant        field
     2        Kolkata Knight Riders        Kolkata Knight Riders         field

        result  dl_applied                   winner  win_by_runs  win_by_wickets  \
     0  normal           0      Sunrisers Hyderabad           35               0
     1  normal           0  Rising Pune Supergiant            0               7
     2  normal           0  Kolkata Knight Riders            0              10

       player_of_match                                     venue         umpire1  \
     0   Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal    AY Dandekar
     1       SPD Smith  Maharashtra Cricket Association Stadium  A Nand Kishore
     2         CA Lynn     Saurashtra Cricket Association Stadium    Nitin Menon

         umpire2  umpire3
     0  NJ Llong      NaN
     1    S Ravi      NaN
     2  CK Nandan      NaN
```

```
[ ]: df['city'].value_counts()
```

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```
[ ]: city
     Mumbai           85
     Bangalore        66
     Kolkata          61
     Delhi            60
     Hyderabad        49
     Chennai          48
     Chandigarh       46
     Jaipur           33
     Pune             32
     Durban           15
     Centurion        12
     Ahmedabad        12
     Visakhapatnam    11
     Rajkot           10
     Dharamsala        9
     Johannesburg      8
     Cape Town         7
     Port Elizabeth    7
     Ranchi            7
     Abu Dhabi         7
     Cuttack           7
     Raipur            6
     Sharjah           6
     Indore            5
     Kochi             5
     Kanpur            4
     East London       3
     Kimberley         3
     Nagpur            3
     Bloemfontein      2
     Name: count, dtype: int64
```

groupby()

```
[ ]: #creating group on different cities(or any catagroical[repeat of one value])
     citygroup=df.groupby('city')
```

```
[ ]: citygroup.size().sort_values(ascending=False)
```

```
[ ]: city
     Mumbai           85
     Bangalore        66
     Kolkata          61
     Delhi            60
     Hyderabad        49
     Chennai          48
```

```
Chandigarh       46
Jaipur           33
Pune             32
Durban           15
Ahmedabad        12
Centurion        12
Visakhapatnam    11
Rajkot           10
Dharamsala        9
Johannesburg      8
Ranchi            7
Cuttack           7
Abu Dhabi         7
Port Elizabeth    7
Cape Town         7
Raipur            6
Sharjah           6
Kochi             5
Indore            5
Kanpur            4
Kimberley         3
East London       3
Nagpur            3
Bloemfontein      2
dtype: int64
```

[ ]: *#variable of groupby fucntion returened*
     citygroup

[ ]: <pandas.core.groupby.generic.DataFrameGroupBy object at 0x7913e975bdd0>

[ ]: *#first rows of each group*
     citygroup.first()

[ ]:                id  season        date                      team1  \
     city
     Abu Dhabi     458    2014  2014-04-16        Kolkata Knight Riders
     Ahmedabad     180    2010  2010-03-15              Rajasthan Royals
     Bangalore       5    2017  2017-04-08  Royal Challengers Bangalore
     Bloemfontein  161    2009  2009-05-15              Delhi Daredevils
     Cape Town     118    2009  2009-04-18                Mumbai Indians
     Centurion     133    2009  2009-04-28              Delhi Daredevils
     Chandigarh     32    2017  2017-04-28            Sunrisers Hyderabad
     Chennai        67    2008  2008-04-23            Chennai Super Kings
     Cuttack       186    2010  2010-03-19              Deccan Chargers
     Delhi          15    2017  2017-04-15              Delhi Daredevils
     Dharamsala    225    2010  2010-04-16                Kings XI Punjab
```

```
Durban          123   2009  2009-04-21              Kings XI Punjab
East London     138   2009  2009-05-01               Mumbai Indians
Hyderabad         1   2017  2017-04-05           Sunrisers Hyderabad
Indore            4   2017  2017-04-08        Rising Pune Supergiant
Jaipur           65   2008  2008-04-21              Kings XI Punjab
Johannesburg    141   2009  2009-05-02           Chennai Super Kings
Kanpur           49   2017  2017-05-10                 Gujarat Lions
Kimberley       151   2009  2009-05-09               Deccan Chargers
Kochi           237   2011  2011-04-09           Kochi Tuskers Kerala
Kolkata          11   2017  2017-04-13              Kings XI Punjab
Mumbai            7   2017  2017-04-09         Kolkata Knight Riders
Nagpur          210   2010  2010-04-05              Rajasthan Royals
Port Elizabeth  122   2009  2009-04-20           Chennai Super Kings
Pune              2   2017  2017-04-06               Mumbai Indians
Raipur          419   2013  2013-04-28              Delhi Daredevils
Rajkot            3   2017  2017-04-07                 Gujarat Lions
Ranchi          441   2013  2013-05-12  Royal Challengers Bangalore
Sharjah         459   2014  2014-04-17              Delhi Daredevils
Visakhapatnam   313   2012  2012-04-07           Chennai Super Kings

                                      team2                 toss_winner  \
city
Abu Dhabi                    Mumbai Indians        Kolkata Knight Riders
Ahmedabad                   Delhi Daredevils             Delhi Daredevils
Bangalore                   Delhi Daredevils  Royal Challengers Bangalore
Bloemfontein                 Kings XI Punjab              Kings XI Punjab
Cape Town                Chennai Super Kings          Chennai Super Kings
Centurion                   Rajasthan Royals             Delhi Daredevils
Chandigarh                   Kings XI Punjab              Kings XI Punjab
Chennai                      Mumbai Indians               Mumbai Indians
Cuttack                      Kings XI Punjab              Kings XI Punjab
Delhi                        Kings XI Punjab             Delhi Daredevils
Dharamsala                   Deccan Chargers              Deccan Chargers
Durban                 Kolkata Knight Riders        Kolkata Knight Riders
East London            Kolkata Knight Riders               Mumbai Indians
Hyderabad        Royal Challengers Bangalore  Royal Challengers Bangalore
Indore                       Kings XI Punjab              Kings XI Punjab
Jaipur                      Rajasthan Royals              Kings XI Punjab
Johannesburg                Delhi Daredevils             Delhi Daredevils
Kanpur                      Delhi Daredevils             Delhi Daredevils
Kimberley                    Kings XI Punjab              Kings XI Punjab
Kochi            Royal Challengers Bangalore         Kochi Tuskers Kerala
Kolkata                Kolkata Knight Riders        Kolkata Knight Riders
Mumbai                       Mumbai Indians               Mumbai Indians
Nagpur                       Deccan Chargers             Rajasthan Royals
Port Elizabeth   Royal Challengers Bangalore          Chennai Super Kings
Pune                  Rising Pune Supergiant       Rising Pune Supergiant
```

| city | | |
|---|---|---|
| Raipur | Pune Warriors | Pune Warriors |
| Rajkot | Kolkata Knight Riders | Kolkata Knight Riders |
| Ranchi | Kolkata Knight Riders | Kolkata Knight Riders |
| Sharjah | Royal Challengers Bangalore | Royal Challengers Bangalore |
| Visakhapatnam | Deccan Chargers | Deccan Chargers |

| city | toss_decision | result | dl_applied | winner \ |
|---|---|---|---|---|
| Abu Dhabi | bat | normal | 0 | Kolkata Knight Riders |
| Ahmedabad | field | normal | 0 | Delhi Daredevils |
| Bangalore | bat | normal | 0 | Royal Challengers Bangalore |
| Bloemfontein | field | normal | 0 | Kings XI Punjab |
| Cape Town | field | normal | 0 | Mumbai Indians |
| Centurion | bat | normal | 0 | Rajasthan Royals |
| Chandigarh | field | normal | 0 | Sunrisers Hyderabad |
| Chennai | field | normal | 0 | Chennai Super Kings |
| Cuttack | field | normal | 0 | Deccan Chargers |
| Delhi | bat | normal | 0 | Delhi Daredevils |
| Dharamsala | field | normal | 0 | Deccan Chargers |
| Durban | field | normal | 1 | Kolkata Knight Riders |
| East London | bat | normal | 0 | Mumbai Indians |
| Hyderabad | field | normal | 0 | Sunrisers Hyderabad |
| Indore | field | normal | 0 | Kings XI Punjab |
| Jaipur | bat | normal | 0 | Rajasthan Royals |
| Johannesburg | field | normal | 0 | Chennai Super Kings |
| Kanpur | field | normal | 0 | Delhi Daredevils |
| Kimberley | field | normal | 0 | Kings XI Punjab |
| Kochi | bat | normal | 0 | Royal Challengers Bangalore |
| Kolkata | field | normal | 0 | Kolkata Knight Riders |
| Mumbai | field | normal | 0 | Mumbai Indians |
| Nagpur | bat | normal | 0 | Rajasthan Royals |
| Port Elizabeth | bat | normal | 0 | Chennai Super Kings |
| Pune | field | normal | 0 | Rising Pune Supergiant |
| Raipur | field | normal | 0 | Delhi Daredevils |
| Rajkot | field | normal | 0 | Kolkata Knight Riders |
| Ranchi | field | normal | 0 | Kolkata Knight Riders |
| Sharjah | field | normal | 0 | Royal Challengers Bangalore |
| Visakhapatnam | field | normal | 0 | Chennai Super Kings |

| city | win_by_runs | win_by_wickets | player_of_match \ |
|---|---|---|---|
| Abu Dhabi | 41 | 0 | JH Kallis |
| Ahmedabad | 0 | 6 | V Sehwag |
| Bangalore | 15 | 0 | KM Jadhav |
| Bloemfontein | 0 | 6 | B Lee |
| Cape Town | 19 | 0 | SR Tendulkar |
| Centurion | 0 | 5 | YK Pathan |

| city | | | |
|---|---|---|---|
| Chandigarh | 26 | 0 | Rashid Khan |
| Chennai | 6 | 0 | ML Hayden |
| Cuttack | 6 | 0 | A Symonds |
| Delhi | 51 | 0 | CJ Anderson |
| Dharamsala | 0 | 5 | RG Sharma |
| Durban | 11 | 0 | CH Gayle |
| East London | 9 | 0 | JP Duminy |
| Hyderabad | 35 | 0 | Yuvraj Singh |
| Indore | 0 | 6 | GJ Maxwell |
| Jaipur | 0 | 6 | SR Watson |
| Johannesburg | 18 | 0 | SB Jakati |
| Kanpur | 0 | 2 | SS Iyer |
| Kimberley | 0 | 3 | DPMD Jayawardene |
| Kochi | 0 | 6 | AB de Villiers |
| Kolkata | 0 | 8 | SP Narine |
| Mumbai | 0 | 4 | N Rana |
| Nagpur | 2 | 0 | SK Warne |
| Port Elizabeth | 92 | 0 | M Muralitharan |
| Pune | 0 | 7 | SPD Smith |
| Raipur | 15 | 0 | DA Warner |
| Rajkot | 0 | 10 | CA Lynn |
| Ranchi | 0 | 5 | JH Kallis |
| Sharjah | 0 | 8 | YS Chahal |
| Visakhapatnam | 74 | 0 | RA Jadeja |

```
                                                              venue  \
city
Abu Dhabi                                      Sheikh Zayed Stadium
Ahmedabad                             Sardar Patel Stadium, Motera
Bangalore                                 M Chinnaswamy Stadium
Bloemfontein                                   OUTsurance Oval
Cape Town                                             Newlands
Centurion                                     SuperSport Park
Chandigarh     Punjab Cricket Association IS Bindra Stadium, …
Chennai                         MA Chidambaram Stadium, Chepauk
Cuttack                                      Barabati Stadium
Delhi                                        Feroz Shah Kotla
Dharamsala     Himachal Pradesh Cricket Association Stadium
Durban                                             Kingsmead
East London                                      Buffalo Park
Hyderabad         Rajiv Gandhi International Stadium, Uppal
Indore                                 Holkar Cricket Stadium
Jaipur                                 Sawai Mansingh Stadium
Johannesburg                          New Wanderers Stadium
Kanpur                                           Green Park
Kimberley                             De Beers Diamond Oval
Kochi                                         Nehru Stadium
```

```
Kolkata                                                 Eden Gardens
Mumbai                                             Wankhede Stadium
Nagpur                 Vidarbha Cricket Association Stadium, Jamtha
Port Elizabeth                                    St George's Park
Pune                      Maharashtra Cricket Association Stadium
Raipur          Shaheed Veer Narayan Singh International Stadium
Rajkot                    Saurashtra Cricket Association Stadium
Ranchi                     JSCA International Stadium Complex
Sharjah                               Sharjah Cricket Stadium
Visakhapatnam   Dr. Y.S. Rajasekhara Reddy ACA-VDCA Cricket St…
```

```
                              umpire1           umpire2  umpire3
city
Abu Dhabi                    M Erasmus     RK Illingworth     NaN
Ahmedabad                    BG Jerling        RE Koertzen     NaN
Bangalore      KN Ananthapadmanabhan        AK Chaudhary     NaN
Bloemfontein         HDPK Dharmasena          IL Howell     NaN
Cape Town                   BR Doctrove       K Hariharan     NaN
Centurion                   GAV Baxter        RE Koertzen     NaN
Chandigarh                 Nitin Menon        CK Nandan     NaN
Chennai                     DJ Harper     GA Pratapkumar     NaN
Cuttack                     BF Bowden          M Erasmus     NaN
Delhi                       YC Barde         Nitin Menon     NaN
Dharamsala                  M Erasmus          AM Saheba     NaN
Durban                      DJ Harper          SD Ranade     NaN
East London                 M Erasmus        SK Tarapore     NaN
Hyderabad                   AY Dandekar         NJ Llong     NaN
Indore                      AK Chaudhary    C Shamshuddin     NaN
Jaipur                       Aleem Dar          RB Tiffin     NaN
Johannesburg                DJ Harper        RE Koertzen     NaN
Kanpur                       YC Barde        AK Chaudhary     NaN
Kimberley                   GAV Baxter          AM Saheba     NaN
Kochi                HDPK Dharmasena        K Hariharan     NaN
Kolkata                     A Deshmukh          NJ Llong     NaN
Mumbai                     Nitin Menon        CK Nandan     NaN
Nagpur               HDPK Dharmasena          SJA Taufel     NaN
Port Elizabeth               BG Jerling         SJA Taufel     NaN
Pune                    A Nand Kishore           S Ravi     NaN
Raipur                      CK Nandan            S Ravi     NaN
Rajkot                     Nitin Menon        CK Nandan     NaN
Ranchi                       NJ Llong          K Srinath     NaN
Sharjah                     Aleem Dar            S Ravi     NaN
Visakhapatnam               JD Cloete   HDPK Dharmasena     NaN
```

```python
#return a dictonary which index is group name and values is index number of
↪orginial dataset
citygroup.groups
```

[ ]: {'Abu Dhabi': [457, 459, 460, 464, 470, 471, 475], 'Ahmedabad': [179, 186, 194, 197, 481, 486, 497, 500, 525, 532, 535, 539], 'Bangalore': [4, 11, 16, 29, 41, 44, 56, 57, 59, 69, 73, 83, 89, 103, 110, 180, 183, 191, 196, 213, 216, 225, 241, 267, 279, 282, 290, 301, 311, 316, 325, 328, 349, 355, 366, 378, 382, 391, 400, 406, 410, 428, 431, 451, 480, 487, 491, 494, 509, 516, 524, 533, 537, 545, 549, 556, 570, 579, 586, 605, 610, 616, 619, 625, 632, 635], 'Bloemfontein': [160, 164], 'Cape Town': [117, 118, 119, 120, 123, 125, 129], 'Centurion': [132, 135, 136, 146, 147, 148, 155, 156, 165, 169, 170, 171], 'Chandigarh': [31, 34, 45, 47, 60, 68, 72, 80, 93, 96, 107, 176, 192, 195, 204, 214, 242, 255, 283, 286, 320, 329, 332, 339, 353, 365, 390, 399, 408, 435, 439, 447, 504, 508, 511, 543, 551, 565, 568, 578, 585, 588, 596, 611, 614, 621], 'Chennai': [66, 70, 78, 84, 90, 106, 109, 178, 189, 201, 205, 210, 221, 223, 234, 247, 261, 271, 275, 288, 296, 305, 306, 307, 319, 331, 333, 342, 346, 351, 363, 379, 380, 385, 395, 398, 409, 413, 417, 424, 445, 518, 520, 541, 546, 553, 558, 562], 'Cuttack': [185, 188, 336, 347, 485, 490, 496], 'Delhi': [14, 17, 38, 40, 43, 50, 54, 61, 75, 86, 97, 99, 108, 182, 184, 199, 202, 208, 217, 228, 237, 252, 258, 262, 265, 273, 300, 317, 322, 334, 341, 344, 356, 368, 371, 384, 393, 403, 407, 437, 442, 453, 454, 479, 482, 484, 488, 501, 522, 534, 538, 542, 547, 582, 592, 598, 601, 608, 633, 634], 'Dharamsala': [224, 227, 292, 295, 299, 370, 373, 411, 449], 'Durban': [122, 124, 126, 127, 130, 133, 134, 138, 144, 145, 157, 158, 159, 167, 168], 'East London': [137, 143, 149], 'Hyderabad': [0, 5, 18, 20, 35, 42, 46, 58, 65, 67, 76, 79, 91, 101, 113, 235, 244, 248, 259, 274, 278, 285, 330, 358, 372, 375, 383, 387, 404, 422, 427, 434, 448, 452, 492, 495, 499, 502, 550, 563, 567, 571, 583, 587, 593, 597, 602, 609, 617], 'Indore': [3, 7, 21, 289, 293], 'Jaipur': [64, 77, 82, 88, 92, 100, 112, 211, 218, 222, 240, 245, 260, 266, 270, 284, 287, 310, 313, 327, 337, 348, 360, 364, 376, 388, 397, 402, 415, 419, 430, 432, 441], 'Johannesburg': [140, 142, 153, 162, 163, 166, 172, 173], 'Kanpur': [48, 51, 626, 629], 'Kimberley': [150, 151, 154], 'Kochi': [236, 251, 264, 268, 277], 'Kolkata': [10, 13, 22, 26, 30, 39, 52, 63, 74, 87, 94, 102, 104, 111, 177, 181, 203, 207, 212, 226, 229, 239, 250, 254, 257, 269, 280, 302, 308, 321, 324, 343, 352, 362, 367, 381, 396, 405, 412, 414, 426, 455, 456, 503, 505, 510, 513, 517, 521, 526, 544, 554, 559, 575, 577, 580, 607, 613, 620, 623, 630], 'Mumbai': [6, 9, 15, 23, 27, 36, 49, 55, 62, 71, 81, 85, 95, 98, 105, 114, 115, 116, 174, 175, 187, 190, 193, 198, 200, 206, 220, 230, 231, 232, 233, 238, 243, 246, 249, 253, 256, 263, 272, 276, 281, 291, 294, 297, 298, 303, 304, 309, 318, 326, 335, 345, 354, 359, 369, 389, 394, 416, 420, 429, 433, 443, 446, 478, 483, 489, 507, 512, 514, 515, 523, 529, 540, 548, 552, 555, 557, 561, 566, 569, 572, 576, 584, 589, 599], 'Nagpur': [209, 215, 219], 'Port Elizabeth': [121, 128, 131, 139, 141, 152, 161], 'Pune': [1, 8, 24, 28, 32, 37, 53, 314, 323, 338, 340, 350, 357, 361, 374, 377, 386, 392, 401, 421, 425, 436, 438, 450, 519, 527, 531, 573, 591, 595, 600, 604], 'Raipur': [418, 423, 560, 564, 627, 631], 'Rajkot': [2, 12, 19, 25, 33, 581, 590, 594, 603, 606], 'Ranchi': [440, 444, 477, 493, 498, 506, 574], 'Sharjah': [458, 463, 465, 467, 472, 473], 'Visakhapatnam': [312, 315, 528, 530, 536, 612, 615, 618, 622, 624, 628]}

```
[ ]:         id  season      city        date                    team1  \
      457    458    2014  Abu Dhabi  2014-04-16  Kolkata Knight Riders
      460    461    2014  Abu Dhabi  2014-04-18     Sunrisers Hyderabad
      475    476    2014  Abu Dhabi  2014-04-29        Rajasthan Royals

                         team2             toss_winner toss_decision  result  \
      457        Mumbai Indians  Kolkata Knight Riders           bat  normal
      460      Rajasthan Royals       Rajasthan Royals         field  normal
      475  Kolkata Knight Riders      Rajasthan Royals           bat     tie

           dl_applied                 winner  win_by_runs  win_by_wickets  \
      457           0  Kolkata Knight Riders           41               0
      460           0       Rajasthan Royals            0               4
      475           0       Rajasthan Royals            0               0

           player_of_match                venue     umpire1         umpire2 umpire3
      457      JH Kallis  Sheikh Zayed Stadium   M Erasmus  RK Illingworth     NaN
      460      AM Rahane  Sheikh Zayed Stadium   BF Bowden  RK Illingworth     NaN
      475     JP Faulkner  Sheikh Zayed Stadium   Aleem Dar    AK Chaudhary     NaN
```

```
[ ]: #gets each group by calling
     citygroup.get_group('Abu Dhabi')
```

```
[ ]:         id  season      city        date                          team1  \
      457    458    2014  Abu Dhabi  2014-04-16          Kolkata Knight Riders
      459    460    2014  Abu Dhabi  2014-04-18            Chennai Super Kings
      460    461    2014  Abu Dhabi  2014-04-18             Sunrisers Hyderabad
      464    465    2014  Abu Dhabi  2014-04-21            Chennai Super Kings
      470    471    2014  Abu Dhabi  2014-04-26  Royal Challengers Bangalore
      471    472    2014  Abu Dhabi  2014-04-26                 Kings XI Punjab
      475    476    2014  Abu Dhabi  2014-04-29               Rajasthan Royals

                         team2             toss_winner toss_decision  result  \
      457        Mumbai Indians  Kolkata Knight Riders           bat  normal
      459       Kings XI Punjab    Chennai Super Kings           bat  normal
      460      Rajasthan Royals       Rajasthan Royals         field  normal
      464      Delhi Daredevils    Chennai Super Kings           bat  normal
      470      Rajasthan Royals       Rajasthan Royals         field  normal
      471  Kolkata Knight Riders  Kolkata Knight Riders         field  normal
      475  Kolkata Knight Riders      Rajasthan Royals           bat     tie

           dl_applied                 winner  win_by_runs  win_by_wickets  \
      457           0  Kolkata Knight Riders           41               0
      459           0        Kings XI Punjab            0               6
      460           0       Rajasthan Royals            0               4
      464           0    Chennai Super Kings           93               0
      470           0       Rajasthan Royals            0               6
```

```
        471            0        Kings XI Punjab            23                  0
        475            0       Rajasthan Royals             0                  0

            player_of_match                 venue         umpire1        umpire2  \
        457       JH Kallis   Sheikh Zayed Stadium      M Erasmus   RK Illingworth
        459      GJ Maxwell   Sheikh Zayed Stadium  RK Illingworth   C Shamshuddin
        460       AM Rahane   Sheikh Zayed Stadium      BF Bowden   RK Illingworth
        464        SK Raina   Sheikh Zayed Stadium  RK Illingworth   C Shamshuddin
        470        PV Tambe   Sheikh Zayed Stadium  HDPK Dharmasena   C Shamshuddin
        471   Sandeep Sharma   Sheikh Zayed Stadium  HDPK Dharmasena  RK Illingworth
        475       JP Faulkner   Sheikh Zayed Stadium      Aleem Dar     AK Chaudhary

            umpire3
        457     NaN
        459     NaN
        460     NaN
        464     NaN
        470     NaN
        471     NaN
        475     NaN
```

[ ]: `citygroup.sum(numeric_only=True)`

[ ]:
```
                     id   season  dl_applied  win_by_runs  win_by_wickets  \
        city
        Abu Dhabi        3263    14098           0          157              16
        Ahmedabad        4863    24156           0          180              38
        Bangalore       22299   132861           3         1263             232
        Bloemfontein      326     4018           0           14               6
        Cape Town         858    14063           1          145              18
        Centurion        1842    24108           1           81              49
        Chandigarh      15325    92582           0          576             167
        Chennai         15096    96554           0          715             111
        Cuttack          2534    14086           0           73              20
        Delhi           19600   120771           2          876             192
        Dharamsala       2949    18103           0          279              23
        Durban           2147    30135           1          159              33
        East London       432     6027           0           87               7
        Hyderabad       15907    98649           2          486             184
        Indore            618    10073           0            0              36
        Jaipur           9210    66363           0          460             151
        Johannesburg     1279    16072           0           25              35
        Kanpur           1358     8066           0            0              22
        Kimberley         458     6027           0           53              10
        Kochi            1301    10055           1          110              13
        Kolkata         19973   122783           3          587             224
        Mumbai          26283   171049           0         1102             264
```

```
Nagpur            646    6030         0          15            6
Port Elizabeth    980   14063         0         200           22
Pune            11238   64455         0         545           98
Raipur           3229   12088         0          21           25
Rajkot           3075   20165         0          70           48
Ranchi           3439   14097         0          41           24
Sharjah          2804   12084         0          74           26
Visakhapatnam    5951   22165         2         282           22

                  umpire3
city
Abu Dhabi             0.0
Ahmedabad            0.0
Bangalore            0.0
Bloemfontein         0.0
Cape Town            0.0
Centurion            0.0
Chandigarh           0.0
Chennai              0.0
Cuttack              0.0
Delhi                0.0
Dharamsala           0.0
Durban               0.0
East London          0.0
Hyderabad            0.0
Indore               0.0
Jaipur               0.0
Johannesburg         0.0
Kanpur               0.0
Kimberley            0.0
Kochi                0.0
Kolkata              0.0
Mumbai               0.0
Nagpur               0.0
Port Elizabeth       0.0
Pune                 0.0
Raipur               0.0
Rajkot               0.0
Ranchi               0.0
Sharjah              0.0
Visakhapatnam        0.0
```

[ ]: `citygroup.mean(numeric_only=True)`

[ ]:
```
                       id      season   dl_applied   win_by_runs  \
city
Abu Dhabi      466.142857  2014.000000    0.000000     22.428571
```

| city | | | | |
|---|---|---|---|---|
| Ahmedabad | 405.250000 | 2013.000000 | 0.000000 | 15.000000 |
| Bangalore | 337.863636 | 2013.045455 | 0.045455 | 19.136364 |
| Bloemfontein | 163.000000 | 2009.000000 | 0.000000 | 7.000000 |
| Cape Town | 122.571429 | 2009.000000 | 0.142857 | 20.714286 |
| Centurion | 153.500000 | 2009.000000 | 0.083333 | 6.750000 |
| Chandigarh | 333.152174 | 2012.652174 | 0.000000 | 12.521739 |
| Chennai | 314.500000 | 2011.541667 | 0.000000 | 14.895833 |
| Cuttack | 362.000000 | 2012.285714 | 0.000000 | 10.428571 |
| Delhi | 326.666667 | 2012.850000 | 0.033333 | 14.600000 |
| Dharamsala | 327.666667 | 2011.444444 | 0.000000 | 31.000000 |
| Durban | 143.133333 | 2009.000000 | 0.066667 | 10.600000 |
| East London | 144.000000 | 2009.000000 | 0.000000 | 29.000000 |
| Hyderabad | 324.632653 | 2013.244898 | 0.040816 | 9.918367 |
| Indore | 123.600000 | 2014.600000 | 0.000000 | 0.000000 |
| Jaipur | 279.090909 | 2011.000000 | 0.000000 | 13.939394 |
| Johannesburg | 159.875000 | 2009.000000 | 0.000000 | 3.125000 |
| Kanpur | 339.500000 | 2016.500000 | 0.000000 | 0.000000 |
| Kimberley | 152.666667 | 2009.000000 | 0.000000 | 17.666667 |
| Kochi | 260.200000 | 2011.000000 | 0.200000 | 22.000000 |
| Kolkata | 327.426230 | 2012.836066 | 0.049180 | 9.622951 |
| Mumbai | 309.211765 | 2012.341176 | 0.000000 | 12.964706 |
| Nagpur | 215.333333 | 2010.000000 | 0.000000 | 5.000000 |
| Port Elizabeth | 140.000000 | 2009.000000 | 0.000000 | 28.571429 |
| Pune | 351.187500 | 2014.218750 | 0.000000 | 17.031250 |
| Raipur | 538.166667 | 2014.666667 | 0.000000 | 3.500000 |
| Rajkot | 307.500000 | 2016.500000 | 0.000000 | 7.000000 |
| Ranchi | 491.285714 | 2013.857143 | 0.000000 | 5.857143 |
| Sharjah | 467.333333 | 2014.000000 | 0.000000 | 12.333333 |
| Visakhapatnam | 541.000000 | 2015.000000 | 0.181818 | 25.636364 |

| | win_by_wickets | umpire3 |
|---|---|---|
| city | | |
| Abu Dhabi | 2.285714 | NaN |
| Ahmedabad | 3.166667 | NaN |
| Bangalore | 3.515152 | NaN |
| Bloemfontein | 3.000000 | NaN |
| Cape Town | 2.571429 | NaN |
| Centurion | 4.083333 | NaN |
| Chandigarh | 3.630435 | NaN |
| Chennai | 2.312500 | NaN |
| Cuttack | 2.857143 | NaN |
| Delhi | 3.200000 | NaN |
| Dharamsala | 2.555556 | NaN |
| Durban | 2.200000 | NaN |
| East London | 2.333333 | NaN |
| Hyderabad | 3.755102 | NaN |
| Indore | 7.200000 | NaN |

```
Jaipur               4.575758    NaN
Johannesburg         4.375000    NaN
Kanpur               5.500000    NaN
Kimberley            3.333333    NaN
Kochi                2.600000    NaN
Kolkata              3.672131    NaN
Mumbai               3.105882    NaN
Nagpur               2.000000    NaN
Port Elizabeth       3.142857    NaN
Pune                 3.062500    NaN
Raipur               4.166667    NaN
Rajkot               4.800000    NaN
Ranchi               3.428571    NaN
Sharjah              4.333333    NaN
Visakhapatnam        2.000000    NaN
```

[ ]: `citygroup['win_by_runs'].mean().sort_values(ascending=False)`

[ ]:
```
city
Dharamsala        31.000000
East London       29.000000
Port Elizabeth    28.571429
Visakhapatnam     25.636364
Abu Dhabi         22.428571
Kochi             22.000000
Cape Town         20.714286
Bangalore         19.136364
Kimberley         17.666667
Pune              17.031250
Ahmedabad         15.000000
Chennai           14.895833
Delhi             14.600000
Jaipur            13.939394
Mumbai            12.964706
Chandigarh        12.521739
Sharjah           12.333333
Durban            10.600000
Cuttack           10.428571
Hyderabad          9.918367
Kolkata            9.622951
Bloemfontein       7.000000
Rajkot             7.000000
Centurion          6.750000
Ranchi             5.857143
Nagpur             5.000000
Raipur             3.500000
Johannesburg       3.125000
```

```
      Indore              0.000000
      Kanpur              0.000000
      Name: win_by_runs, dtype: float64
```

```
[ ]: df2=pd.read_csv('/content/deliveries.csv')
     df2
```

```
[ ]:         match_id  inning                  batting_team  \
      0              1       1         Sunrisers Hyderabad
      1              1       1         Sunrisers Hyderabad
      2              1       1         Sunrisers Hyderabad
      3              1       1         Sunrisers Hyderabad
      4              1       1         Sunrisers Hyderabad
      ...          ...     ...                           ...
      150455       636       2  Royal Challengers Bangalore
      150456       636       2  Royal Challengers Bangalore
      150457       636       2  Royal Challengers Bangalore
      150458       636       2  Royal Challengers Bangalore
      150459       636       2  Royal Challengers Bangalore

                            bowling_team  over  ball         batsman     non_striker  \
      0       Royal Challengers Bangalore     1     1       DA Warner        S Dhawan
      1       Royal Challengers Bangalore     1     2       DA Warner        S Dhawan
      2       Royal Challengers Bangalore     1     3       DA Warner        S Dhawan
      3       Royal Challengers Bangalore     1     4       DA Warner        S Dhawan
      4       Royal Challengers Bangalore     1     5       DA Warner        S Dhawan
      ...                            ...   ...   ...             ...             ...
      150455          Sunrisers Hyderabad    20     2     Sachin Baby       CJ Jordan
      150456          Sunrisers Hyderabad    20     3     Sachin Baby       CJ Jordan
      150457          Sunrisers Hyderabad    20     4   Iqbal Abdulla     Sachin Baby
      150458          Sunrisers Hyderabad    20     5     Sachin Baby   Iqbal Abdulla
      150459          Sunrisers Hyderabad    20     6   Iqbal Abdulla     Sachin Baby

               bowler  is_super_over  …  bye_runs  legbye_runs  noball_runs  \
      0       TS Mills              0  …         0            0            0
      1       TS Mills              0  …         0            0            0
      2       TS Mills              0  …         0            0            0
      3       TS Mills              0  …         0            0            0
      4       TS Mills              0  …         0            0            0
      ...          ...            ...  …       ...          ...          ...
      150455   B Kumar              0  …         0            0            0
      150456   B Kumar              0  …         0            0            0
      150457   B Kumar              0  …         0            1            0
      150458   B Kumar              0  …         0            0            0
      150459   B Kumar              0  …         0            0            0

              penalty_runs  batsman_runs  extra_runs  total_runs  player_dismissed  \
```

```
0                    0           0         0         0            NaN
1                    0           0         0         0            NaN
2                    0           4         0         4            NaN
3                    0           0         0         0            NaN
4                    0           0         2         2            NaN
...                ...         ...       ...       ...            ...
150455               0           2         0         2            NaN
150456               0           0         0         0      CJ Jordan
150457               0           0         1         1            NaN
150458               0           1         0         1            NaN
150459               0           4         0         4            NaN

        dismissal_kind  fielder
0                  NaN      NaN
1                  NaN      NaN
2                  NaN      NaN
3                  NaN      NaN
4                  NaN      NaN
...                ...      ...
150455             NaN      NaN
150456         run out  NV Ojha
150457             NaN      NaN
150458             NaN      NaN
150459             NaN      NaN

[150460 rows x 21 columns]
```

```python
#top 5 batsman intrams of runs
batsmangroup=df2.groupby('batsman')
```

```python
batsmangroup.sum(numeric_only=True)[['total_runs']].
 ↪sort_values('total_runs',ascending=False).head(5)
```

```
           total_runs
batsman
SK Raina         4745
V Kohli          4588
G Gambhir        4388
RG Sharma        4334
DA Warner        4213
```

```python
batsmangroup['total_runs'].sum().sort_values(ascending=False).head(5)
```

```
batsman
SK Raina     4745
V Kohli      4588
G Gambhir    4388
```

```
RG Sharma     4334
DA Warner     4213
Name: total_runs, dtype: int64
```

[ ]: `df2.head(3)`

[ ]:
```
   match_id  inning          batting_team                bowling_team  over  \
0         1       1  Sunrisers Hyderabad  Royal Challengers Bangalore     1
1         1       1  Sunrisers Hyderabad  Royal Challengers Bangalore     1
2         1       1  Sunrisers Hyderabad  Royal Challengers Bangalore     1

   ball    batsman non_striker     bowler  is_super_over  …  bye_runs  \
0     1  DA Warner    S Dhawan   TS Mills              0  …         0
1     2  DA Warner    S Dhawan   TS Mills              0  …         0
2     3  DA Warner    S Dhawan   TS Mills              0  …         0

   legbye_runs  noball_runs  penalty_runs  batsman_runs  extra_runs  \
0            0            0             0             0           0
1            0            0             0             0           0
2            0            0             0             4           0

   total_runs  player_dismissed dismissal_kind fielder
0           0               NaN            NaN     NaN
1           0               NaN            NaN     NaN
2           4               NaN            NaN     NaN

[3 rows x 21 columns]
```

[ ]:
```python
#batsman who delevared most six
#method 1 using groupby and method 2 using .values_count()
#method 1:
mask_six=df2['batsman_runs']==6
df2[mask_six].groupby('batsman').sum(numeric_only=True).
 ↪sort_values('batsman_runs',ascending=False)['batsman_runs']
```

[ ]:
```
batsman
CH Gayle        1596
SK Raina        1044
RG Sharma       1038
DA Warner        960
V Kohli          960
                ...
Sohail Tanvir      6
T Kohli            6
T Henderson        6
A Mithun           6
A Choudhary        6
```

```
Name: batsman_runs, Length: 301, dtype: int64
```

[ ]: 
```python
df2[mask_six].groupby('batsman')['batsman_runs'].sum().
 ↪sort_values(ascending=False)
```

[ ]: 
```
batsman
CH Gayle           1596
SK Raina           1044
RG Sharma          1038
DA Warner           960
V Kohli             960
                    …
Sohail Tanvir         6
T Kohli               6
T Henderson           6
A Mithun              6
A Choudhary           6
Name: batsman_runs, Length: 301, dtype: int64
```

[ ]: 
```python
#how much six once played
df2[mask_six].groupby('batsman')['batsman_runs'].count().
 ↪sort_values(ascending=False).rename('six no.')
```

[ ]: 
```
batsman
CH Gayle           266
SK Raina           174
RG Sharma          173
DA Warner          160
V Kohli            160
                    …
Sohail Tanvir        1
T Kohli              1
T Henderson          1
A Mithun             1
A Choudhary          1
Name: six no., Length: 301, dtype: int64
```

[ ]: 
```python
#method 2
df2[mask_six]['batsman'].value_counts()
```

[ ]: 
```
batsman
CH Gayle           266
SK Raina           174
RG Sharma          173
DA Warner          160
V Kohli            160
                    …
```

```
KW Richardson      1
P Sahu             1
KJ Abbott          1
KC Cariappa        1
Iqbal Abdulla      1
Name: count, Length: 301, dtype: int64
```

```python
[ ]: #CH Gayle most runs aginest which team?
     def Most_runs(name):
         mask=df2['batsman']==name
         return df2[mask].groupby('bowling_team')['batsman_runs'].sum().
      ↪sort_values(ascending=False).index[0]
     Most_runs("CH Gayle")
     # Most_runs('V Kohli')
```

```
[ ]: 'Kings XI Punjab'
```

#pd.crosstab() for two Catagorical data analysis

```python
[ ]: df.head(2)
```

```
[ ]:    id  season        city        date                    team1  \
     0   1    2017   Hyderabad  2017-04-05  Sunrisers Hyderabad
     1   2    2017        Pune  2017-04-06        Mumbai Indians

                           team2                  toss_winner toss_decision  \
     0  Royal Challengers Bangalore  Royal Challengers Bangalore         field
     1        Rising Pune Supergiant        Rising Pune Supergiant         field

        result  dl_applied                winner  win_by_runs  win_by_wickets  \
     0  normal           0   Sunrisers Hyderabad           35               0
     1  normal           0  Rising Pune Supergiant            0               7

       player_of_match                                     venue        umpire1  \
     0    Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal    AY Dandekar
     1        SPD Smith   Maharashtra Cricket Association Stadium  A Nand Kishore

        umpire2  umpire3
     0  NJ Llong      NaN
     1    S Ravi      NaN
```

```python
[ ]: df.groupby('season')['city'].value_counts()
```

```
[ ]: season  city
     2008    Mumbai        10
             Bangalore      7
             Chandigarh     7
```

```
        Chennai        7
        Hyderabad      7
                      ..
2017    Pune           7
        Rajkot         5
        Chandigarh     4
        Indore         3
        Kanpur         2
Name: count, Length: 106, dtype: int64
```

[ ]: ```python
#city and season are catagorical data
pd.crosstab(df['season'],df['city'])
#count num of match palyed each city in each season
```

[ ]:
| city | Abu Dhabi | Ahmedabad | Bangalore | Bloemfontein | Cape Town | Centurion |
| --- | --- | --- | --- | --- | --- | --- |
| season | | | | | | |
| 2008 | 0 | 0 | 7 | 0 | 0 | 0 |
| 2009 | 0 | 0 | 0 | 2 | 7 | 12 |
| 2010 | 0 | 4 | 7 | 0 | 0 | 0 |
| 2011 | 0 | 0 | 6 | 0 | 0 | 0 |
| 2012 | 0 | 0 | 8 | 0 | 0 | 0 |
| 2013 | 0 | 0 | 8 | 0 | 0 | 0 |
| 2014 | 7 | 4 | 6 | 0 | 0 | 0 |
| 2015 | 0 | 4 | 7 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 9 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 8 | 0 | 0 | 0 |

| city | Chandigarh | Chennai | Cuttack | Delhi | … | Kolkata | Mumbai | Nagpur |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| season | | | | | … | | | |
| 2008 | 7 | 7 | 0 | 6 | … | 7 | 10 | 0 |
| 2009 | 0 | 0 | 0 | 0 | … | 0 | 0 | 0 |
| 2010 | 5 | 7 | 2 | 7 | … | 7 | 13 | 3 |
| 2011 | 4 | 9 | 0 | 7 | … | 7 | 16 | 0 |
| 2012 | 6 | 10 | 2 | 8 | … | 7 | 8 | 0 |
| 2013 | 6 | 8 | 0 | 8 | … | 8 | 8 | 0 |
| 2014 | 3 | 0 | 3 | 5 | … | 4 | 7 | 0 |
| 2015 | 4 | 7 | 0 | 5 | … | 7 | 11 | 0 |
| 2016 | 7 | 0 | 0 | 7 | … | 7 | 4 | 0 |
| 2017 | 4 | 0 | 0 | 7 | … | 7 | 8 | 0 |

| city | Port Elizabeth | Pune | Raipur | Rajkot | Ranchi | Sharjah | Visakhapatnam |
| --- | --- | --- | --- | --- | --- | --- | --- |
| season | | | | | | | |
| 2008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009 | 7 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2012 | 0 | 9 | 0 | 0 | 0 | 0 | 2 |

```
2013                0    8    2    0    2    0    0
2014                0    0    0    0    4    6    0
2015                0    4    2    0    1    0    3
2016                0    4    2    5    0    0    6
2017                0    7    0    5    0    0    0

[10 rows x 30 columns]
```

isin()

```
[ ]: df2['batsman'].value_counts()
```

```
[ ]: batsman
     V Kohli         3494
     G Gambhir       3433
     SK Raina        3369
     RG Sharma       3274
     S Dhawan        3005
                     ...
     NJ Rimmington      1
     V Pratap Singh     1
     LH Ferguson        1
     Sunny Gupta        1
     S Kaushik          1
     Name: count, Length: 461, dtype: int64
```

```
[ ]: #most destractive death over(16-20) batsman in ipl hitory
     #who played minmum 200 ball
     #basies of most strike rate=(no. of runs/no. of balls)/100
```

```
[ ]: #first find players who played 200 ball among 16-20 overs
     deadth_over_batsman=df2[df2['over']>15].groupby('batsman')['batsman_runs'].
      ↪count()
     deadth_over_batsman
```

```
[ ]: batsman
     A Ashish Reddy    148
     A Chandila          7
     A Chopra            2
     A Choudhary        20
     A Flintoff         18
                       ...
     YS Chahal          27
     YV Takawale        13
     Yashpal Singh      13
     Yuvraj Singh      516
     Z Khan            109
```

```
Name: batsman_runs, Length: 416, dtype: int64
```

```
[ ]: batsman_200=deadth_over_batsman[deadth_over_batsman>200].index.tolist()
     batsman_200
```

```
[ ]: ['A Mishra',
      'AB de Villiers',
      'AD Mathews',
      'AM Rahane',
      'AR Patel',
      'AT Rayudu',
      'BJ Hodge',
      'DA Miller',
      'DA Warner',
      'DJ Bravo',
      'DJ Hussey',
      'DPMD Jayawardene',
      'Harbhajan Singh',
      'IK Pathan',
      'JA Morkel',
      'JH Kallis',
      'JP Duminy',
      'JP Faulkner',
      'KA Pollard',
      'KD Karthik',
      'KM Jadhav',
      'LRPL Taylor',
      'MK Pandey',
      'MK Tiwary',
      'MS Dhoni',
      'NV Ojha',
      'P Kumar',
      'PP Chawla',
      'R Vinay Kumar',
      'RA Jadeja',
      'RG Sharma',
      'RV Uthappa',
      'S Badrinath',
      'S Dhawan',
      'SK Raina',
      'SPD Smith',
      'SS Tiwary',
      'STR Binny',
      'V Kohli',
      'WP Saha',
      'Y Venugopal Rao',
      'YK Pathan',
```

'Yuvraj Singh']

```
#now we need these 200 player strike rate  and rank
new_df2=df2[df2['batsman'].isin(batsman_200)]
new_df2
```

```
        match_id  inning                  batting_team  \
0              1       1           Sunrisers Hyderabad
1              1       1           Sunrisers Hyderabad
2              1       1           Sunrisers Hyderabad
3              1       1           Sunrisers Hyderabad
4              1       1           Sunrisers Hyderabad
...          ...     ...                           ...
150442       636       2  Royal Challengers Bangalore
150443       636       2  Royal Challengers Bangalore
150445       636       2  Royal Challengers Bangalore
150446       636       2  Royal Challengers Bangalore
150448       636       2  Royal Challengers Bangalore

                         bowling_team  over  ball      batsman   non_striker  \
0        Royal Challengers Bangalore     1     1    DA Warner      S Dhawan
1        Royal Challengers Bangalore     1     2    DA Warner      S Dhawan
2        Royal Challengers Bangalore     1     3    DA Warner      S Dhawan
3        Royal Challengers Bangalore     1     4    DA Warner      S Dhawan
4        Royal Challengers Bangalore     1     5    DA Warner      S Dhawan
...                               ...   ...   ...          ...           ...
150442           Sunrisers Hyderabad    18     1    STR Binny   Sachin Baby
150443           Sunrisers Hyderabad    18     2    STR Binny   Sachin Baby
150445           Sunrisers Hyderabad    18     4    STR Binny   Sachin Baby
150446           Sunrisers Hyderabad    18     5    STR Binny   Sachin Baby
150448           Sunrisers Hyderabad    19     1    STR Binny   Sachin Baby

                  bowler  is_super_over  …  bye_runs  legbye_runs  \
0               TS Mills              0  …         0            0
1               TS Mills              0  …         0            0
2               TS Mills              0  …         0            0
3               TS Mills              0  …         0            0
4               TS Mills              0  …         0            0
...                  ...            ...  …       ...          ...
150442           B Kumar              0  …         0            0
150443           B Kumar              0  …         0            0
150445           B Kumar              0  …         0            0
150446           B Kumar              0  …         0            1
150448  Mustafizur Rahman            0  …         0            0

        noball_runs  penalty_runs  batsman_runs  extra_runs  total_runs  \
0                 0             0             0           0           0
```

44

|        |   |   |   |   |   |
|--------|---|---|---|---|---|
| 1      | 0 | 0 | 0 | 0 | 0 |
| 2      | 0 | 0 | 4 | 0 | 4 |
| 3      | 0 | 0 | 0 | 0 | 0 |
| 4      | 0 | 0 | 0 | 2 | 2 |
| ...    | ... | ... | ... | ... | ... |
| 150442 | 0 | 0 | 0 | 0 | 0 |
| 150443 | 0 | 0 | 1 | 0 | 1 |
| 150445 | 0 | 0 | 0 | 0 | 0 |
| 150446 | 0 | 0 | 0 | 1 | 1 |
| 150448 | 0 | 0 | 1 | 0 | 1 |

|        | player_dismissed | dismissal_kind | fielder |
|--------|------------------|----------------|---------|
| 0      | NaN | NaN | NaN |
| 1      | NaN | NaN | NaN |
| 2      | NaN | NaN | NaN |
| 3      | NaN | NaN | NaN |
| 4      | NaN | NaN | NaN |
| ...    | ... | ... | ... |
| 150442 | NaN | NaN | NaN |
| 150443 | NaN | NaN | NaN |
| 150445 | NaN | NaN | NaN |
| 150446 | NaN | NaN | NaN |
| 150448 | STR Binny | run out | DJ Hooda |

[66006 rows x 21 columns]

```python
#calculate strike rate=(no. of runs/no. of balls)*100
runs=new_df2.groupby('batsman')['batsman_runs'].sum()
runs
```

```
batsman
A Mishra            340
AB de Villiers     3486
AD Mathews          724
AM Rahane          3057
AR Patel            606
AT Rayudu          2416
BJ Hodge           1400
DA Miller          1563
DA Warner          4014
DJ Bravo           1262
DJ Hussey          1322
DPMD Jayawardene   1808
Harbhajan Singh     799
IK Pathan          1150
JA Morkel           975
JH Kallis          2427
```

```
    JP Duminy            1993
    JP Faulkner           527
    KA Pollard           2354
    KD Karthik           2903
    KM Jadhav             893
    LRPL Taylor          1017
    MK Pandey            2223
    MK Tiwary            1648
    MS Dhoni             3560
    NV Ojha              1553
    P Kumar               340
    PP Chawla             515
    R Vinay Kumar         304
    RA Jadeja            1732
    RG Sharma            4207
    RV Uthappa           3778
    S Badrinath          1441
    S Dhawan             3561
    SK Raina             4548
    SPD Smith            1713
    SS Tiwary            1276
    STR Binny             766
    V Kohli              4423
    WP Saha              1557
    Y Venugopal Rao       985
    YK Pathan            2922
    Yuvraj Singh         2591
    Name: batsman_runs, dtype: int64
```

[ ]: 
```python
balls=new_df2.groupby('batsman')['batsman_runs'].count()
balls
```

[ ]: 
```
    batsman
    A Mishra              382
    AB de Villiers       2402
    AD Mathews            599
    AM Rahane            2602
    AR Patel              494
    AT Rayudu            1964
    BJ Hodge             1153
    DA Miller            1135
    DA Warner            2902
    DJ Bravo             1032
    DJ Hussey            1101
    DPMD Jayawardene     1522
    Harbhajan Singh       591
    IK Pathan             985
```

```
JA Morkel            712
JH Kallis           2291
JP Duminy           1634
JP Faulkner          406
KA Pollard          1674
KD Karthik          2360
KM Jadhav            684
LRPL Taylor          847
MK Pandey           1901
MK Tiwary           1444
MS Dhoni            2680
NV Ojha             1356
P Kumar              323
PP Chawla            467
R Vinay Kumar        285
RA Jadeja           1458
RG Sharma           3274
RV Uthappa          2960
S Badrinath         1245
S Dhawan            3005
SK Raina            3369
SPD Smith           1333
SS Tiwary           1111
STR Binny            619
V Kohli             3494
WP Saha             1219
Y Venugopal Rao      865
YK Pathan           2076
Yuvraj Singh        2050
Name: batsman_runs, dtype: int64
```

```python
strike_rate=(runs/balls)*100
strike_rate.sort_values(ascending=False).head(5)
```

```
batsman
AB de Villiers    145.129059
YK Pathan         140.751445
KA Pollard        140.621266
DA Warner         138.318401
DA Miller         137.709251
Name: batsman_runs, dtype: float64
```

[ ]:

# 1    Marge 2 datasets using marge()

##find Yellow cap(most runs of one player in one season)

```
[ ]: df.head(3)
```

```
[ ]:    id  season      city        date                    team1  \
     0   1    2017  Hyderabad  2017-04-05    Sunrisers Hyderabad
     1   2    2017       Pune  2017-04-06         Mumbai Indians
     2   3    2017     Rajkot  2017-04-07          Gujarat Lions

                            team2                  toss_winner toss_decision  \
     0  Royal Challengers Bangalore  Royal Challengers Bangalore         field
     1        Rising Pune Supergiant       Rising Pune Supergiant         field
     2         Kolkata Knight Riders        Kolkata Knight Riders         field

        result  dl_applied                    winner  win_by_runs  win_by_wickets  \
     0  normal           0       Sunrisers Hyderabad           35               0
     1  normal           0    Rising Pune Supergiant            0               7
     2  normal           0     Kolkata Knight Riders            0              10

       player_of_match                                         venue        umpire1  \
     0    Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal     AY Dandekar
     1       SPD Smith    Maharashtra Cricket Association Stadium  A Nand Kishore
     2         CA Lynn     Saurashtra Cricket Association Stadium     Nitin Menon

        umpire2  umpire3
     0  NJ Llong      NaN
     1    S Ravi      NaN
     2 CK Nandan      NaN
```

```
[ ]: df2.head(2)
```

```
[ ]:    match_id  inning       batting_team                  bowling_team  over  \
     0         1       1  Sunrisers Hyderabad  Royal Challengers Bangalore     1
     1         1       1  Sunrisers Hyderabad  Royal Challengers Bangalore     1

        ball   batsman non_striker     bowler  is_super_over  …  bye_runs  \
     0     1  DA Warner    S Dhawan  TS Mills              0  …         0
     1     2  DA Warner    S Dhawan  TS Mills              0  …         0

        legbye_runs  noball_runs  penalty_runs  batsman_runs  extra_runs  \
     0            0            0             0             0           0
     1            0            0             0             0           0

        total_runs  player_dismissed dismissal_kind fielder
     0           0               NaN            NaN     NaN
     1           0               NaN            NaN     NaN

     [2 rows x 21 columns]
```

```
merge_df=df2.merge(df,left_on='match_id',right_on='id')
```

```
merge_df.head(3)
```

```
   match_id  inning        batting_team                 bowling_team  over  \
0         1       1  Sunrisers Hyderabad  Royal Challengers Bangalore     1
1         1       1  Sunrisers Hyderabad  Royal Challengers Bangalore     1
2         1       1  Sunrisers Hyderabad  Royal Challengers Bangalore     1

   ball    batsman non_striker     bowler  is_super_over  …   result  \
0     1  DA Warner    S Dhawan   TS Mills              0  …   normal
1     2  DA Warner    S Dhawan   TS Mills              0  …   normal
2     3  DA Warner    S Dhawan   TS Mills              0  …   normal

   dl_applied              winner  win_by_runs  win_by_wickets  \
0           0  Sunrisers Hyderabad           35               0
1           0  Sunrisers Hyderabad           35               0
2           0  Sunrisers Hyderabad           35               0

   player_of_match                                      venue      umpire1  \
0     Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal  AY Dandekar
1     Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal  AY Dandekar
2     Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal  AY Dandekar

    umpire2 umpire3
0  NJ Llong     NaN
1  NJ Llong     NaN
2  NJ Llong     NaN

[3 rows x 39 columns]
```

```
#first group will create by season and second for each season group will create
↪by batsman..
new_series=merge_df.groupby(['season','batsman'])['batsman_runs'].sum()
new_series ##dubble index series(special series)
```

```
season  batsman
2008    A Chopra           42
        A Kumble           13
        A Mishra           37
        A Mukund            0
        A Nehra             3
                          …
2017    Washington Sundar   9
        YK Pathan         143
        YS Chahal          13
        Yuvraj Singh      252
```

```
         Z Khan                  4
    Name: batsman_runs, Length: 1531, dtype: int64
```

[ ]: `new_series=new_series.rename('total individula runs')`

[ ]: ```
     #to convert series to dataframe use *reset_index()
     new_series.sort_values(ascending=False).reset_index()
     ```

[ ]: 
```
          season      batsman  total individula runs
     0       2016     V Kohli                     973
     1       2016   DA Warner                     848
     2       2012    CH Gayle                     733
     3       2013  MEK Hussey                     733
     4       2013    CH Gayle                     720
     …         …           …                        …
     1526    2011    VR Aaron                       0
     1527    2017    MM Patel                       0
     1528    2011    ND Doshi                       0
     1529    2011    S Nadeem                       0
     1530    2011  SK Trivedi                       0

     [1531 rows x 3 columns]
```

[ ]: ```
     #finded Yellow cap(most runs of one player in one season)
     new_series.sort_values(ascending=False).reset_index().
       ↪drop_duplicates('season',keep='first')
     ```

[ ]: 
```
         season        batsman  total individula runs
     0     2016       V Kohli                      973
     2     2012      CH Gayle                      733
     3     2013    MEK Hussey                      733
     6     2014    RV Uthappa                      660
     7     2017     DA Warner                      641
     9     2010  SR Tendulkar                      618
     10    2008      SE Marsh                      616
     11    2011      CH Gayle                      608
     14    2009     ML Hayden                      572
     17    2015     DA Warner                      562
```

[ ]:

#pivot Table for represent differend dimension of dataset

[ ]: `df.head(2)`

[ ]: 
```
        id  season       city       date                team1  \
     0   1    2017  Hyderabad  2017-04-05  Sunrisers Hyderabad
```

```
1  2   2017        Pune  2017-04-06       Mumbai Indians
```

```
                            team2                    toss_winner toss_decision  \
0  Royal Challengers Bangalore  Royal Challengers Bangalore         field
1        Rising Pune Supergiant        Rising Pune Supergiant         field

    result  dl_applied                   winner  win_by_runs  win_by_wickets  \
0  normal           0      Sunrisers Hyderabad           35               0
1  normal           0    Rising Pune Supergiant            0               7

    player_of_match                                      venue        umpire1  \
0    Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal    AY Dandekar
1        SPD Smith    Maharashtra Cricket Association Stadium  A Nand Kishore

     umpire2  umpire3
0  NJ Llong      NaN
1    S Ravi      NaN
```

```python
#this function helps to find out(all winner team win how much avg run on each
 city)[prottok ta winner team kon city te gor a koto run kore jitte parse]

df.
 pivot_table(index='city',columns='winner',values='win_by_runs',aggfunc='mean')
```

```
winner            Chennai Super Kings  Deccan Chargers  Delhi Daredevils  \
city
Abu Dhabi                   93.000000              NaN               NaN
Ahmedabad                         NaN              NaN          0.000000
Bangalore                   19.500000         0.000000          5.666667
Bloemfontein                      NaN              NaN         14.000000
Cape Town                         NaN        12.000000          0.000000
Centurion                   25.000000         9.500000          0.000000
Chandigarh                  11.000000              NaN          0.000000
Chennai                     17.484848        15.500000          0.000000
Cuttack                           NaN         9.666667               NaN
Delhi                       26.800000        13.500000         15.869565
Dharamsala                   0.000000        41.000000          0.000000
Durban                      24.000000         6.000000          7.000000
East London                 78.000000              NaN          0.000000
Hyderabad                   38.500000        14.000000          0.000000
Indore                            NaN              NaN               NaN
Jaipur                      31.500000              NaN          0.000000
Johannesburg                18.000000         3.000000          0.000000
Kanpur                            NaN              NaN          0.000000
Kimberley                    0.000000        53.000000               NaN
Kochi                             NaN        55.000000         38.000000
Kolkata                     14.500000              NaN          0.000000
```

```
Mumbai                         7.500000           3.333333           0.000000
Nagpur                              NaN           6.500000                NaN
Port Elizabeth                46.000000                NaN           0.000000
Pune                          37.000000          18.000000          32.333333
Raipur                              NaN                NaN           3.750000
Rajkot                              NaN                NaN           0.000000
Ranchi                        11.333333                NaN                NaN
Sharjah                        0.000000                NaN           0.000000
Visakhapatnam                 74.000000                NaN           4.000000

winner          Gujarat Lions  Kings XI Punjab  Kochi Tuskers Kerala  \
city
Abu Dhabi                 NaN        11.500000                   NaN
Ahmedabad                 NaN         0.000000                   NaN
Bangalore                 0.0        10.200000                   NaN
Bloemfontein              NaN         0.000000                   NaN
Cape Town                 NaN        27.000000                   NaN
Centurion                 NaN              NaN                   NaN
Chandigarh                0.0        13.863636                   NaN
Chennai                   NaN         3.500000                   NaN
Cuttack                   NaN        44.000000                   NaN
Delhi                     1.0         1.500000                   0.0
Dharamsala                NaN        39.400000                   NaN
Durban                    NaN         1.500000                   NaN
East London               NaN              NaN                   NaN
Hyderabad                 NaN         6.250000                   NaN
Indore                    NaN         0.000000                   0.0
Jaipur                    NaN              NaN                   NaN
Johannesburg              NaN         1.000000                   NaN
Kanpur                    0.0              NaN                   NaN
Kimberley                 NaN         0.000000                   NaN
Kochi                     NaN              NaN                   8.5
Kolkata                   0.0         1.000000                   6.0
Mumbai                    0.0        10.000000                   0.0
Nagpur                    NaN              NaN                   NaN
Port Elizabeth            NaN         0.000000                   NaN
Pune                      0.0         0.000000                   NaN
Raipur                    NaN              NaN                   NaN
Rajkot                    0.0        24.500000                   NaN
Ranchi                    NaN              NaN                   NaN
Sharjah                   NaN        36.000000                   NaN
Visakhapatnam             NaN         0.000000                   NaN

winner          Kolkata Knight Riders  Mumbai Indians  Pune Warriors  \
city
Abu Dhabi                   41.000000             NaN            NaN
Ahmedabad                         NaN       25.000000            NaN
```

|  |  |  |  |
| --- | --- | --- | --- |
| Bangalore | 30.333333 | 9.375000 | NaN |
| Bloemfontein | NaN | NaN | NaN |
| Cape Town | NaN | 19.000000 | NaN |
| Centurion | 0.000000 | 0.000000 | NaN |
| Chandigarh | 13.000000 | 12.000000 | 0.000000 |
| Chennai | 0.000000 | 3.000000 | 24.000000 |
| Cuttack | 0.000000 | NaN | NaN |
| Delhi | 3.400000 | 81.333333 | 20.000000 |
| Dharamsala | NaN | NaN | NaN |
| Durban | 5.500000 | NaN | NaN |
| East London | NaN | 9.000000 | NaN |
| Hyderabad | 10.750000 | 12.600000 | 0.000000 |
| Indore | NaN | 0.000000 | NaN |
| Jaipur | 0.000000 | 18.500000 | NaN |
| Johannesburg | NaN | NaN | NaN |
| Kanpur | NaN | NaN | NaN |
| Kimberley | NaN | NaN | NaN |
| Kochi | NaN | NaN | NaN |
| Kolkata | 11.378378 | 11.111111 | NaN |
| Mumbai | 14.333333 | 15.866667 | 9.333333 |
| Nagpur | NaN | NaN | NaN |
| Port Elizabeth | NaN | 54.000000 | NaN |
| Pune | 16.333333 | 0.333333 | 15.000000 |
| Raipur | NaN | NaN | NaN |
| Rajkot | 0.000000 | 0.000000 | NaN |
| Ranchi | 0.000000 | NaN | 7.000000 |
| Sharjah | 2.000000 | NaN | NaN |
| Visakhapatnam | NaN | 40.000000 | NaN |

| winner | Rajasthan Royals | Rising Pune Supergiant | \ |
| --- | --- | --- | --- |
| city |  |  |  |
| Abu Dhabi | 0.000000 | NaN |  |
| Ahmedabad | 17.571429 | NaN |  |
| Bangalore | 19.666667 | 27.0 |  |
| Bloemfontein | NaN | NaN |  |
| Cape Town | 0.000000 | NaN |  |
| Centurion | 0.000000 | NaN |  |
| Chandigarh | 24.666667 | NaN |  |
| Chennai | 10.000000 | NaN |  |
| Cuttack | NaN | NaN |  |
| Delhi | 1.250000 | NaN |  |
| Dharamsala | NaN | NaN |  |
| Durban | 40.000000 | NaN |  |
| East London | NaN | NaN |  |
| Hyderabad | 0.000000 | 12.0 |  |
| Indore | NaN | NaN |  |
| Jaipur | 13.083333 | NaN |  |

| city | | |
|---|---|---|
| Johannesburg | NaN | NaN |
| Kanpur | NaN | NaN |
| Kimberley | NaN | NaN |
| Kochi | NaN | NaN |
| Kolkata | 0.000000 | 0.0 |
| Mumbai | 25.600000 | 11.5 |
| Nagpur | 2.000000 | NaN |
| Port Elizabeth | 0.000000 | NaN |
| Pune | 13.000000 | 12.2 |
| Raipur | NaN | NaN |
| Rajkot | NaN | NaN |
| Ranchi | NaN | NaN |
| Sharjah | NaN | NaN |
| Visakhapatnam | 0.000000 | NaN |

| winner<br>city | Rising Pune Supergiants | Royal Challengers Bangalore \ |
|---|---|---|
| Abu Dhabi | NaN | NaN |
| Ahmedabad | NaN | 0.000000 |
| Bangalore | NaN | 25.533333 |
| Bloemfontein | NaN | NaN |
| Cape Town | NaN | 75.000000 |
| Centurion | NaN | 6.000000 |
| Chandigarh | NaN | 0.333333 |
| Chennai | NaN | 28.500000 |
| Cuttack | NaN | NaN |
| Delhi | 0.0 | 7.000000 |
| Dharamsala | NaN | NaN |
| Durban | NaN | 2.666667 |
| East London | NaN | NaN |
| Hyderabad | 34.0 | 0.000000 |
| Indore | NaN | NaN |
| Jaipur | NaN | 15.333333 |
| Johannesburg | NaN | 0.000000 |
| Kanpur | NaN | NaN |
| Kimberley | NaN | NaN |
| Kochi | NaN | 0.000000 |
| Kolkata | NaN | 0.000000 |
| Mumbai | 0.0 | 7.800000 |
| Nagpur | NaN | NaN |
| Port Elizabeth | NaN | NaN |
| Pune | NaN | 34.000000 |
| Raipur | NaN | 0.000000 |
| Rajkot | NaN | 21.000000 |
| Ranchi | NaN | 0.000000 |
| Sharjah | NaN | 0.000000 |
| Visakhapatnam | 9.5 | NaN |

```
winner          Sunrisers Hyderabad
city
Abu Dhabi                      NaN
Ahmedabad                     32.0
Bangalore                      4.0
Bloemfontein                   NaN
Cape Town                      NaN
Centurion                      NaN
Chandigarh                    19.0
Chennai                        NaN
Cuttack                        NaN
Delhi                          5.5
Dharamsala                     NaN
Durban                         NaN
East London                    NaN
Hyderabad                      9.5
Indore                         NaN
Jaipur                         NaN
Johannesburg                   NaN
Kanpur                         0.0
Kimberley                      NaN
Kochi                          NaN
Kolkata                        NaN
Mumbai                         7.0
Nagpur                         NaN
Port Elizabeth                 NaN
Pune                          11.0
Raipur                         6.0
Rajkot                         0.0
Ranchi                         0.0
Sharjah                        NaN
Visakhapatnam                 35.0
```

```python
#prottok season a kon city te kon winner team total koto run a jitte parse
df.
  pivot_table(index=['season','city'],columns='winner',values='win_by_runs',aggfunc='sum')
```

```
winner          Chennai Super Kings  Deccan Chargers  Delhi Daredevils  \
season city
2008   Bangalore                13.0              NaN               0.0
       Chandigarh               33.0              NaN               NaN
       Chennai                  24.0              0.0               0.0
       Delhi                     0.0              NaN              22.0
       Hyderabad                 0.0              NaN               0.0
...                               …                …                 …
2017   Kanpur                    NaN              NaN               0.0
```

```
            Kolkata                     NaN            NaN            NaN
            Mumbai                     NaN            NaN            NaN
            Pune                       NaN            NaN           97.0
            Rajkot                     NaN            NaN            NaN

winner              Gujarat Lions  Kings XI Punjab  Kochi Tuskers Kerala  \
season city
2008   Bangalore             NaN              0.0                    NaN
       Chandigarh            NaN            116.0                    NaN
       Chennai               NaN              NaN                    NaN
       Delhi                 NaN              6.0                    NaN
       Hyderabad             NaN              0.0                    NaN
...                          ...              ...                    ...
2017   Kanpur                NaN              NaN                    NaN
       Kolkata               0.0              NaN                    NaN
       Mumbai                NaN              7.0                    NaN
       Pune                  NaN              NaN                    NaN
       Rajkot                0.0             26.0                    NaN

winner              Kolkata Knight Riders  Mumbai Indians  Pune Warriors  \
season city
2008   Bangalore                   140.0             0.0            NaN
       Chandigarh                    NaN             NaN            NaN
       Chennai                       NaN             NaN            NaN
       Delhi                         NaN             NaN            NaN
       Hyderabad                    23.0            25.0            NaN
...                                  ...             ...            ...
2017   Kanpur                        NaN             NaN            NaN
       Kolkata                      99.0             9.0            NaN
       Mumbai                        NaN            14.0            NaN
       Pune                          0.0             NaN            NaN
       Rajkot                        0.0             0.0            NaN

winner              Rajasthan Royals  Rising Pune Supergiant  \
season city
2008   Bangalore                0.0                      NaN
       Chandigarh               NaN                      NaN
       Chennai                 10.0                      NaN
       Delhi                    NaN                      NaN
       Hyderabad                0.0                      NaN
...                             ...                      ...
2017   Kanpur                   NaN                      NaN
       Kolkata                  NaN                      0.0
       Mumbai                   NaN                     23.0
       Pune                     NaN                     61.0
       Rajkot                   NaN                      NaN
```

```
winner                  Rising Pune Supergiants  Royal Challengers Bangalore  \
season city
2008   Bangalore                           NaN                           3.0
       Chandigarh                          NaN                           NaN
       Chennai                             NaN                          14.0
       Delhi                               NaN                           NaN
       Hyderabad                           NaN                           0.0
...                                        ...                           ...
2017   Kanpur                              NaN                           NaN
       Kolkata                             NaN                           NaN
       Mumbai                              NaN                           NaN
       Pune                                NaN                           NaN
       Rajkot                              NaN                          21.0

winner                  Sunrisers Hyderabad
season city
2008   Bangalore                        NaN
       Chandigarh                       NaN
       Chennai                          NaN
       Delhi                            NaN
       Hyderabad                        NaN
...                                     ...
2017   Kanpur                           0.0
       Kolkata                          NaN
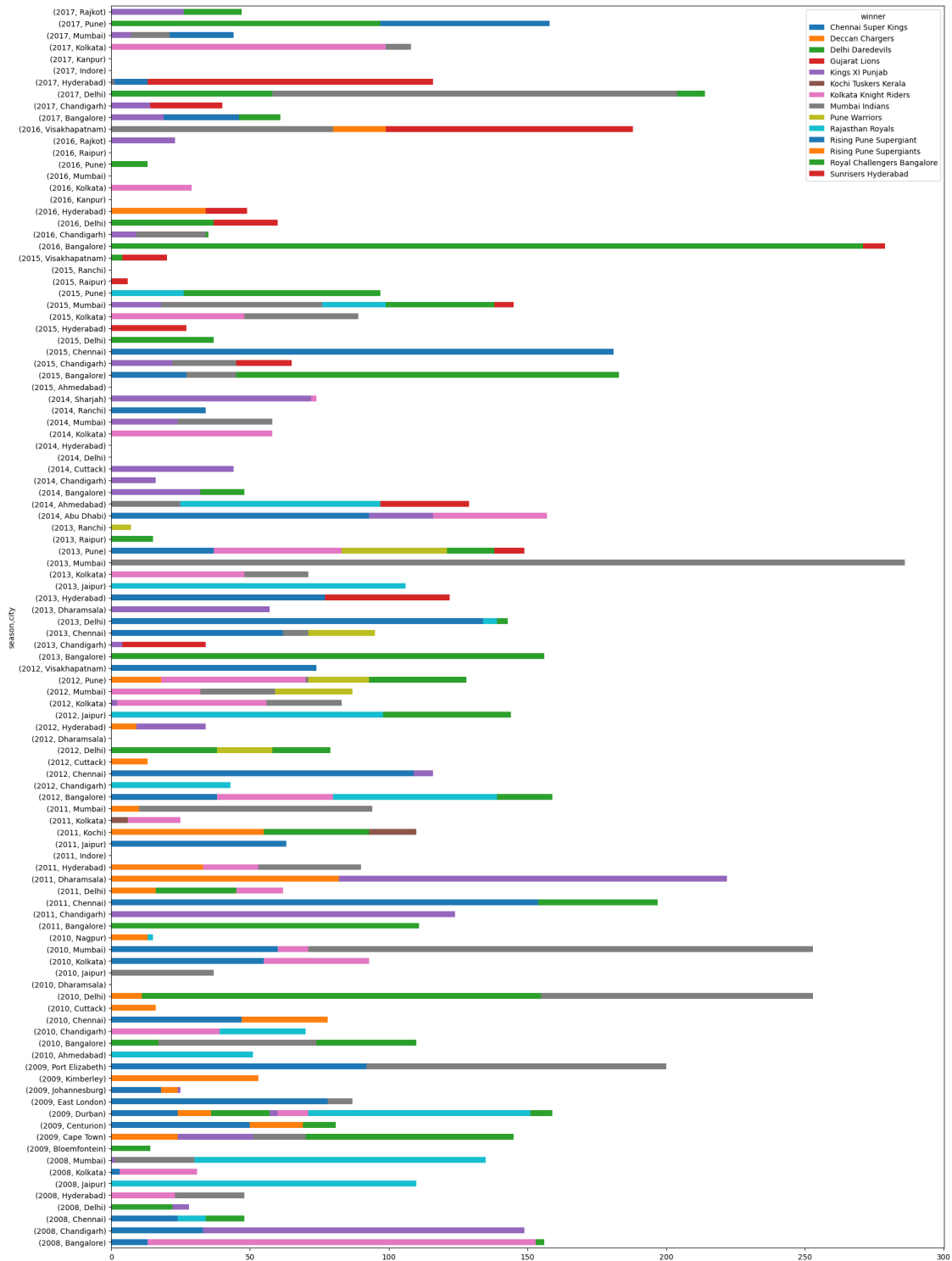       Mumbai                           NaN
       Pune                             NaN
       Rajkot                           NaN

[106 rows x 14 columns]
```

```python
type(df.
  ↪pivot_table(index=['season','city'],columns='winner',values='win_by_runs',aggfunc='sum'))
```

```
pandas.core.frame.DataFrame
```

```python
df.
  ↪pivot_table(index=['season','city'],columns='winner',values='win_by_runs',aggfunc='sum').
  ↪plot(kind='barh',stacked=True,figsize=(20,30))
```

```
<Axes: ylabel='season,city'>
```

```
[ ]: #proti ta team koita kore 6 dise prottok over a method-1 using
     ↪pivot_table()[df2] method-2:groupby()
     df2.head(3)
```

```
[ ]:    match_id  inning         batting_team                  bowling_team  over  \
     0         1       1  Sunrisers Hyderabad  Royal Challengers Bangalore     1
     1         1       1  Sunrisers Hyderabad  Royal Challengers Bangalore     1
     2         1       1  Sunrisers Hyderabad  Royal Challengers Bangalore     1

        ball    batsman non_striker    bowler  is_super_over  …  bye_runs  \
     0     1  DA Warner   S Dhawan  TS Mills              0  …         0
     1     2  DA Warner   S Dhawan  TS Mills              0  …         0
     2     3  DA Warner   S Dhawan  TS Mills              0  …         0

        legbye_runs  noball_runs  penalty_runs  batsman_runs  extra_runs  \
     0            0            0             0             0           0
     1            0            0             0             0           0
     2            0            0             0             4           0

        total_runs  player_dismissed dismissal_kind fielder
     0           0               NaN            NaN     NaN
     1           0               NaN            NaN     NaN
     2           4               NaN            NaN     NaN

     [3 rows x 21 columns]
```

```
[ ]: mask=df2['batsman_runs']==6
     pdf=df2[mask].
      ↪pivot_table(index='over',columns='batting_team',values='batsman_runs',aggfunc='count')
     pdf
```

```
[ ]: batting_team  Chennai Super Kings  Deccan Chargers  Delhi Daredevils  \
     over
     1                             5.0              3.0              14.0
     2                            17.0             21.0              19.0
     3                            37.0             11.0              30.0
     4                            34.0             17.0              41.0
     5                            41.0             27.0              29.0
     6                            43.0             22.0              27.0
     7                            22.0             11.0              20.0
     8                            25.0             13.0              26.0
     9                            23.0             17.0              32.0
     10                           23.0             14.0              24.0
     11                           36.0             15.0              34.0
     12                           36.0             26.0              38.0
     13                           35.0             23.0              37.0
     14                           45.0             22.0              35.0
     15                           43.0             20.0              28.0
     16                           46.0             21.0              43.0
     17                           51.0             38.0              56.0
     18                           58.0             37.0              44.0
```

| | | | |
|---|---|---|---|
| 19 | 54.0 | 23.0 | 59.0 |
| 20 | 68.0 | 19.0 | 50.0 |

| batting_team | Gujarat Lions | Kings XI Punjab | Kochi Tuskers Kerala \ |
|---|---|---|---|
| over | | | |
| 1 | 4.0 | 10.0 | 2.0 |
| 2 | 6.0 | 19.0 | 4.0 |
| 3 | 14.0 | 27.0 | 3.0 |
| 4 | 9.0 | 36.0 | 3.0 |
| 5 | 11.0 | 30.0 | 3.0 |
| 6 | 12.0 | 39.0 | 3.0 |
| 7 | 10.0 | 19.0 | 2.0 |
| 8 | 6.0 | 35.0 | 2.0 |
| 9 | 11.0 | 36.0 | 1.0 |
| 10 | 8.0 | 29.0 | 3.0 |
| 11 | 5.0 | 37.0 | 1.0 |
| 12 | 7.0 | 38.0 | 3.0 |
| 13 | 5.0 | 47.0 | 2.0 |
| 14 | 8.0 | 41.0 | 3.0 |
| 15 | 5.0 | 51.0 | 4.0 |
| 16 | 5.0 | 59.0 | NaN |
| 17 | 7.0 | 39.0 | 3.0 |
| 18 | 9.0 | 57.0 | 4.0 |
| 19 | 9.0 | 53.0 | 5.0 |
| 20 | 4.0 | 60.0 | 2.0 |

| batting_team | Kolkata Knight Riders | Mumbai Indians | Pune Warriors \ |
|---|---|---|---|
| over | | | |
| 1 | 10.0 | 9.0 | 5.0 |
| 2 | 13.0 | 17.0 | 6.0 |
| 3 | 28.0 | 22.0 | 6.0 |
| 4 | 35.0 | 28.0 | 7.0 |
| 5 | 25.0 | 43.0 | 7.0 |
| 6 | 34.0 | 50.0 | 3.0 |
| 7 | 26.0 | 18.0 | 5.0 |
| 8 | 25.0 | 23.0 | 10.0 |
| 9 | 27.0 | 35.0 | 9.0 |
| 10 | 21.0 | 22.0 | 6.0 |
| 11 | 34.0 | 33.0 | 13.0 |
| 12 | 32.0 | 49.0 | 5.0 |
| 13 | 42.0 | 51.0 | 10.0 |
| 14 | 31.0 | 50.0 | 13.0 |
| 15 | 40.0 | 53.0 | 13.0 |
| 16 | 50.0 | 66.0 | 16.0 |
| 17 | 55.0 | 60.0 | 13.0 |
| 18 | 52.0 | 86.0 | 12.0 |
| 19 | 45.0 | 72.0 | 18.0 |

| over | 34.0 | 89.0 | 19.0 |

| batting_team | Rajasthan Royals | Rising Pune Supergiant \ |
| --- | --- | --- |
| over | | |
| 1 | 12.0 | 1.0 |
| 2 | 7.0 | NaN |
| 3 | 13.0 | 2.0 |
| 4 | 21.0 | 5.0 |
| 5 | 23.0 | 8.0 |
| 6 | 24.0 | 6.0 |
| 7 | 15.0 | 1.0 |
| 8 | 24.0 | NaN |
| 9 | 20.0 | 3.0 |
| 10 | 26.0 | 8.0 |
| 11 | 30.0 | 3.0 |
| 12 | 33.0 | 2.0 |
| 13 | 39.0 | 7.0 |
| 14 | 38.0 | 4.0 |
| 15 | 34.0 | 5.0 |
| 16 | 37.0 | 5.0 |
| 17 | 45.0 | 2.0 |
| 18 | 34.0 | 2.0 |
| 19 | 37.0 | 14.0 |
| 20 | 26.0 | 11.0 |

| batting_team | Rising Pune Supergiants | Royal Challengers Bangalore \ |
| --- | --- | --- |
| over | | |
| 1 | NaN | 20.0 |
| 2 | 2.0 | 28.0 |
| 3 | 1.0 | 40.0 |
| 4 | 1.0 | 43.0 |
| 5 | 5.0 | 40.0 |
| 6 | 5.0 | 29.0 |
| 7 | 4.0 | 18.0 |
| 8 | 3.0 | 34.0 |
| 9 | 1.0 | 47.0 |
| 10 | 1.0 | 36.0 |
| 11 | 2.0 | 47.0 |
| 12 | 2.0 | 36.0 |
| 13 | 1.0 | 51.0 |
| 14 | 1.0 | 53.0 |
| 15 | 7.0 | 54.0 |
| 16 | 6.0 | 71.0 |
| 17 | 6.0 | 61.0 |
| 18 | 9.0 | 82.0 |
| 19 | 2.0 | 74.0 |
| 20 | 9.0 | 71.0 |

```
batting_team  Sunrisers Hyderabad
over
1                          3.0
2                         12.0
3                         16.0
4                          8.0
5                         17.0
6                         10.0
7                         13.0
8                         19.0
9                         15.0
10                        12.0
11                        11.0
12                        11.0
13                        19.0
14                        18.0
15                        33.0
16                        22.0
17                        18.0
18                        37.0
19                        42.0
20                        28.0
```

```python
mask=df2['batsman_runs']==6
gdf=df2[mask].groupby(['over','batting_team'])['batsman_runs'].count().
  ↪rename('no. of Six')
gdf
```

```
over   batting_team
1      Chennai Super Kings            5
       Deccan Chargers                3
       Delhi Daredevils              14
       Gujarat Lions                  4
       Kings XI Punjab               10
                                     ..
20     Rajasthan Royals              26
       Rising Pune Supergiant        11
       Rising Pune Supergiants        9
       Royal Challengers Bangalore   71
       Sunrisers Hyderabad           28
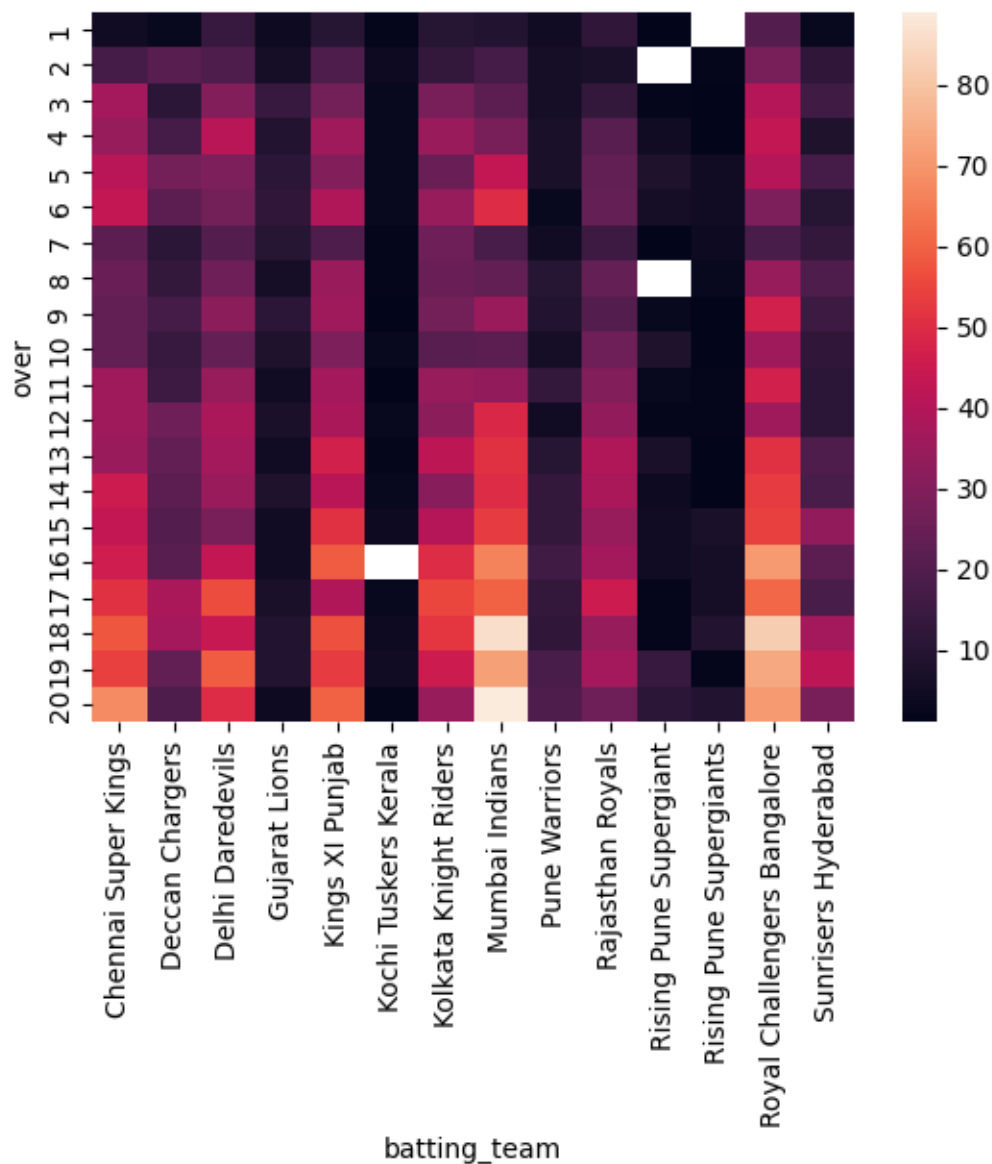Name: no. of Six, Length: 276, dtype: int64
```

```python
import seaborn as sns
sns.heatmap(pdf)# take pivot_table
```

```
<Axes: xlabel='batting_team', ylabel='over'>
```

```
df2.corr(numeric_only=True)#return pivot_table
```

```
              match_id    inning       over       ball  is_super_over  \
match_id      1.000000  0.001033   0.004365  -0.002464      -0.001220
inning        0.001033  1.000000  -0.051496  -0.003618       0.091904
over          0.004365 -0.051496   1.000000  -0.010953      -0.037394
ball         -0.002464 -0.003618  -0.010953   1.000000      -0.001258
is_super_over -0.001220  0.091904  -0.037394  -0.001258       1.000000
wide_runs    -0.004850  0.001055  -0.016226  -0.005931      -0.001155
bye_runs     -0.004662 -0.000395   0.013669   0.006755       0.001516
legbye_runs  -0.004324 -0.001385  -0.005907  -0.004449       0.001717
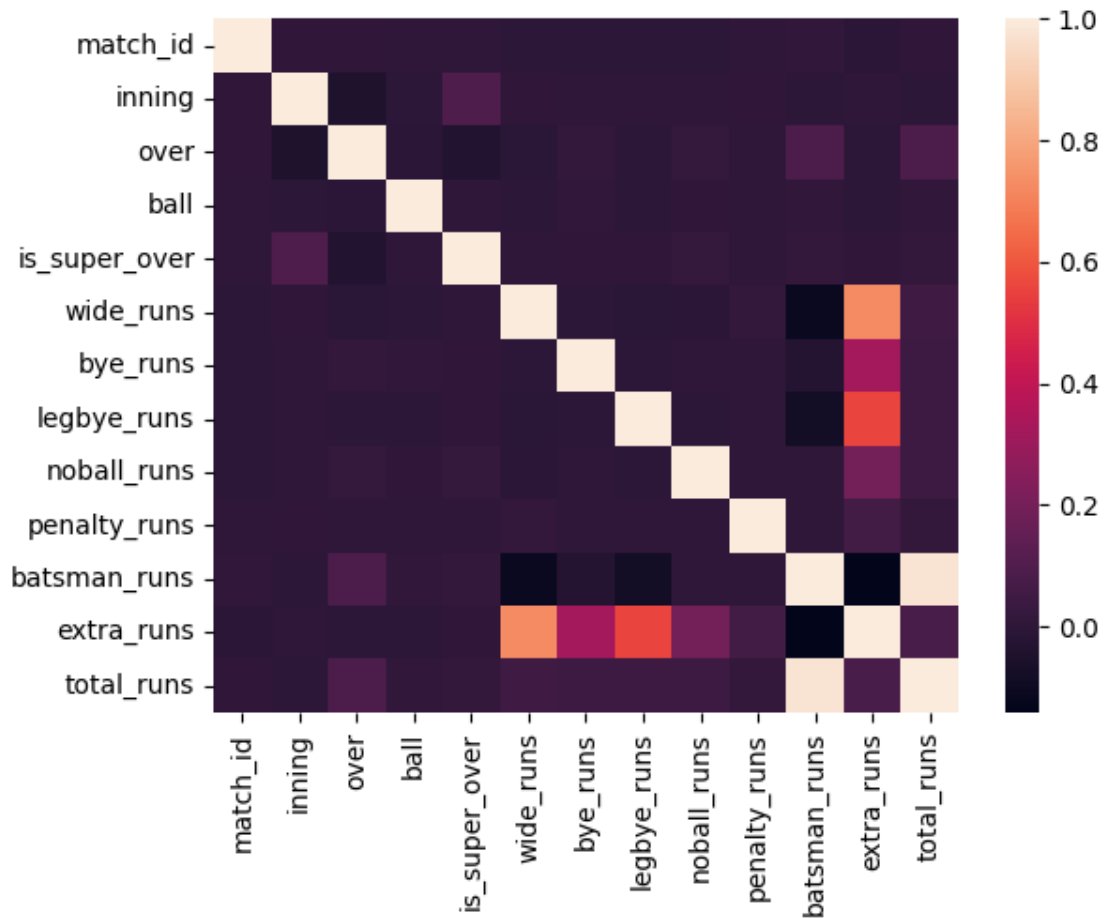```

```
noball_runs    -0.005849  0.000389  0.015717  0.002350       0.014389
penalty_runs   -0.000972  0.003763 -0.001055  0.000774      -0.000085
batsman_runs    0.006273 -0.005668  0.089945  0.008944       0.011497
extra_runs     -0.008833  0.000132 -0.007649 -0.004176       0.003613
total_runs      0.004366 -0.005680  0.088896  0.008086       0.012377

               wide_runs  bye_runs  legbye_runs  noball_runs  penalty_runs  \
match_id       -0.004850 -0.004662    -0.004324    -0.005849     -0.000972
inning          0.001055 -0.000395    -0.001385     0.000389      0.003763
over           -0.016226  0.013669    -0.005907     0.015717     -0.001055
ball           -0.005931  0.006755    -0.004449     0.002350      0.000774
is_super_over  -0.001155  0.001516     0.001717     0.014389     -0.000085
wide_runs       1.000000 -0.006230    -0.016186    -0.008703      0.013633
bye_runs       -0.006230  1.000000    -0.004751    -0.002555     -0.000156
legbye_runs    -0.016186 -0.004751     1.000000    -0.006637     -0.000405
noball_runs    -0.008703 -0.002555    -0.006637     1.000000     -0.000218
penalty_runs    0.013633 -0.000156    -0.000405    -0.000218      1.000000
batsman_runs   -0.111690 -0.032785    -0.085177     0.000272     -0.002795
extra_runs      0.723726  0.318850     0.557403     0.196724      0.061842
total_runs      0.047354  0.037402     0.037322     0.043722      0.010843

               batsman_runs  extra_runs  total_runs
match_id           0.006273   -0.008833    0.004366
inning            -0.005668    0.000132   -0.005680
over               0.089945   -0.007649    0.088896
ball               0.008944   -0.004176    0.008086
is_super_over      0.011497    0.003613    0.012377
wide_runs         -0.111690    0.723726    0.047354
bye_runs          -0.032785    0.318850    0.037402
legbye_runs       -0.085177    0.557403    0.037322
noball_runs        0.000272    0.196724    0.043722
penalty_runs      -0.002795    0.061842    0.010843
batsman_runs       1.000000   -0.141761    0.975809
extra_runs        -0.141761    1.000000    0.078085
total_runs         0.975809    0.078085    1.000000
```

```python
[ ]: sns.heatmap(df2.corr(numeric_only=True))
```

```
[ ]: <Axes: >
```

[ ]:

#Remane colnums name using .rename()

[ ]: `df.head(3)`

[ ]:
```
   id  season      city        date                    team1  \
0   1    2017  Hyderabad  2017-04-05      Sunrisers Hyderabad
1   2    2017       Pune  2017-04-06           Mumbai Indians
2   3    2017     Rajkot  2017-04-07            Gujarat Lions

                         team2                  toss_winner toss_decision  \
0  Royal Challengers Bangalore  Royal Challengers Bangalore         field
1        Rising Pune Supergiant       Rising Pune Supergiant         field
2        Kolkata Knight Riders        Kolkata Knight Riders         field

   result  dl_applied              winner  win_by_runs  win_by_wickets  \
0  normal           0  Sunrisers Hyderabad           35               0
```

```
1   normal           0        Rising Pune Supergiant                    0                    7
2   normal           0         Kolkata Knight Riders                    0                   10

    player_of_match                                          venue          umpire1  \
0     Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal      AY Dandekar
1        SPD Smith    Maharashtra Cricket Association Stadium   A Nand Kishore
2          CA Lynn      Saurashtra Cricket Association Stadium      Nitin Menon

      umpire2  umpire3
0   NJ Llong      NaN
1     S Ravi      NaN
2  CK Nandan      NaN
```

[ ]: `df.rename(columns={'team1':'batting_team','team2':'bowlling team'})`

```
[ ]:      id  season        city        date                   batting_team  \
     0     1    2017   Hyderabad  2017-04-05            Sunrisers Hyderabad
     1     2    2017        Pune  2017-04-06                 Mumbai Indians
     2     3    2017      Rajkot  2017-04-07                  Gujarat Lions
     3     4    2017      Indore  2017-04-08         Rising Pune Supergiant
     4     5    2017   Bangalore  2017-04-08  Royal Challengers Bangalore
     ..   ...    ...         ...         ...                            ...
     631  632    2016      Raipur  2016-05-22               Delhi Daredevils
     632  633    2016   Bangalore  2016-05-24                  Gujarat Lions
     633  634    2016       Delhi  2016-05-25            Sunrisers Hyderabad
     634  635    2016       Delhi  2016-05-27                  Gujarat Lions
     635  636    2016   Bangalore  2016-05-29            Sunrisers Hyderabad

                        bowlling team                   toss_winner toss_decision  \
     0    Royal Challengers Bangalore  Royal Challengers Bangalore         field
     1         Rising Pune Supergiant       Rising Pune Supergiant         field
     2          Kolkata Knight Riders        Kolkata Knight Riders         field
     3                Kings XI Punjab              Kings XI Punjab         field
     4               Delhi Daredevils  Royal Challengers Bangalore           bat
     ..                           ...                          ...           ...
     631  Royal Challengers Bangalore  Royal Challengers Bangalore         field
     632  Royal Challengers Bangalore  Royal Challengers Bangalore         field
     633        Kolkata Knight Riders        Kolkata Knight Riders         field
     634          Sunrisers Hyderabad          Sunrisers Hyderabad         field
     635  Royal Challengers Bangalore          Sunrisers Hyderabad           bat

          result  dl_applied                       winner  win_by_runs  \
     0    normal           0          Sunrisers Hyderabad           35
     1    normal           0       Rising Pune Supergiant            0
     2    normal           0        Kolkata Knight Riders            0
     3    normal           0              Kings XI Punjab            0
     4    normal           0  Royal Challengers Bangalore           15
```

```
..         …          …                                    …                 …
631  normal          0  Royal Challengers Bangalore                          0
632  normal          0  Royal Challengers Bangalore                          0
633  normal          0            Sunrisers Hyderabad                        22
634  normal          0            Sunrisers Hyderabad                         0
635  normal          0            Sunrisers Hyderabad                         8


     win_by_wickets player_of_match  \
0                 0     Yuvraj Singh
1                 7        SPD Smith
2                10          CA Lynn
3                 6       GJ Maxwell
4                 0        KM Jadhav
..              …                …
631               6          V Kohli
632               4   AB de Villiers
633               0      MC Henriques
634               4        DA Warner
635               0       BCJ Cutting


                                                    venue           umpire1  \
0            Rajiv Gandhi International Stadium, Uppal       AY Dandekar
1              Maharashtra Cricket Association Stadium   A Nand Kishore
2               Saurashtra Cricket Association Stadium      Nitin Menon
3                               Holkar Cricket Stadium      AK Chaudhary
4                               M Chinnaswamy Stadium              NaN
..                                                  …                …
631  Shaheed Veer Narayan Singh International Stadium   A Nand Kishore
632                             M Chinnaswamy Stadium      AK Chaudhary
633                                  Feroz Shah Kotla        M Erasmus
634                                  Feroz Shah Kotla        M Erasmus
635                             M Chinnaswamy Stadium  HDPK Dharmasena


           umpire2  umpire3
0          NJ Llong      NaN
1            S Ravi      NaN
2         CK Nandan      NaN
3     C Shamshuddin      NaN
4              NaN      NaN
..              …        …
631     BNJ Oxenford      NaN
632  HDPK Dharmasena      NaN
633    C Shamshuddin      NaN
634        CK Nandan      NaN
635     BNJ Oxenford      NaN

[636 rows x 18 columns]
```

## 2 set_index() and reset_index()

```
[ ]: df.head(3)
```

```
[ ]:    id  season      city        date                    team1  \
     0   1    2017  Hyderabad  2017-04-05  Sunrisers Hyderabad
     1   2    2017       Pune  2017-04-06       Mumbai Indians
     2   3    2017     Rajkot  2017-04-07        Gujarat Lions

                            team2                 toss_winner toss_decision  \
     0  Royal Challengers Bangalore  Royal Challengers Bangalore         field
     1        Rising Pune Supergiant       Rising Pune Supergiant         field
     2        Kolkata Knight Riders        Kolkata Knight Riders         field

        result  dl_applied                  winner  win_by_runs  win_by_wickets  \
     0  normal           0      Sunrisers Hyderabad           35               0
     1  normal           0   Rising Pune Supergiant            0               7
     2  normal           0    Kolkata Knight Riders            0              10

       player_of_match                                      venue        umpire1  \
     0    Yuvraj Singh  Rajiv Gandhi International Stadium, Uppal     AY Dandekar
     1        SPD Smith   Maharashtra Cricket Association Stadium  A Nand Kishore
     2         CA Lynn     Saurashtra Cricket Association Stadium     Nitin Menon

         umpire2  umpire3
     0  NJ Llong      NaN
     1    S Ravi      NaN
     2  CK Nandan      NaN
```

```
[ ]: df.set_index('id')
```

```
[ ]:      season      city        date                        team1  \
     id
     1      2017  Hyderabad  2017-04-05          Sunrisers Hyderabad
     2      2017       Pune  2017-04-06               Mumbai Indians
     3      2017     Rajkot  2017-04-07                Gujarat Lions
     4      2017     Indore  2017-04-08       Rising Pune Supergiant
     5      2017  Bangalore  2017-04-08  Royal Challengers Bangalore
     ..      ...        ...         ...                          ...
     632    2016     Raipur  2016-05-22             Delhi Daredevils
     633    2016  Bangalore  2016-05-24                Gujarat Lions
     634    2016      Delhi  2016-05-25          Sunrisers Hyderabad
     635    2016      Delhi  2016-05-27                Gujarat Lions
     636    2016  Bangalore  2016-05-29          Sunrisers Hyderabad

                            team2                 toss_winner toss_decision  \
     id
```

```
1      Royal Challengers Bangalore   Royal Challengers Bangalore        field
2          Rising Pune Supergiant        Rising Pune Supergiant         field
3           Kolkata Knight Riders         Kolkata Knight Riders         field
4                 Kings XI Punjab               Kings XI Punjab         field
5               Delhi Daredevils   Royal Challengers Bangalore          bat
..                            …                             …            …
632   Royal Challengers Bangalore   Royal Challengers Bangalore        field
633   Royal Challengers Bangalore   Royal Challengers Bangalore        field
634         Kolkata Knight Riders         Kolkata Knight Riders        field
635            Sunrisers Hyderabad           Sunrisers Hyderabad        field
636   Royal Challengers Bangalore           Sunrisers Hyderabad         bat

      result   dl_applied                    winner  win_by_runs  \
id
1     normal           0        Sunrisers Hyderabad           35
2     normal           0     Rising Pune Supergiant            0
3     normal           0      Kolkata Knight Riders            0
4     normal           0            Kings XI Punjab            0
5     normal           0  Royal Challengers Bangalore          15
..         …           …                         …            …
632   normal           0  Royal Challengers Bangalore           0
633   normal           0  Royal Challengers Bangalore           0
634   normal           0        Sunrisers Hyderabad           22
635   normal           0        Sunrisers Hyderabad            0
636   normal           0        Sunrisers Hyderabad            8

      win_by_wickets player_of_match  \
id
1                  0     Yuvraj Singh
2                  7        SPD Smith
3                 10          CA Lynn
4                  6        GJ Maxwell
5                  0        KM Jadhav
..                 …                …
632                6           V Kohli
633                4    AB de Villiers
634                0      MC Henriques
635                4        DA Warner
636                0       BCJ Cutting

                                            venue         umpire1  \
id
1          Rajiv Gandhi International Stadium, Uppal     AY Dandekar
2            Maharashtra Cricket Association Stadium   A Nand Kishore
3             Saurashtra Cricket Association Stadium      Nitin Menon
4                           Holkar Cricket Stadium      AK Chaudhary
5                        M Chinnaswamy Stadium                  NaN
```

```
..                                          …                      …
632    Shaheed Veer Narayan Singh International Stadium    A Nand Kishore
633                        M Chinnaswamy Stadium       AK Chaudhary
634                            Feroz Shah Kotla          M Erasmus
635                            Feroz Shah Kotla          M Erasmus
636                        M Chinnaswamy Stadium   HDPK Dharmasena


            umpire2 umpire3
id
1           NJ Llong      NaN
2            S Ravi      NaN
3          CK Nandan      NaN
4      C Shamshuddin      NaN
5               NaN      NaN
..               …        …
632    BNJ Oxenford      NaN
633  HDPK Dharmasena      NaN
634    C Shamshuddin      NaN
635      CK Nandan      NaN
636    BNJ Oxenford      NaN

[636 rows x 17 columns]
```

```
[ ]: df.set_index('id').reset_index()
```

```
[ ]:       id  season       city        date                        team1  \
     0     1    2017  Hyderabad  2017-04-05          Sunrisers Hyderabad
     1     2    2017       Pune  2017-04-06              Mumbai Indians
     2     3    2017     Rajkot  2017-04-07               Gujarat Lions
     3     4    2017     Indore  2017-04-08       Rising Pune Supergiant
     4     5    2017  Bangalore  2017-04-08  Royal Challengers Bangalore
     ..   …      …         …          …                          …
     631  632    2016     Raipur  2016-05-22            Delhi Daredevils
     632  633    2016  Bangalore  2016-05-24               Gujarat Lions
     633  634    2016      Delhi  2016-05-25         Sunrisers Hyderabad
     634  635    2016      Delhi  2016-05-27               Gujarat Lions
     635  636    2016  Bangalore  2016-05-29         Sunrisers Hyderabad

                               team2                  toss_winner toss_decision  \
     0    Royal Challengers Bangalore  Royal Challengers Bangalore         field
     1         Rising Pune Supergiant       Rising Pune Supergiant         field
     2          Kolkata Knight Riders        Kolkata Knight Riders         field
     3                Kings XI Punjab              Kings XI Punjab         field
     4               Delhi Daredevils  Royal Challengers Bangalore           bat
     ..                          …                            …             …
     631  Royal Challengers Bangalore  Royal Challengers Bangalore         field
     632  Royal Challengers Bangalore  Royal Challengers Bangalore         field
```

```
633       Kolkata Knight Riders       Kolkata Knight Riders       field
634        Sunrisers Hyderabad         Sunrisers Hyderabad       field
635  Royal Challengers Bangalore        Sunrisers Hyderabad         bat

     result  dl_applied                       winner  win_by_runs  \
0    normal           0          Sunrisers Hyderabad           35
1    normal           0         Rising Pune Supergiant            0
2    normal           0         Kolkata Knight Riders            0
3    normal           0              Kings XI Punjab            0
4    normal           0  Royal Challengers Bangalore           15
..      …          …                          …           …
631  normal           0  Royal Challengers Bangalore            0
632  normal           0  Royal Challengers Bangalore            0
633  normal           0          Sunrisers Hyderabad           22
634  normal           0          Sunrisers Hyderabad            0
635  normal           0          Sunrisers Hyderabad            8

     win_by_wickets player_of_match  \
0                 0     Yuvraj Singh
1                 7        SPD Smith
2                10          CA Lynn
3                 6        GJ Maxwell
4                 0        KM Jadhav
..               …               …
631               6          V Kohli
632               4  AB de Villiers
633               0     MC Henriques
634               4        DA Warner
635               0      BCJ Cutting

                                                  venue          umpire1  \
0            Rajiv Gandhi International Stadium, Uppal      AY Dandekar
1              Maharashtra Cricket Association Stadium  A Nand Kishore
2               Saurashtra Cricket Association Stadium      Nitin Menon
3                              Holkar Cricket Stadium      AK Chaudhary
4                              M Chinnaswamy Stadium              NaN
..                                                  …               …
631  Shaheed Veer Narayan Singh International Stadium  A Nand Kishore
632                          M Chinnaswamy Stadium      AK Chaudhary
633                             Feroz Shah Kotla         M Erasmus
634                             Feroz Shah Kotla         M Erasmus
635                          M Chinnaswamy Stadium  HDPK Dharmasena

            umpire2  umpire3
0           NJ Llong      NaN
1            S Ravi      NaN
2          CK Nandan      NaN
```

```
3       C Shamshuddin      NaN
4                 NaN      NaN
..                 …        …
631      BNJ Oxenford      NaN
632  HDPK Dharmasena      NaN
633      C Shamshuddin      NaN
634          CK Nandan      NaN
635      BNJ Oxenford      NaN

[636 rows x 18 columns]
```

#Drop null value and Fill null value

```
[ ]: titanic=pd.read_csv('/content/Titanic-Dataset.csv')
     titanic
```

```
[ ]:      PassengerId  Survived  Pclass  \
     0              1         0       3
     1              2         1       1
     2              3         1       3
     3              4         1       1
     4              5         0       3
     ..           …         …       …
     886          887         0       2
     887          888         1       1
     888          889         0       3
     889          890         1       1
     890          891         0       3


                                                    Name     Sex   Age  SibSp  \
     0                            Braund, Mr. Owen Harris    male  22.0      1
     1    Cumings, Mrs. John Bradley (Florence Briggs Th…  female  38.0      1
     2                             Heikkinen, Miss. Laina  female  26.0      0
     3        Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0      1
     4                           Allen, Mr. William Henry    male  35.0      0
     ..                                               …       …     …      …
     886                            Montvila, Rev. Juozas    male  27.0      0
     887                     Graham, Miss. Margaret Edith  female  19.0      0
     888         Johnston, Miss. Catherine Helen "Carrie"  female   NaN      1
     889                             Behr, Mr. Karl Howell    male  26.0      0
     890                               Dooley, Mr. Patrick    male  32.0      0

          Parch            Ticket     Fare Cabin Embarked
     0         0         A/5 21171   7.2500   NaN        S
     1         0          PC 17599  71.2833   C85        C
     2         0  STON/O2. 3101282   7.9250   NaN        S
     3         0            113803  53.1000  C123        S
```

```
4           0          373450   8.0500    NaN        S
..          …                    …        …    …             …
886         0          211536  13.0000    NaN        S
887         0          112053  30.0000    B42        S
888         2      W./C. 6607  23.4500    NaN        S
889         0          111369  30.0000   C148        C
890         0          370376   7.7500    NaN        Q

[891 rows x 12 columns]
```

```
titanic.dropna()
```

```
     PassengerId  Survived  Pclass  \
1              2         1       1
3              4         1       1
6              7         0       1
10            11         1       3
11            12         1       1
..           …         …       …
871          872         1       1
872          873         0       1
879          880         1       1
887          888         1       1
889          890         1       1

                                                  Name     Sex   Age  SibSp  \
1    Cumings, Mrs. John Bradley (Florence Briggs Th…  female  38.0      1
3        Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0      1
6                            McCarthy, Mr. Timothy J    male  54.0      0
10                   Sandstrom, Miss. Marguerite Rut  female   4.0      1
11                        Bonnell, Miss. Elizabeth  female  58.0      0
..                                              …     …    …     …
871  Beckwith, Mrs. Richard Leonard (Sallie Monypeny)  female  47.0      1
872                          Carlsson, Mr. Frans Olof    male  33.0      0
879      Potter, Mrs. Thomas Jr (Lily Alexenia Wilson)  female  56.0      0
887                      Graham, Miss. Margaret Edith  female  19.0      0
889                          Behr, Mr. Karl Howell    male  26.0      0

     Parch    Ticket      Fare        Cabin Embarked
1        0  PC 17599   71.2833          C85        C
3        0    113803   53.1000         C123        S
6        0     17463   51.8625          E46        S
10       1   PP 9549   16.7000           G6        S
11       0    113783   26.5500         C103        S
..       …       …       …            …        …
871      1     11751   52.5542          D35        S
872      0       695    5.0000  B51 B53 B55        S
```

```
879      1    11767  83.1583          C50        C
887      0   112053  30.0000          B42        S
889      0   111369  30.0000          C148       C

[183 rows x 12 columns]
```

```
[ ]: titanic.dropna(how='all')
```

```
[ ]:      PassengerId  Survived  Pclass  \
     0              1         0       3
     1              2         1       1
     2              3         1       3
     3              4         1       1
     4              5         0       3
     ..           ...       ...     ...
     886          887         0       2
     887          888         1       1
     888          889         0       3
     889          890         1       1
     890          891         0       3

                                                       Name     Sex   Age  SibSp  \
     0                              Braund, Mr. Owen Harris    male  22.0      1
     1    Cumings, Mrs. John Bradley (Florence Briggs Th…  female  38.0      1
     2                               Heikkinen, Miss. Laina  female  26.0      0
     3         Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0      1
     4                             Allen, Mr. William Henry    male  35.0      0
     ..                                                 ...     ...   ...    ...
     886                              Montvila, Rev. Juozas    male  27.0      0
     887                       Graham, Miss. Margaret Edith  female  19.0      0
     888           Johnston, Miss. Catherine Helen "Carrie"  female   NaN      1
     889                              Behr, Mr. Karl Howell    male  26.0      0
     890                                Dooley, Mr. Patrick    male  32.0      0

          Parch            Ticket     Fare Cabin Embarked
     0         0         A/5 21171   7.2500   NaN        S
     1         0          PC 17599  71.2833   C85        C
     2         0  STON/O2. 3101282   7.9250   NaN        S
     3         0            113803  53.1000  C123        S
     4         0            373450   8.0500   NaN        S
     ..      ...               ...      ...   ...      ...
     886       0            211536  13.0000   NaN        S
     887       0            112053  30.0000   B42        S
     888       2        W./C. 6607  23.4500   NaN        S
     889       0            111369  30.0000  C148        C
     890       0            370376   7.7500   NaN        Q
```

[891 rows x 12 columns]

```
[ ]: titanic.dropna(axis=1)# jei colnums golo te kono akta null value nai oi golo
     ↪thakbe
```

```
[ ]:      PassengerId  Survived  Pclass  \
     0              1         0       3
     1              2         1       1
     2              3         1       3
     3              4         1       1
     4              5         0       3
     ..           ...       ...     ...
     886          887         0       2
     887          888         1       1
     888          889         0       3
     889          890         1       1
     890          891         0       3

                                                       Name     Sex  SibSp  Parch  \
     0                              Braund, Mr. Owen Harris    male      1      0
     1    Cumings, Mrs. John Bradley (Florence Briggs Th…  female      1      0
     2                               Heikkinen, Miss. Laina  female      0      0
     3         Futrelle, Mrs. Jacques Heath (Lily May Peel)  female      1      0
     4                             Allen, Mr. William Henry    male      0      0
     ..                                                 ...     ...    ...    ...
     886                             Montvila, Rev. Juozas    male      0      0
     887                       Graham, Miss. Margaret Edith  female      0      0
     888           Johnston, Miss. Catherine Helen "Carrie"  female      1      2
     889                              Behr, Mr. Karl Howell    male      0      0
     890                               Dooley, Mr. Patrick    male      0      0

                   Ticket     Fare
     0          A/5 21171   7.2500
     1           PC 17599  71.2833
     2    STON/O2. 3101282   7.9250
     3             113803  53.1000
     4             373450   8.0500
     ..               ...      ...
     886           211536  13.0000
     887           112053  30.0000
     888         W./C. 6607  23.4500
     889           111369  30.0000
     890           370376   7.7500

     [891 rows x 9 columns]
```

```
#nirdishto koiakta colnums a check koter jonno jodi null thake tobe delete hobe
na hoi hobe na
titanic.dropna(subset=['Cabin','Ticket'])
```

```
     PassengerId  Survived  Pclass  \
1              2         1       1
3              4         1       1
6              7         0       1
10            11         1       3
11            12         1       1
..           ...       ...     ...
871          872         1       1
872          873         0       1
879          880         1       1
887          888         1       1
889          890         1       1

                                                  Name     Sex   Age  SibSp  \
1      Cumings, Mrs. John Bradley (Florence Briggs Th…  female  38.0      1
3            Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0      1
6                             McCarthy, Mr. Timothy J    male  54.0      0
10                  Sandstrom, Miss. Marguerite Rut  female   4.0      1
11                      Bonnell, Miss. Elizabeth  female  58.0      0
..                                               …      …     …      …
871    Beckwith, Mrs. Richard Leonard (Sallie Monypeny)  female  47.0      1
872                          Carlsson, Mr. Frans Olof    male  33.0      0
879      Potter, Mrs. Thomas Jr (Lily Alexenia Wilson)  female  56.0      0
887                     Graham, Miss. Margaret Edith  female  19.0      0
889                        Behr, Mr. Karl Howell    male  26.0      0

     Parch    Ticket      Fare         Cabin Embarked
1        0  PC 17599   71.2833          C85        C
3        0    113803   53.1000         C123        S
6        0     17463   51.8625          E46        S
10       1   PP 9549   16.7000           G6        S
11       0    113783   26.5500         C103        S
..     ...       ...       ...          ...      ...
871      1     11751   52.5542          D35        S
872      0       695    5.0000  B51 B53 B55        S
879      1     11767   83.1583          C50        C
887      0    112053   30.0000          B42        S
889      0    111369   30.0000         C148        C

[204 rows x 12 columns]
```

```
titanic.fillna(0)
```

```
[ ]:      PassengerId  Survived  Pclass  \
     0              1         0       3
     1              2         1       1
     2              3         1       3
     3              4         1       1
     4              5         0       3
     ..           ...       ...     ...
     886          887         0       2
     887          888         1       1
     888          889         0       3
     889          890         1       1
     890          891         0       3

                                                    Name      Sex    Age  SibSp  \
     0                              Braund, Mr. Owen Harris     male   22.0      1
     1    Cumings, Mrs. John Bradley (Florence Briggs Th…  female   38.0      1
     2                               Heikkinen, Miss. Laina  female   26.0      0
     3         Futrelle, Mrs. Jacques Heath (Lily May Peel)  female   35.0      1
     4                             Allen, Mr. William Henry     male   35.0      0
     ..                                                 …       …      …      …
     886                             Montvila, Rev. Juozas     male   27.0      0
     887                       Graham, Miss. Margaret Edith  female   19.0      0
     888           Johnston, Miss. Catherine Helen "Carrie"  female    0.0      1
     889                              Behr, Mr. Karl Howell     male   26.0      0
     890                                Dooley, Mr. Patrick     male   32.0      0

          Parch            Ticket     Fare Cabin Embarked
     0         0         A/5 21171   7.2500     0        S
     1         0          PC 17599  71.2833   C85        C
     2         0  STON/O2. 3101282   7.9250     0        S
     3         0            113803  53.1000  C123        S
     4         0            373450   8.0500     0        S
     ..       …                 …      …     …        …
     886       0            211536  13.0000     0        S
     887       0            112053  30.0000   B42        S
     888       2         W./C. 6607  23.4500     0        S
     889       0            111369  30.0000  C148        C
     890       0            370376   7.7500     0        Q

     [891 rows x 12 columns]
```

```
[ ]: titanic['Cabin'].fillna('zero',inplace=True)
```

<ipython-input-108-38a3eff1cb70>:1: FutureWarning: A value is trying to be set
on a copy of a DataFrame or Series through chained assignment using an inplace
method.
The behavior will change in pandas 3.0. This inplace method will never work

because the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform the operation inplace on the original object.

```
titanic['Cabin'].fillna('zero',inplace=True)
```

`[ ]:` `titanic`

`[ ]:`

|     | PassengerId | Survived | Pclass | \ |
|-----|-------------|----------|--------|---|
| 0   | 1           | 0        | 3      |   |
| 1   | 2           | 1        | 1      |   |
| 2   | 3           | 1        | 3      |   |
| 3   | 4           | 1        | 1      |   |
| 4   | 5           | 0        | 3      |   |
| ..  | …           | …        | …      |   |
| 886 | 887         | 0        | 2      |   |
| 887 | 888         | 1        | 1      |   |
| 888 | 889         | 0        | 3      |   |
| 889 | 890         | 1        | 1      |   |
| 890 | 891         | 0        | 3      |   |

|     | Name | Sex | Age | SibSp | \ |
|-----|------|-----|-----|-------|---|
| 0   | Braund, Mr. Owen Harris | male | 22.0 | 1 | |
| 1   | Cumings, Mrs. John Bradley (Florence Briggs Th… | female | 38.0 | 1 | |
| 2   | Heikkinen, Miss. Laina | female | 26.0 | 0 | |
| 3   | Futrelle, Mrs. Jacques Heath (Lily May Peel) | female | 35.0 | 1 | |
| 4   | Allen, Mr. William Henry | male | 35.0 | 0 | |
| ..  | … | … | … | … | |
| 886 | Montvila, Rev. Juozas | male | 27.0 | 0 | |
| 887 | Graham, Miss. Margaret Edith | female | 19.0 | 0 | |
| 888 | Johnston, Miss. Catherine Helen "Carrie" | female | NaN | 1 | |
| 889 | Behr, Mr. Karl Howell | male | 26.0 | 0 | |
| 890 | Dooley, Mr. Patrick | male | 32.0 | 0 | |

|     | Parch | Ticket | Fare | Cabin | Embarked |
|-----|-------|--------|------|-------|----------|
| 0   | 0 | A/5 21171 | 7.2500 | zero | S |
| 1   | 0 | PC 17599 | 71.2833 | C85 | C |
| 2   | 0 | STON/O2. 3101282 | 7.9250 | zero | S |
| 3   | 0 | 113803 | 53.1000 | C123 | S |
| 4   | 0 | 373450 | 8.0500 | zero | S |
| ..  | … | … | … | … | … |
| 886 | 0 | 211536 | 13.0000 | zero | S |
| 887 | 0 | 112053 | 30.0000 | B42 | S |

```
888      2           W./C. 6607  23.4500   zero           S
889      0              111369  30.0000   C148           C
890      0              370376   7.7500   zero           Q
```

[891 rows x 12 columns]

[ ]: `titanic['Age'].bfill()`

```
[ ]: 0      22.0
     1      38.0
     2      26.0
     3      35.0
     4      35.0
            …
     886    27.0
     887    19.0
     888    26.0
     889    26.0
     890    32.0
     Name: Age, Length: 891, dtype: float64
```

[ ]: `titanic['Age'].ffill()`

```
[ ]: 0      22.0
     1      38.0
     2      26.0
     3      35.0
     4      35.0
            …
     886    27.0
     887    19.0
     888    19.0
     889    26.0
     890    32.0
     Name: Age, Length: 891, dtype: float64
```

[ ]: `titanic['Age'].fillna(titanic['Age'].median())`

```
[ ]: 0      22.0
     1      38.0
     2      26.0
     3      35.0
     4      35.0
            …
     886    27.0
     887    19.0
     888    28.0
```

```
889      26.0
890      32.0
Name: Age, Length: 891, dtype: float64
```

#Add colnums on Datasets

```
[ ]: movie.head(3)
```

```
[ ]:                             movie          lead
     0            Uri: The Surgical Strike  Vicky Kaushal
     1                       Battalion 609    Vicky Ahuja
     2  The Accidental Prime Minister (film)    Anupam Kher
```

```
[ ]: movie['new colnum']='bd'
     movie.head()
```

```
[ ]:                             movie          lead new colnum
     0            Uri: The Surgical Strike    Vicky Kaushal        bd
     1                       Battalion 609      Vicky Ahuja        bd
     2  The Accidental Prime Minister (film)      Anupam Kher        bd
     3                     Why Cheat India    Emraan Hashmi        bd
     4                     Evening Shadows  Mona Ambegaonkar        bd
```

```
[ ]: movie['movie'].str.split(' ').apply(lambda x:x[0]) #apply(lambda x:x[0])-->␣
     ↪lembda function take input as x and retrun first element of x
```

```
[ ]: 0             Uri:
     1        Battalion
     2              The
     3              Why
     4          Evening
                 …
     1495           Hum
     1496       Aankhen
     1497      Saathiya
     1498       Company
     1499         Awara
     Name: movie, Length: 1500, dtype: object
```

```
[ ]: movie['new col']=movie['movie'].str.split(' ').apply(lambda x:x[0])
     movie
```

```
[ ]:                             movie             lead new colnum  \
     0            Uri: The Surgical Strike    Vicky Kaushal        bd
     1                       Battalion 609      Vicky Ahuja        bd
     2      The Accidental Prime Minister (film)      Anupam Kher        bd
     3                     Why Cheat India    Emraan Hashmi        bd
```

```
4                          Evening Shadows    Mona Ambegaonkar          bd
...                                      ...                 ...          ...
1495               Hum Tumhare Hain Sanam      Shah Rukh Khan          bd
1496                  Aankhen (2002 film)    Amitabh Bachchan          bd
1497                     Saathiya (film)        Vivek Oberoi          bd
1498                      Company (film)          Ajay Devgn          bd
1499                  Awara Paagal Deewana        Akshay Kumar          bd

        new col
0          Uri:
1      Battalion
2            The
3            Why
4        Evening
...          ...
1495         Hum
1496     Aankhen
1497    Saathiya
1498     Company
1499       Awara

[1500 rows x 4 columns]
```

[ ]: