In [1]:
```python
import os
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```python
os.chdir("C:\\Users\\harsh\\Personal\\A1a,b")
```

In [3]:
```python
ipl=pd.read_csv("IPL_Ball_by_Ball_2008_2022.csv", encoding='latin1')
```

In [4]:
```python
ipl_salary= pd.read_csv("IPL salary.csv", encoding='latin1')
```

In [5]:
```python
ipl_match=pd.read_csv("IPL Matches 2008-2020.csv", encoding='latin1')
```

In [6]:
```python
ipl_match.columns
```

Out[6]:
```
Index(['id', 'city', 'date', 'player_of_match', 'venue', 'neutral_venue',
       'team1', 'team2', 'toss_winner', 'toss_decision', 'winner', 'result',
       'result_margin', 'eliminator', 'method', 'umpire1', 'umpire2'],
      dtype='object')
```

In [7]:
```python
ipl.columns
```

Out[7]:
```
Index(['ID', 'Season', 'innings', 'overs', 'ballnumber', 'batter', 'bowler',
       'non-striker', 'extra_type', 'batsman_run', 'extras_run', 'total_run',
       'non_boundary', 'isWicketDelivery', 'player_out', 'kind',
       'fielders_involved', 'BattingTeam'],
      dtype='object')
```

In [8]:
```python
ipl_salary.columns
```

Out[8]:
```
Index(['Id', 'Name', 'Year', 'Final Price', 'Role', 'Nationality', 'Team',
       'Ent', 'Age', 'Matches', 'LMatches', 'Runs', 'LRuns', 'HS', 'LHS',
       'Ave', 'LAve', 'StrRate', 'LStrRate', 'Fifties', 'LFifties', 'Hundreds',
       'LHundreds', 'Fours', 'LFours', 'Sixes', 'LSixes', 'Catches',
       'LCatches', 'Stumps', 'LStumps', 'Wkts', 'LWkts', 'Econ', 'LEcon',
       'FourWkts', 'LFourWkts', 'FiveWkts', 'LFiveWkts', 'Indian',
       'Specialist', 'Status'],
      dtype='object')
```

```
In [9]:   ipl_match['date'] = pd.to_datetime(ipl_match['date'])
```

```
In [10]:  ipl_match['year'] = ipl_match ['date'].dt.year
```

```
In [11]:  ipl_match.head()
```

Out[11]:

| | id | city | date | player_of_match | venue | neutral_venue | team1 | team2 | toss_winner | toss_decision | winner | result | res |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 335982 | Bangalore | 2008-04-18 | BB McCullum | M Chinnaswamy Stadium | 0 | Royal Challengers Bangalore | Kolkata Knight Riders | Royal Challengers Bangalore | field | Kolkata Knight Riders | runs | |
| 1 | 335983 | Chandigarh | 2008-04-19 | MEK Hussey | Punjab Cricket Association Stadium, Mohali | 0 | Kings XI Punjab | Chennai Super Kings | Chennai Super Kings | bat | Chennai Super Kings | runs | |
| 2 | 335984 | Delhi | 2008-04-19 | MF Maharoof | Feroz Shah Kotla | 0 | Delhi Daredevils | Rajasthan Royals | Rajasthan Royals | bat | Delhi Daredevils | wickets | |
| 3 | 335985 | Mumbai | 2008-04-20 | MV Boucher | Wankhede Stadium | 0 | Mumbai Indians | Royal Challengers Bangalore | Mumbai Indians | bat | Royal Challengers Bangalore | wickets | |
| 4 | 335986 | Kolkata | 2008-04-20 | DJ Hussey | Eden Gardens | 0 | Kolkata Knight Riders | Deccan Chargers | Deccan Chargers | bat | Kolkata Knight Riders | wickets | |

```
In [12]:  ipl.head()
```

Out[12]:

| | ID | Season | innings | overs | ballnumber | batter | bowler | non-striker | extra_type | batsman_run | extras_run | total_run | non_boundary | isWicketDe |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1312200 | 1312 | 1 | 0 | 1 | YBK Jaiswal | Mohammed Shami | JC Buttler | NaN | 0 | 0 | 0 | 0 | |
| 1 | 1312200 | 1312 | 1 | 0 | 2 | YBK Jaiswal | Mohammed Shami | JC Buttler | legbyes | 0 | 1 | 1 | 0 | |
| 2 | 1312200 | 1312 | 1 | 0 | 3 | JC Buttler | Mohammed Shami | YBK Jaiswal | NaN | 1 | 0 | 1 | 0 | |
| 3 | 1312200 | 1312 | 1 | 0 | 4 | YBK Jaiswal | Mohammed Shami | JC Buttler | NaN | 0 | 0 | 0 | 0 | |
| 4 | 1312200 | 1312 | 1 | 0 | 5 | YBK Jaiswal | Mohammed Shami | JC Buttler | NaN | 0 | 0 | 0 | 0 | |

In [13]:
```python
ipl_salary.head()
```

Out[13]:

| | Id | Name | Year | Final Price | Role | Nationality | Team | Ent | Age | Matches | ... | LWkts | Econ | LEcon | FourWkts | LFourWkts | FiveWkts | LFiveWkt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | AB de Villiers | 2008 | 12048000 | Wicketkeeper batsman | South African | DD | 0 | 24 | 6 | ... | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |
| 1 | 1 | AB de Villiers | 2009 | 14736000 | Wicketkeeper batsman | South African | DD | 0 | 25 | 15 | ... | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |
| 2 | 1 | AB de Villiers | 2010 | 13887000 | Wicketkeeper batsman | South African | DD | 0 | 26 | 7 | ... | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |
| 3 | 1 | AB de Villiers | 2011 | 50600000 | Wicketkeeper batsman | South African | RCB | 0 | 27 | 16 | ... | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |
| 4 | 1 | AB de Villiers | 2012 | 55297000 | Wicketkeeper batsman | South African | RCB | 0 | 28 | 16 | ... | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |

5 rows × 42 columns

In [14]:
```python
ipl_subset = ipl_match[['id','year']]
df = pd.merge(ipl, ipl_subset, how="outer", left_on=["ID"], right_on=["id"])
```

In [15]:
```python
df.tail(5)
```

Out[15]:

| | ID | Season | innings | overs | ballnumber | batter | bowler | non-striker | extra_type | batsman_run | extras_run | total_run | non_boundary | isWicketDe |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 225949 | 335982 | 3359 | 2 | 14 | 5 | P Kumar | I Sharma | SB Joshi | legbyes | 0 | 1 | 1 | 0 | |
| 225950 | 335982 | 3359 | 2 | 14 | 6 | SB Joshi | I Sharma | P Kumar | NaN | 1 | 0 | 1 | 0 | |
| 225951 | 335982 | 3359 | 2 | 14 | 7 | P Kumar | I Sharma | SB Joshi | NaN | 0 | 0 | 0 | 0 | |
| 225952 | 335982 | 3359 | 2 | 15 | 1 | SB Joshi | LR Shukla | P Kumar | wides | 0 | 1 | 1 | 0 | |
| 225953 | 335982 | 3359 | 2 | 15 | 2 | SB Joshi | LR Shukla | P Kumar | NaN | 0 | 0 | 0 | 0 | |

In [16]:
```python
df.isnull().sum().sort_values(ascending=False)
```

```
Out[16]:  fielders_involved     217966
          kind                  214803
          player_out            214803
          extra_type            213905
          year                   32337
          id                     32337
          total_run                  0
          BattingTeam                0
          isWicketDelivery           0
          non_boundary               0
          ID                         0
          Season                     0
          batsman_run                0
          non-striker                0
          bowler                     0
          batter                     0
          ballnumber                 0
          overs                      0
          innings                    0
          extras_run                 0
          dtype: int64
```

```
In [17]:  df['year'].unique()
```

```
Out[17]:  array([  nan, 2020., 2019., 2018., 2017., 2016., 2015., 2014., 2013.,
                 2012., 2011., 2010., 2009., 2008.])
```

```
In [18]:  df.groupby(['year','batter'])['batsman_run'].sum()
```

```
Out[18]:  year      batter
          2008.0   A Chopra              42
                   A Kumble              13
                   A Mishra              37
                   A Mukund               0
                   A Nehra                3
                                        ...
          2020.0   VR Aaron               1
                   WP Saha              214
                   Washington Sundar    111
                   YBK Jaiswal           40
                   YS Chahal              1
          Name: batsman_run, Length: 1946, dtype: int64
```

```
In [19]:  df.groupby(['year','bowler'])['isWicketDelivery'].sum()
```

```
Out[19]: year       bowler
         2008.0  A Kumble              8
                 A Mishra             11
                 A Nehra              14
                 A Nel                 1
                 A Symonds             0
                                      ..
         2020.0  UT Yadav              1
                 V Shankar             4
                 VR Aaron              0
                 Washington Sundar     9
                 YS Chahal            22
         Name: isWicketDelivery, Length: 1438, dtype: int64
```

In [20]: 
```python
df.groupby(['year','batter','overs'])['batsman_run'].sum()
```

```
Out[20]: year       batter      overs
         2008.0  A Chopra    0        2
                             1        7
                             2        3
                             3        1
                             4        5
                                     ..
         2020.0  YBK Jaiswal  10       9
                              11       6
                              12       0
                 YS Chahal    16       1
                              19       0
         Name: batsman_run, Length: 19672, dtype: int64
```

In [21]: 
```python
df2=df.groupby(['year','batter'])['batsman_run'].sum().reset_index()
```

In [22]: 
```python
df2.sort_values(['year','batsman_run'], ascending=False, inplace=True)
```

In [23]: 
```python
for i in df2.year.unique():
    print(df2[df2.year == i][:3])
```

```
         year        batter   batsman_run
1866   2020.0   KL Rahul             676
1912   2020.0    S Dhawan            618
1833   2020.0   DA Warner            548
         year        batter   batsman_run
1694   2019.0   DA Warner            692
1729   2019.0    KL Rahul            593
1764   2019.0   Q de Kock            529
         year          batter   batsman_run
1594   2018.0   KS Williamson          735
1636   2018.0          RR Pant         684
1592   2018.0         KL Rahul         659
         year        batter   batsman_run
1422   2017.0   DA Warner            641
1431   2017.0   G Gambhir            498
1495   2017.0    S Dhawan            479
         year          batter   batsman_run
1383   2016.0          V Kohli          973
1278   2016.0         DA Warner         848
1256   2016.0   AB de Villiers          687
         year        batter   batsman_run
1148   2015.0    DA Warner           562
1130   2015.0    AM Rahane           540
1183   2015.0   LMP Simmons          540
         year        batter   batsman_run
1088   2014.0   RV Uthappa           660
1019   2014.0    DR Smith            566
1025   2014.0   GJ Maxwell           552
         year        batter   batsman_run
910    2013.0   MEK Hussey           733
852    2013.0    CH Gayle            720
983    2013.0     V Kohli            639
         year        batter   batsman_run
684    2012.0    CH Gayle            733
706    2012.0   G Gambhir            590
785    2012.0    S Dhawan            569
         year        batter   batsman_run
502    2011.0     CH Gayle           608
636    2011.0      V Kohli           557
623    2011.0   SR Tendulkar         553
         year        batter   batsman_run
446    2010.0   SR Tendulkar         618
365    2010.0     JH Kallis          572
441    2010.0      SK Raina          528
```

```
        year          batter   batsman_run
229  2009.0        ML Hayden            572
166  2009.0     AC Gilchrist            495
165  2009.0  AB de Villiers            465
        year          batter   batsman_run
115  2008.0        SE Marsh            616
39   2008.0        G Gambhir            534
126  2008.0  ST Jayasuriya            514
```

In [24]:
```python
df3=df.groupby(['year','bowler'])['isWicketDelivery'].sum().reset_index()
```

In [25]:
```python
df3.sort_values(['year','isWicketDelivery'], ascending=False, inplace=True)
```

In [26]:
```python
for i in df3.year.unique():
    print(df3[df3.year == i][:3])
```

```
        year      bowler  isWicketDelivery
1381  2020.0   K Rabada                 32
1376  2020.0  JJ Bumrah                 30
1430  2020.0   TA Boult                 26
        year        bowler  isWicketDelivery
1278  2019.0     K Rabada                 29
1269  2019.0   Imran Tahir                26
1274  2019.0    JJ Bumrah                 23
        year        bowler  isWicketDelivery
1144  2018.0       AJ Tye                 28
1217  2018.0       S Kaul                 24
1215  2018.0  Rashid Khan                 23
        year      bowler  isWicketDelivery
1048  2017.0     B Kumar                 28
1075  2017.0  JD Unadkat                 27
1076  2017.0   JJ Bumrah                 23
        year      bowler  isWicketDelivery
938   2016.0    B Kumar                 24
1018  2016.0  SR Watson                 23
1031  2016.0  YS Chahal                 22
        year        bowler  isWicketDelivery
847   2015.0    DJ Bravo                 28
910   2015.0  SL Malinga                 26
830   2015.0     A Nehra                 25
        year        bowler  isWicketDelivery
779   2014.0  MM Sharma                 26
811   2014.0  SP Narine                 22
734   2014.0    B Kumar                 21
        year         bowler  isWicketDelivery
629   2013.0      DJ Bravo                 34
654   2013.0    JP Faulkner               33
694   2013.0  R Vinay Kumar               27
        year        bowler  isWicketDelivery
537   2012.0    M Morkel                 30
576   2012.0   SP Narine                 29
575   2012.0  SL Malinga                 25
        year      bowler  isWicketDelivery
447   2011.0  SL Malinga                 30
402   2011.0    MM Patel                 22
432   2011.0   S Aravind                 22
        year           bowler  isWicketDelivery
284   2010.0          PP Ojha                 22
211   2010.0         A Mishra                 20
246   2010.0  Harbhajan Singh                 20
```

```
         year     bowler  isWicketDelivery
174  2009.0  RP Singh              26
99   2009.0  A Kumble              22
102  2009.0   A Nehra              22
         year         bowler  isWicketDelivery
84   2008.0  Sohail Tanvir            24
34   2008.0     IK Pathan            20
36   2008.0     JA Morkel            20
```

In [27]:
```python
for i in df2.year.unique()[:3]:
    print(df2[df2.year == i][:3])
```

```
        year      batter  batsman_run
1866  2020.0   KL Rahul          676
1912  2020.0   S Dhawan          618
1833  2020.0  DA Warner          548
        year      batter  batsman_run
1694  2019.0  DA Warner          692
1729  2019.0   KL Rahul          593
1764  2019.0  Q de Kock          529
        year          batter  batsman_run
1594  2018.0  KS Williamson          735
1636  2018.0        RR Pant          684
1592  2018.0       KL Rahul          659
```

In [28]:
```python
runs = ipl.groupby(['batter','ID'])[['batsman_run']].sum().reset_index()
```

In [29]:
```python
Rahul = runs[runs['batter'] == 'KL Rahul']
```

In [30]:
```python
import scipy.stats as st

def get_best_distribution(data):
    dist_names = ['alpha', 'beta', 'betaprime', 'burr12', 'crystalball', 'dgamma', 'dweibull', 'erlang', 'exponnorm', 'f', 'fati

    dist_results = []
    params = {}

    for dist_name in dist_names:
        dist = getattr(st, dist_name)
        param = dist.fit(data)

        params[dist_name] = param
        D, p = st.kstest(data, dist_name, args=param)
```

```
        print("p value for " + dist_name + " = " + str(p))
        dist_results.append((dist_name, p))

    best_dist, best_p = max(dist_results, key=lambda item: item[1])
```

In [31]: `get_best_distribution([1, 2, 3, 4, 5])`

```
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_distn_infrastructure.py:2789: RuntimeWarning: invalid valu
e encountered in double_scalars
  Lhat = muhat - Shat*mu
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:876: RuntimeWarning: divide by zero e
ncountered in divide
  a/(b-1.0),
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:880: RuntimeWarning: divide by zero e
ncountered in divide
  a*(a+1.0)/((b-2.0)*(b-1.0)),
```

```
p value for alpha = 0.9932844409413394
p value for beta = 0.9616000009106146
p value for betaprime = 0.6496787472642459
p value for burr12 = 0.9794171026721988
p value for crystalball = 0.9969513039529324
p value for dgamma = 0.9405145408525022
p value for dweibull = 0.9776736247615253
p value for erlang = 0.9969350632373827
p value for exponnorm = 0.9969511681285804
p value for f = 0.9965239282312607
p value for fatiguelife = 0.9964362806556953
```

```
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 406666666.6666666.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 401666666.6666666.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 407777777.7777777.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 405833333.33333325.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 399444444.4444444.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 401041666.6666666.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 403194444.4444444.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 402048611.11111104.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 395810185.1851851.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 397530864.19753075.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400163966.0493827.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 405664866.2551441.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 403201195.9876544.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400194830.2469137.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
```

```
eter of the erlang distribution has been given a non-integer value 401585165.89506173.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 403026941.87242806.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 402311197.91666675.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 399396379.8868312.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 402249991.9624486.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 401455627.3576819.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 401488011.9920268.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400180804.71965015.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 401778599.61741257.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 401197715.7278806.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 399734218.2677468.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 401621048.5387732.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 401068716.3762431.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 401100966.2141525.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400036076.88453805.
  warnings.warn(
```

```
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 401342968.93419397.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400008241.5601244.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 399799840.78205985.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400775684.85612935.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 401404194.30009115.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 401055206.11509943.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 399877625.04662526.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400976632.9623018.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400578874.5288047.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 399981798.8789716.
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eter of the erlang distribution has been given a non-integer value 400786854.30606747.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400596783.65010804.
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eter of the erlang distribution has been given a non-integer value 400592306.3697822.
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eter of the erlang distribution has been given a non-integer value 399942807.4882646.
  warnings.warn(
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  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400411047.5634577.
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eter of the erlang distribution has been given a non-integer value 400456362.26503885.
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eter of the erlang distribution has been given a non-integer value 399996171.59982014.
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eter of the erlang distribution has been given a non-integer value 399978854.00257057.
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eter of the erlang distribution has been given a non-integer value 399922329.4896786.
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eter of the erlang distribution has been given a non-integer value 400322854.0711988.
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eter of the erlang distribution has been given a non-integer value 400629171.13123244.
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eter of the erlang distribution has been given a non-integer value 399983093.3219528.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400237913.8838873.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
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eter of the erlang distribution has been given a non-integer value 400409965.0575259.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400005753.1594783.
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eter of the erlang distribution has been given a non-integer value 400006026.6315179.
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eter of the erlang distribution has been given a non-integer value 400140170.4580412.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400185911.31036514.
  warnings.warn(
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C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400090779.1396194.
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eter of the erlang distribution has been given a non-integer value 399926667.26687753.
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eter of the erlang distribution has been given a non-integer value 400152141.1653915.
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eter of the erlang distribution has been given a non-integer value 400110571.94652236.
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eter of the erlang distribution has been given a non-integer value 400070085.2290206.
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eter of the erlang distribution has been given a non-integer value 400005351.32865214.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400058390.7691848.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400003540.3757701.
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eter of the erlang distribution has been given a non-integer value 400053449.01570797.
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C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
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  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400045130.90905166.
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  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400029195.3845924.
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eter of the erlang distribution has been given a non-integer value 400055219.203593.
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eter of the erlang distribution has been given a non-integer value 400055919.8924464.
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eter of the erlang distribution has been given a non-integer value 400040451.49388945.
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  warnings.warn(
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C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
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eter of the erlang distribution has been given a non-integer value 400061787.7893904.
  warnings.warn(
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C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400056972.4832321.
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eter of the erlang distribution has been given a non-integer value 400057935.3013407.
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eter of the erlang distribution has been given a non-integer value 400058041.22759044.
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eter of the erlang distribution has been given a non-integer value 400058253.08009005.
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  warnings.warn(
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  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058213.48344076.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058356.34691113.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058303.38378614.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058316.6245674.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058515.00800765.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058544.12250805.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058373.4990525.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058388.05630267.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058452.88859624.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
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eter of the erlang distribution has been given a non-integer value 400058353.6968761.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058467.4458464.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058377.95895976.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058303.7437851.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058426.520331.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058408.7760143.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058439.4180605.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058393.32373494.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058399.7725996.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058408.6447579.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058384.3640723.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058389.4127438.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058392.0027078.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058387.5666286.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058399.7069714.
  warnings.warn(

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C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058395.2708922.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058402.93140364.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058399.0902099.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058397.77335197.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058397.147737.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058392.6590523.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058397.4824205.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.5592568.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058397.42004275.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058392.84618545.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058396.2765784.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058394.12580264.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058393.9584609.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058394.0946138.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058392.03460646.
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  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058393.47749734.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058392.4318993.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058392.44749373.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058392.3638229.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058391.2884351.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.50013477.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058391.960654.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058391.02880996.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058391.5665039.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058391.6083393.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7043855.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.05991423.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058389.99351305.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058389.84402263.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
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eter of the erlang distribution has been given a non-integer value 400058390.3445661.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.2734031.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.3066037.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.38134897.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.4145495.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.6122098.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.55449456.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.5918672.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.53789425.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.5752669.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.69069725.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.82993853.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7569275.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.729941.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.680526.
  warnings.warn(
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C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.65353954.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7545842.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.69904053.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7360697.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.70829785.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7495629.
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C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7113622.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7341127.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7268769.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.77542084.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7802091.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7456368.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7480309.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.77230287.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7516488.
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  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7402736.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.75334406.
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eter of the erlang distribution has been given a non-integer value 400058390.7605041.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400058390.7511492.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.75738585.
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C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7527083.
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C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7765511.
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eter of the erlang distribution has been given a non-integer value 400058390.78001165.
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C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7971543.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76429665.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7600101.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.77286744.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7664393.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.772868.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
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eter of the erlang distribution has been given a non-integer value 400058390.7645975.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76674074.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400058390.760814.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400058390.7698545.
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eter of the erlang distribution has been given a non-integer value 400058390.76901716.
  warnings.warn(
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eter of the erlang distribution has been given a non-integer value 400058390.7741069.
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eter of the erlang distribution has been given a non-integer value 400058390.7717296.
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eter of the erlang distribution has been given a non-integer value 400058390.7695197.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.769101.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7668911.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76726496.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76782864.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.768038.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7679961.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7682054.
  warnings.warn(
```

```
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76742685.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7666985.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7669916.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7671004.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7674645.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7667948.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.767159.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76643205.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.766253.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7669325.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7664795.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.766407.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.766504.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7666616.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7666853.
```

```
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76684296.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.766649.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76678246.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7668868.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7667179.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76677006.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76683676.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7667763.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76678824.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76685655.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76679635.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.76683056.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7668397.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
eter of the erlang distribution has been given a non-integer value 400058390.7668337.
  warnings.warn(
C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:3180: RuntimeWarning: The shape param
```

eter of the erlang distribution has been given a non-integer value array(4.00058391e+08).
  warnings.warn(
p value for gamma = 0.9969350632373827
p value for gausshyper = 0.961599999997569
p value for genextreme = 0.8666127099241974

C:\Users\harsh\OneDrive\Desktop\python\lib\site-packages\scipy\stats\_continuous_distns.py:4071: RuntimeWarning: divide by zero
encountered in power
  return 1.0/Cinv * x**(a-1.0) * (1.0-x)**(b-1.0) / (1.0+z*x)**c
p value for gengamma = 0.36092016480553606

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
Cell In[31], line 1
----> 1 get_best_distribution([1, 2, 3, 4, 5])

Cell In[30], line 10, in get_best_distribution(data)
      7 params = {}
      9 for dist_name in dist names:
---> 10     dist = getattr(st, dist_name)
     11     param = dist.fit(data)
     13     params[dist_name] = param

AttributeError: module 'scipy.stats' has no attribute 'gumbel_1'
```

In [32]:   `ipl_salary.head()`

Out[32]:

| | Id | Name | Year | Final Price | Role | Nationality | Team | Ent | Age | Matches | ... | LWkts | Econ | LEcon | FourWkts | LFourWkts | FiveWkts | LFiveWkt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | AB de Villiers | 2008 | 12048000 | Wicketkeeper batsman | South African | DD | 0 | 24 | 6 | ... | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |
| 1 | 1 | AB de Villiers | 2009 | 14736000 | Wicketkeeper batsman | South African | DD | 0 | 25 | 15 | ... | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |
| 2 | 1 | AB de Villiers | 2010 | 13887000 | Wicketkeeper batsman | South African | DD | 0 | 26 | 7 | ... | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |
| 3 | 1 | AB de Villiers | 2011 | 50600000 | Wicketkeeper batsman | South African | RCB | 0 | 27 | 16 | ... | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |
| 4 | 1 | AB de Villiers | 2012 | 55297000 | Wicketkeeper batsman | South African | RCB | 0 | 28 | 16 | ... | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 |

5 rows × 42 columns

In [33]:
```python
ipl_salary.columns
```

Out[33]:
```
Index(['Id', 'Name', 'Year', 'Final Price', 'Role', 'Nationality', 'Team',
       'Ent', 'Age', 'Matches', 'LMatches', 'Runs', 'LRuns', 'HS', 'LHS',
       'Ave', 'LAve', 'StrRate', 'LStrRate', 'Fifties', 'LFifties', 'Hundreds',
       'LHundreds', 'Fours', 'LFours', 'Sixes', 'LSixes', 'Catches',
       'LCatches', 'Stumps', 'LStumps', 'Wkts', 'LWkts', 'Econ', 'LEcon',
       'FourWkts', 'LFourWkts', 'FiveWkts', 'LFiveWkts', 'Indian',
       'Specialist', 'Status'],
      dtype='object')
```

In [34]:
```python
ipl_salary['Role'].unique()
```

Out[34]:
```
array(['Wicketkeeper batsman', 'Batsman', 'Bowler', 'All-rounder',
       'All-Rounder', 'Bowling All-rounder', 'Wicket Keeper',
       'Wicketkeeper', 'Wicketkeeper-batsman'], dtype=object)
```

In [35]:
```python
batter = ipl_salary[ipl_salary['Role'] == 'Batsman']
batter=pd.DataFrame(batter)
```

In [36]:
```python
batter.head()
```

Out[36]:

| | Id | Name | Year | Final Price | Role | Nationality | Team | Ent | Age | Matches | ... | LWkts | Econ | LEcon | FourWkts | LFourWkts | FiveWkts | LFiveWkts |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **10** | 2 | Aaron Finch | 2010 | 1388700 | Batsman | Australian | RR | 1 | 24 | 1 | ... | 0 | 4.28 | 0.00 | 0 | 0 | 0 | 0 |
| **11** | 2 | Aaron Finch | 2011 | 13800000 | Batsman | Australian | DD | 0 | 25 | 6 | ... | 0 | 6.50 | 4.28 | 0 | 0 | 0 | 0 |
| **12** | 2 | Aaron Finch | 2012 | 15081000 | Batsman | Australian | DD | 0 | 26 | 2 | ... | 0 | 0.00 | 6.50 | 0 | 0 | 0 | 0 |
| **13** | 2 | Aaron Finch | 2013 | 2663500 | Batsman | Australian | PWI | 0 | 27 | 14 | ... | 0 | 12.25 | 0.00 | 0 | 0 | 0 | 0 |
| **14** | 2 | Aaron Finch | 2014 | 40000000 | Batsman | Australian | SRH | 0 | 28 | 13 | ... | 1 | 0.00 | 12.25 | 0 | 0 | 0 | 0 |

5 rows × 42 columns

In [37]:
```python
batter.columns
```

Out[37]:
```
Index(['Id', 'Name', 'Year', 'Final Price', 'Role', 'Nationality', 'Team',
       'Ent', 'Age', 'Matches', 'LMatches', 'Runs', 'LRuns', 'HS', 'LHS',
       'Ave', 'LAve', 'StrRate', 'LStrRate', 'Fifties', 'LFifties', 'Hundreds',
       'LHundreds', 'Fours', 'LFours', 'Sixes', 'LSixes', 'Catches',
       'LCatches', 'Stumps', 'LStumps', 'Wkts', 'LWkts', 'Econ', 'LEcon',
       'FourWkts', 'LFourWkts', 'FiveWkts', 'LFiveWkts', 'Indian',
       'Specialist', 'Status'],
      dtype='object')
```

In [38]:
```python
batter['Runs'].corr(batter['Final Price'])
```

Out[38]:
```
0.5265053037384917
```

In [39]:
```python
from sklearn.linear_model import LinearRegression
from sklearn import datasets, linear_model, metrics
```
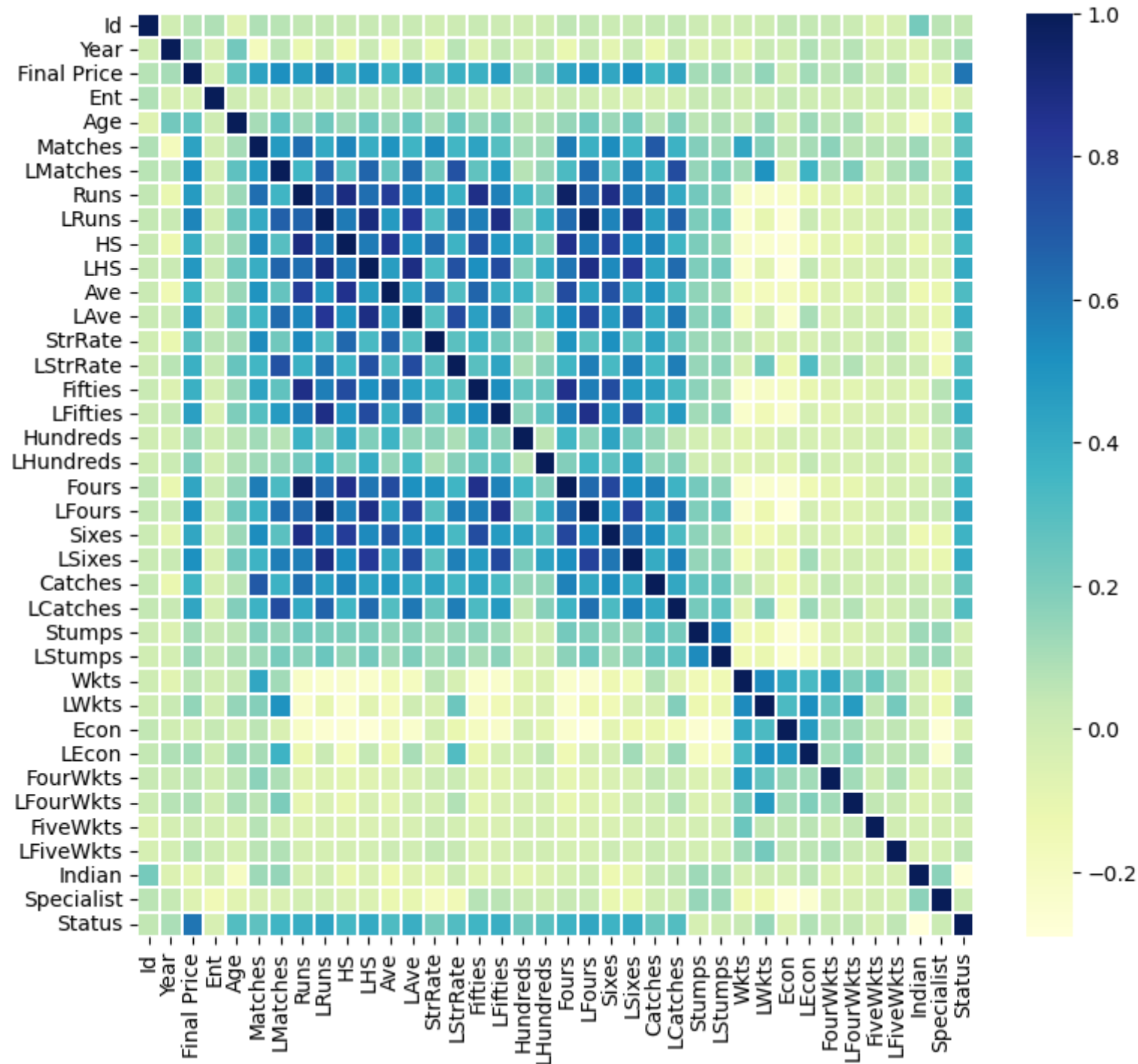
In [40]:
```python
import matplotlib.pyplot as plt
import seaborn as sns
```

In [41]:
```python
corrmat = ipl_salary.corr()
f, ax = plt.subplots(figsize =(9, 8))
sns.heatmap(corrmat, ax=ax, cmap='YlGnBu', linewidths=0.1)
```

```
C:\Users\harsh\AppData\Local\Temp\ipykernel_28476\752447781.py:1: FutureWarning: The default value of numeric_only in DataFrame.
corr is deprecated. In a future version, it will default to False. Select only valid columns or specify the value of numeric_onl
y to silence this warning.
  corrmat = ipl_salary.corr()
```

Out[41]:
```
<Axes: >
```

—

```
In [42]: x=ipl_salary[["Runs", "Wkts"]]
         y=ipl_salary["Final Price"]
```

```
In [43]: from sklearn.model_selection import train_test_split
```

```
In [44]: x_train, x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=0)
```

```
In [45]: linreg=LinearRegression()
         linreg.fit(x_train,y_train)
```

```
Out[45]: ▾ LinearRegression

         LinearRegression()
```

```
In [46]: y_pred=linreg.predict(x_test)
         y_pred
```

```
Out[46]:   array([5.84191260e+07, 1.03266871e+07, 2.63688960e+07, 4.84022088e+07,
                  1.37376948e+07, 7.31801716e+07, 1.87071517e+07, 1.92698649e+07,
                  3.91821504e+07, 4.97529637e+07, 4.98305620e+07, 1.98498072e+07,
                  2.33301364e+07, 1.03266871e+07, 3.88964528e+07, 1.93736445e+07,
                  4.79435452e+07, 1.19369584e+07, 1.11318227e+07, 1.83780437e+07,
                  3.60394762e+07, 6.49814900e+07, 1.59626367e+07, 1.67677724e+07,
                  1.91831794e+07, 3.49571899e+07, 2.71828488e+07, 1.03266871e+07,
                  3.97535457e+07, 4.27057548e+07, 2.51567840e+07, 4.57531965e+07,
                  1.67677724e+07, 3.29398071e+07, 1.77461441e+07, 2.60833334e+07,
                  1.65340320e+07, 2.58495931e+07, 4.72769174e+07, 3.79700383e+07,
                  1.11318227e+07, 2.80399418e+07, 3.50871507e+07, 1.91831794e+07,
                  1.03266871e+07, 1.97547097e+07, 4.93720335e+07, 1.03266871e+07,
                  1.03266871e+07, 3.58490111e+07, 3.69223452e+07, 1.38502915e+07,
                  2.75637790e+07, 3.06112207e+07, 5.18480799e+07, 2.98404081e+07,
                  1.11318227e+07, 2.05424813e+07, 1.03266871e+07, 2.89400399e+07,
                  1.45428305e+07, 3.95630806e+07, 2.81351743e+07, 1.02987960e+08,
                  1.03266871e+07, 1.03266871e+07, 2.52781978e+07, 1.13222878e+07,
                  2.81351743e+07, 2.03433341e+07, 4.75626150e+07, 4.54847279e+07,
                  2.99445928e+07, 2.55465313e+07, 1.38502915e+07, 1.20841483e+07,
                  2.88018022e+07, 1.37550589e+07, 1.19369584e+07, 1.14175204e+07,
                  1.03266871e+07, 2.56503109e+07, 1.03266871e+07, 1.27420941e+07,
                  2.83256394e+07, 2.19450584e+07, 4.12166272e+07, 1.52787798e+07,
                  2.24212212e+07, 2.24989546e+07, 1.44475979e+07, 3.40395926e+07,
                  6.15618002e+07, 3.90869179e+07, 3.21000782e+07, 1.11837800e+07,
                  3.17540113e+07, 5.83238934e+07, 1.16079855e+07, 5.46098239e+07,
                  1.82395359e+07, 1.18504079e+07, 1.03266871e+07, 1.03266871e+07,
                  3.21000782e+07, 2.84725592e+07, 1.19369584e+07, 1.87589739e+07,
                  1.03266871e+07, 2.32696321e+07, 1.61098266e+07, 2.40659506e+07,
                  1.27420941e+07, 2.09753688e+07, 4.08011038e+07, 5.77349989e+07,
                  3.79441272e+07, 3.48791864e+07, 1.21793808e+07, 5.07052892e+07,
                  1.75729080e+07, 4.86879064e+07, 1.84906404e+07, 1.59626367e+07,
                  4.23248246e+07, 1.20408730e+07, 1.21793808e+07, 1.03266871e+07,
                  6.17522653e+07, 1.68630049e+07, 5.77524981e+07, 1.11318227e+07,
                  4.78483127e+07, 1.19369584e+07, 3.07323644e+07, 4.76578476e+07,
                  1.25170358e+07, 4.48008710e+07, 1.56856211e+07, 1.05171522e+07,
                  1.67072681e+07, 4.47056384e+07, 1.26035863e+07, 1.15647102e+07,
                  2.12784306e+07, 1.75989542e+07, 4.06969191e+07, 3.99351937e+07,
                  1.37550589e+07, 1.20408730e+07, 5.36574984e+07, 1.75643610e+07,
                  2.44556980e+07, 2.85161046e+07, 3.40395926e+07, 1.03266871e+07,
                  1.03266871e+07, 1.12270553e+07, 1.69323264e+07, 1.21274235e+07,
                  4.11820340e+07, 1.27420941e+07, 1.03266871e+07, 1.03266871e+07,
                  2.52780627e+07, 1.19369584e+07, 1.11318227e+07, 1.89928493e+07,
                  1.77633731e+07, 5.71811028e+07, 3.55633134e+07, 1.03266871e+07,
                  4.82292429e+07, 2.65419970e+07, 3.26111043e+07, 4.62293593e+07,
```

```
       2.96933533e+07, 3.16760078e+07, 1.12270553e+07, 1.33134894e+07,
       1.16079855e+07, 1.15647102e+07, 3.21349415e+07, 1.62050591e+07,
       4.43247082e+07, 4.19438944e+07, 3.33035082e+07, 4.11820340e+07,
       5.52764517e+07, 2.38669385e+07, 1.03266871e+07, 1.27420941e+07,
       4.46104059e+07, 1.83954078e+07, 7.57514505e+07, 2.08975004e+07,
       2.60571522e+07, 3.06715899e+07, 2.27067838e+07, 2.98493603e+07,
       2.62044771e+07, 1.35472297e+07, 3.76584296e+07, 1.78153304e+07,
       4.23248246e+07, 3.73727319e+07, 1.03266871e+07, 1.36598264e+07,
       1.11318227e+07, 1.50189932e+07, 3.80393598e+07, 1.27420941e+07,
       1.03266871e+07, 2.71828488e+07, 2.70094777e+07, 3.25849230e+07,
       3.00395553e+07, 5.26445335e+07, 6.09384476e+07, 1.45515125e+07,
       1.31836636e+07, 2.43949236e+07])
```

In [47]:
```python
from sklearn.metrics import r2_score
```

In [48]:
```python
R_squared= r2_score(y_test, y_pred)*100
print("R_squared of the model is %.2f" %R_squared)
```

```
R_squared of the model is 35.40
```

In [49]:
```python
import numpy as np

def mape(y_test, pred):
    y_test, pred = np.array(y_test), np.array(pred)
    mape = np.mean(np.abs((y_test - pred) / y_test))
    return mape
```

In [50]:
```python
mape(y_test, y_pred)
```

Out[50]:
```
4.48512492421036
```