

```
In [1]: import numpy as np
```

Seasons

```
In [2]: Seasons = ["2010", "2011", "2012", "2013", "2014", "2015", "2016", "2017", "2018", "2019"]
```

```
In [3]: Sdict = {"2010":0, "2011":1, "2012":2, "2013":3, "2014":4, "2015":5, "2016":6, "2017":7, "2018":8, "2019":9}
```

Players

```
In [4]: Players = ["Sachin", "Rahul", "Smith", "Sami", "Pollard", "Morris", "Samson", "Dhoni", "Kohli"]
```

```
In [5]: Pdict = {"Sachin":0,"Rahul":1,"Smith":2,"Sami":3,"Pollard":4,"Morris":5,"Samson":6}
```

Salaries

```
In [6]: Sachin_Salary = [15946875, 17718750, 19490625, 21262500, 23034375, 24806250, 25244493, 26000000, 27744189, 29488377, 31232567, 33976754, 35324500, 37038573, 38750000, 4041250, 42410581, 44579912, 46500000, 48022500, 49754, 513640, 5394041, 56041250, 58410581, 60779912, 63149243, 6518574, 67450000, 69493160, 71806720, 74061274, 763758000, 785202590, 806647180, 828091770, 8495, 86348000, 88235220, 902455000, 92410581, 945779912, 964500000, 98022500, 10075, 103144240, 105380160, 1073615960, 1094574189, 1113520500, 11314940153, 11516359805, 117779, 1194171200, 1214484040, 1234796880, 1256053663, 1275506632, 1296669630, 1317832627, 1331862875] Kohli_Salary = [0, 0, 0, 4822800, 5184480, 5546160, 6993708, 16402500, 17632688, 18862875] Sky_Salary = [3031920, 3841443, 13041250, 14410581, 15779912, 14200000, 15691000, 171820]
```

Matrix

```
In [7]: Salary = np.array([Sachin_Salary, Rahul_Salary, Smith_Salary, Sami_Salary, Pollard_Salary])
```

Games

```
In [8]: Sachin_G = [80,77,82,82,73,82,58,78,6,35]
Rahul_G = [82,57,82,79,76,72,60,72,79,80]
Smith_G = [79,78,75,81,76,79,62,76,77,69]
Sami_G = [80,65,77,66,69,77,55,67,77,40]
Pollard_G = [82,82,82,79,82,78,54,76,71,41]
Morris_G = [70,69,67,77,70,77,57,74,79,44]
Samson_G = [78,64,80,78,45,80,60,70,62,82]
Dhoni_G = [35,35,80,74,82,78,66,81,81,27]
Kohli_G = [40,40,40,81,78,81,39,0,10,51]
Sky_G = [75,51,51,79,77,76,49,69,54,62]
```

Matrix

```
In [9]: Games = np.array([Sachin_G, Rahul_G, Smith_G, Sami_G, Pollard_G, Morris_G, Samson_G])
```

Points

```
In [10]: Sachin PTS = [2832,2430,2323,2201,1970,2078,1616,2133,83,782]
Rahul PTS = [1653,1426,1779,1688,1619,1312,1129,1170,1245,1154]
Smith PTS = [2478,2132,2250,2304,2258,2111,1683,2036,2089,1743]
Sami PTS = [2122,1881,1978,1504,1943,1970,1245,1920,2112,966]
Pollard PTS = [1292,1443,1695,1624,1503,1784,1113,1296,1297,646]
Morris PTS = [1572,1561,1496,1746,1678,1438,1025,1232,1281,928]
Samson PTS = [1258,1104,1684,1781,841,1268,1189,1186,1185,1564]
Dhoni PTS = [903,903,1624,1871,2472,2161,1850,2280,2593,686]
Kohli PTS = [597,597,597,1361,1619,2026,852,0,159,904]
Sky PTS = [2040,1397,1254,2386,2045,1941,1082,1463,1028,1331]
```

Matrix

```
In [11]: Points = np.array([Sachin PTS, Rahul PTS, Smith PTS, Sami PTS, Pollard PTS, Morris PTS, Samson PTS])
```

In [12]: Salary

```
Out[12]: array([[15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
   25244493, 27849149, 30453805, 23500000],
   [12000000, 12744189, 13488377, 14232567, 14976754, 16324500,
   18038573, 19752645, 21466718, 23180790],
   [ 4621800,  5828090, 13041250, 14410581, 15779912, 14500000,
   16022500, 17545000, 19067500, 20644400],
   [ 3713640,  4694041, 13041250, 14410581, 15779912, 17149243,
   18518574, 19450000, 22407474, 22458000],
   [ 4493160,  4806720, 6061274, 13758000, 15202590, 16647180,
   18091770, 19536360, 20513178, 21436271],
   [ 3348000,  4235220, 12455000, 14410581, 15779912, 14500000,
   16022500, 17545000, 19067500, 20644400],
   [ 3144240,  3380160, 3615960, 4574189, 13520500, 14940153,
   16359805, 17779458, 18668431, 20068563],
   [       0,         0, 4171200, 4484040, 4796880, 6053663,
   15506632, 16669630, 17832627, 18995624],
   [       0,         0,         0, 4822800, 5184480, 5546160,
   6993708, 16402500, 17632688, 18862875],
   [ 3031920,  3841443, 13041250, 14410581, 15779912, 14200000,
   15691000, 17182000, 18673000, 15000000]])
```

In [13]: Games

```
Out[13]: array([[ 80,  77,  82,  82,  73,  82,  58,  78,   6,  35],
   [ 82,  57,  82,  79,  76,  72,  60,  72,  79,  80],
   [ 79,  78,  75,  81,  76,  79,  62,  76,  77,  69],
   [ 80,  65,  77,  66,  69,  77,  55,  67,  77,  40],
   [ 82,  82,  82,  79,  82,  78,  54,  76,  71,  41],
   [ 70,  69,  67,  77,  70,  77,  57,  74,  79,  44],
   [ 78,  64,  80,  78,  45,  80,  60,  70,  62,  82],
   [ 35,  35,  80,  74,  82,  78,  66,  81,  81,  27],
   [ 40,  40,  40,  81,  78,  81,  39,   0,  10,  51],
   [ 75,  51,  51,  79,  77,  76,  49,  69,  54,  62]]))
```

In [14]: Points

```
Out[14]: array([[ 2832,  2430,  2323,  2201,  1970,  2078,  1616,  2133,   83,  782],
   [ 1653,  1426,  1779,  1688,  1619,  1312,  1129,  1170,  1245,  1154],
   [ 2478,  2132,  2250,  2304,  2258,  2111,  1683,  2036,  2089,  1743],
   [ 2122,  1881,  1978,  1504,  1943,  1970,  1245,  1920,  2112,  966],
   [ 1292,  1443,  1695,  1624,  1503,  1784,  1113,  1296,  1297,  646],
   [ 1572,  1561,  1496,  1746,  1678,  1438,  1025,  1232,  1281,  928],
   [ 1258,  1104,  1684,  1781,   841,  1268,  1189,  1186,  1185,  1564],
   [  903,   903,  1624,  1871,  2472,  2161,  1850,  2280,  2593,   686],
   [  597,   597,   597,  1361,  1619,  2026,   852,     0,   159,   904],
   [ 2040,  1397,  1254,  2386,  2045,  1941,  1082,  1463,  1028,  1331]]))
```

In [15]: mydata = np.arange(0,20)
print(mydata)

```
[ 0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19]
```

```
In [16]: np.reshape(mydata,(4,5))
```

```
Out[16]: array([[ 0,  1,  2,  3,  4],
   [ 5,  6,  7,  8,  9],
   [10, 11, 12, 13, 14],
   [15, 16, 17, 18, 19]])
```

```
In [17]: mydata
```

```
Out[17]: array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
   17, 18, 19])
```

```
In [18]: MATR1 = np.reshape(mydata, (5,4), order = 'c')
MATR1
```

```
Out[18]: array([[ 0,  1,  2,  3],
   [ 4,  5,  6,  7],
   [ 8,  9, 10, 11],
   [12, 13, 14, 15],
   [16, 17, 18, 19]])
```

```
In [19]: MATR1
```

```
Out[19]: array([[ 0,  1,  2,  3],
   [ 4,  5,  6,  7],
   [ 8,  9, 10, 11],
   [12, 13, 14, 15],
   [16, 17, 18, 19]])
```

```
In [20]: MATR1[4,3]
```

```
Out[20]: 19
```

```
In [21]: MATR1[3,3]
```

```
Out[21]: 15
```

```
In [22]: MATR1
```

```
Out[22]: array([[ 0,  1,  2,  3],
   [ 4,  5,  6,  7],
   [ 8,  9, 10, 11],
   [12, 13, 14, 15],
   [16, 17, 18, 19]])
```

```
In [23]: MATR1[-3,-1]
```

```
Out[23]: 11
```

```
In [24]: MATR1
```

```
Out[24]: array([[ 0,  1,  2,  3],
                 [ 4,  5,  6,  7],
                 [ 8,  9, 10, 11],
                 [12, 13, 14, 15],
                 [16, 17, 18, 19]])
```

```
In [25]: mydata
```

```
Out[25]: array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
                 17, 18, 19])
```

```
In [26]: MATR2 = np.reshape(mydata, (5,4), order = 'F')
```

```
In [27]: MATR2
```

```
Out[27]: array([[ 0,  5, 10, 15],
                 [ 1,  6, 11, 16],
                 [ 2,  7, 12, 17],
                 [ 3,  8, 13, 18],
                 [ 4,  9, 14, 19]])
```

```
In [28]: MATR2[4,3]
```

```
Out[28]: 19
```

```
In [29]: MATR2[0,2]
```

```
Out[29]: 10
```

```
In [30]: MATR2[0:2]
```

```
Out[30]: array([[ 0,  5, 10, 15],
                 [ 1,  6, 11, 16]])
```

```
In [31]: MATR2
```

```
Out[31]: array([[ 0,  5, 10, 15],
                 [ 1,  6, 11, 16],
                 [ 2,  7, 12, 17],
                 [ 3,  8, 13, 18],
                 [ 4,  9, 14, 19]])
```

```
In [32]: MATR2[1:2]
```

```
Out[32]: array([[ 1,  6, 11, 16]])
```

```
In [33]: MATR2[1,2]
```

```
Out[33]: 11
```

```
In [34]: MATR2
```

```
Out[34]: array([[ 0,  5, 10, 15],  
                 [ 1,  6, 11, 16],  
                 [ 2,  7, 12, 17],  
                 [ 3,  8, 13, 18],  
                 [ 4,  9, 14, 19]])
```

```
In [35]: MATR2[-2,-1]
```

```
Out[35]: 18
```

```
In [36]: MATR2[-3,-3]
```

```
Out[36]: 7
```

```
In [37]: MATR2
```

```
Out[37]: array([[ 0,  5, 10, 15],  
                 [ 1,  6, 11, 16],  
                 [ 2,  7, 12, 17],  
                 [ 3,  8, 13, 18],  
                 [ 4,  9, 14, 19]])
```

```
In [38]: MATR2[0:2]
```

```
Out[38]: array([[ 0,  5, 10, 15],  
                 [ 1,  6, 11, 16]])
```

```
In [39]: mydata
```

```
Out[39]: array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,  
                 17, 18, 19])
```

```
In [40]: MATR3 = np.reshape(mydata, (5,4), order = 'A')  
MATR3
```

```
Out[40]: array([[ 0,  1,  2,  3],  
                 [ 4,  5,  6,  7],  
                 [ 8,  9, 10, 11],  
                 [12, 13, 14, 15],  
                 [16, 17, 18, 19]])
```

```
In [41]: MATR2
```

```
Out[41]: array([[ 0,  5, 10, 15],  
                 [ 1,  6, 11, 16],  
                 [ 2,  7, 12, 17],  
                 [ 3,  8, 13, 18],  
                 [ 4,  9, 14, 19]])
```

```
In [42]: MATR1
```

```
Out[42]: array([[ 0,  1,  2,  3],
   [ 4,  5,  6,  7],
   [ 8,  9, 10, 11],
   [12, 13, 14, 15],
   [16, 17, 18, 19]])
```

```
In [43]: a1 = ['welcome', 'to', 'datascience']
a2 = ['required', 'hard', 'work' ]
a3 = [1,2,3]
```

```
In [44]: [a1,a2,a3]
```

```
Out[44]: [['welcome', 'to', 'datascience'], ['required', 'hard', 'work'], [1, 2, 3]]
```

```
In [45]: [a1+a2+a3]
```

```
Out[45]: [['welcome', 'to', 'datascience', 'required', 'hard', 'work', 1, 2, 3]]
```

```
In [46]: np.array([a1,a2,a3])
```

```
Out[46]: array([['welcome', 'to', 'datascience'],
   ['required', 'hard', 'work'],
   ['1', '2', '3']], dtype='|<U11')
```

```
In [47]: Games
```

```
Out[47]: array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],
   [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],
   [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],
   [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],
   [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],
   [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],
   [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],
   [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],
   [40, 40, 40, 81, 78, 81, 39, 0, 10, 51],
   [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

```
In [48]: Games[0]
```

```
Out[48]: array([80, 77, 82, 82, 73, 82, 58, 78, 6, 35])
```

```
In [49]: Games[5]
```

```
Out[49]: array([70, 69, 67, 77, 70, 77, 57, 74, 79, 44])
```

```
In [50]: Games[0:5]
```

```
Out[50]: array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],  
[82, 57, 82, 79, 76, 72, 60, 72, 79, 80],  
[79, 78, 75, 81, 76, 79, 62, 76, 77, 69],  
[80, 65, 77, 66, 69, 77, 55, 67, 77, 40],  
[82, 82, 82, 79, 82, 78, 54, 76, 71, 41]])
```

```
In [51]: Games[0,5]
```

```
Out[51]: 82
```

```
In [52]: Games[0,2]
```

```
Out[52]: 82
```

```
In [53]: Games
```

```
Out[53]: array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],  
[82, 57, 82, 79, 76, 72, 60, 72, 79, 80],  
[79, 78, 75, 81, 76, 79, 62, 76, 77, 69],  
[80, 65, 77, 66, 69, 77, 55, 67, 77, 40],  
[82, 82, 82, 79, 82, 78, 54, 76, 71, 41],  
[70, 69, 67, 77, 70, 77, 57, 74, 79, 44],  
[78, 64, 80, 78, 45, 80, 60, 70, 62, 82],  
[35, 35, 80, 74, 82, 78, 66, 81, 81, 27],  
[40, 40, 40, 81, 78, 81, 39, 0, 10, 51],  
[75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

```
In [54]: Games[0:2]
```

```
Out[54]: array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],  
[82, 57, 82, 79, 76, 72, 60, 72, 79, 80]])
```

```
In [55]: Games
```

```
Out[55]: array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],  
[82, 57, 82, 79, 76, 72, 60, 72, 79, 80],  
[79, 78, 75, 81, 76, 79, 62, 76, 77, 69],  
[80, 65, 77, 66, 69, 77, 55, 67, 77, 40],  
[82, 82, 82, 79, 82, 78, 54, 76, 71, 41],  
[70, 69, 67, 77, 70, 77, 57, 74, 79, 44],  
[78, 64, 80, 78, 45, 80, 60, 70, 62, 82],  
[35, 35, 80, 74, 82, 78, 66, 81, 81, 27],  
[40, 40, 40, 81, 78, 81, 39, 0, 10, 51],  
[75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

```
In [56]: Games[1:2]
```

```
Out[56]: array([[82, 57, 82, 79, 76, 72, 60, 72, 79, 80]])
```

```
In [57]: Games[2]
```

```
Out[57]: array([79, 78, 75, 81, 76, 79, 62, 76, 77, 69])
```

```
In [58]: Games
```

```
Out[58]: array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],  
[82, 57, 82, 79, 76, 72, 60, 72, 79, 80],  
[79, 78, 75, 81, 76, 79, 62, 76, 77, 69],  
[80, 65, 77, 66, 69, 77, 55, 67, 77, 40],  
[82, 82, 82, 79, 82, 78, 54, 76, 71, 41],  
[70, 69, 67, 77, 70, 77, 57, 74, 79, 44],  
[78, 64, 80, 78, 45, 80, 60, 70, 62, 82],  
[35, 35, 80, 74, 82, 78, 66, 81, 81, 27],  
[40, 40, 40, 81, 78, 81, 39, 0, 10, 51],  
[75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

```
In [59]: Games[2:8]
```

```
Out[59]: 77
```

```
In [60]: Games
```

```
Out[60]: array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],  
[82, 57, 82, 79, 76, 72, 60, 72, 79, 80],  
[79, 78, 75, 81, 76, 79, 62, 76, 77, 69],  
[80, 65, 77, 66, 69, 77, 55, 67, 77, 40],  
[82, 82, 82, 79, 82, 78, 54, 76, 71, 41],  
[70, 69, 67, 77, 70, 77, 57, 74, 79, 44],  
[78, 64, 80, 78, 45, 80, 60, 70, 62, 82],  
[35, 35, 80, 74, 82, 78, 66, 81, 81, 27],  
[40, 40, 40, 81, 78, 81, 39, 0, 10, 51],  
[75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

```
In [61]: Games[-3:-1]
```

```
Out[61]: array([[35, 35, 80, 74, 82, 78, 66, 81, 81, 27],  
[40, 40, 40, 81, 78, 81, 39, 0, 10, 51]])
```

```
In [62]: Games[-3,-1]
```

```
Out[62]: 27
```

In [63]: Points

```
Out[63]: array([[2832, 2430, 2323, 2201, 1970, 2078, 1616, 2133, 83, 782],
 [1653, 1426, 1779, 1688, 1619, 1312, 1129, 1170, 1245, 1154],
 [2478, 2132, 2250, 2304, 2258, 2111, 1683, 2036, 2089, 1743],
 [2122, 1881, 1978, 1504, 1943, 1970, 1245, 1920, 2112, 966],
 [1292, 1443, 1695, 1624, 1503, 1784, 1113, 1296, 1297, 646],
 [1572, 1561, 1496, 1746, 1678, 1438, 1025, 1232, 1281, 928],
 [1258, 1104, 1684, 1781, 841, 1268, 1189, 1186, 1185, 1564],
 [903, 903, 1624, 1871, 2472, 2161, 1850, 2280, 2593, 686],
 [597, 597, 597, 1361, 1619, 2026, 852, 0, 159, 904],
 [2040, 1397, 1254, 2386, 2045, 1941, 1082, 1463, 1028, 1331]])
```

In [64]: Points[0]

```
Out[64]: array([2832, 2430, 2323, 2201, 1970, 2078, 1616, 2133, 83, 782])
```

In [65]: Points[6,1]

```
Out[65]: 1104
```

In [66]: Points[3:6]

```
Out[66]: array([[2122, 1881, 1978, 1504, 1943, 1970, 1245, 1920, 2112, 966],
 [1292, 1443, 1695, 1624, 1503, 1784, 1113, 1296, 1297, 646],
 [1572, 1561, 1496, 1746, 1678, 1438, 1025, 1232, 1281, 928]])
```

In [67]: Points

```
Out[67]: array([[2832, 2430, 2323, 2201, 1970, 2078, 1616, 2133, 83, 782],
 [1653, 1426, 1779, 1688, 1619, 1312, 1129, 1170, 1245, 1154],
 [2478, 2132, 2250, 2304, 2258, 2111, 1683, 2036, 2089, 1743],
 [2122, 1881, 1978, 1504, 1943, 1970, 1245, 1920, 2112, 966],
 [1292, 1443, 1695, 1624, 1503, 1784, 1113, 1296, 1297, 646],
 [1572, 1561, 1496, 1746, 1678, 1438, 1025, 1232, 1281, 928],
 [1258, 1104, 1684, 1781, 841, 1268, 1189, 1186, 1185, 1564],
 [903, 903, 1624, 1871, 2472, 2161, 1850, 2280, 2593, 686],
 [597, 597, 597, 1361, 1619, 2026, 852, 0, 159, 904],
 [2040, 1397, 1254, 2386, 2045, 1941, 1082, 1463, 1028, 1331]])
```

In [68]: Points[-6,-1]

```
Out[68]: 646
```

===== DICTIONARY =====

In [69]: dict1 = {'key1':'val1', 'key2':'val2', 'key3':'val3'}

```
In [70]: dict1
```

```
Out[70]: {'key1': 'val1', 'key2': 'val2', 'key3': 'val3'}
```

```
In [71]: dict1['key2']
```

```
Out[71]: 'val2'
```

```
In [72]: dict2 = {'bang':2,'hyd':'we are hear', 'pune':True}
```

```
In [73]: dict2
```

```
Out[73]: {'bang': 2, 'hyd': 'we are hear', 'pune': True}
```

```
In [74]: dict3 = {'Germany':'I have been here', 'France':2, 'Spain': True}
```

```
In [75]: dict3
```

```
Out[75]: {'Germany': 'I have been here', 'France': 2, 'Spain': True}
```

```
In [76]: dict3['Germany']
```

```
Out[76]: 'I have been here'
```

```
In [77]: Games
```

```
Out[77]: array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],  
                 [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],  
                 [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],  
                 [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],  
                 [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],  
                 [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],  
                 [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],  
                 [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],  
                 [40, 40, 40, 81, 78, 81, 39, 0, 10, 51],  
                 [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

```
In [78]: Pdict
```

```
Out[78]: {'Sachin': 0,  
          'Rahul': 1,  
          'Smith': 2,  
          'Sami': 3,  
          'Pollard': 4,  
          'Morris': 5,  
          'Samson': 6,  
          'Dhoni': 7,  
          'Kohli': 8,  
          'Sky': 9}
```

```
In [79]: Pdict['Sachin']
```

```
Out[79]: 0
```

```
In [80]: Games[0]
```

```
Out[80]: array([80, 77, 82, 82, 73, 82, 58, 78, 6, 35])
```

```
In [81]: Games
```

```
Out[81]: array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],  
[82, 57, 82, 79, 76, 72, 60, 72, 79, 80],  
[79, 78, 75, 81, 76, 79, 62, 76, 77, 69],  
[80, 65, 77, 66, 69, 77, 55, 67, 77, 40],  
[82, 82, 82, 79, 82, 78, 54, 76, 71, 41],  
[70, 69, 67, 77, 70, 77, 57, 74, 79, 44],  
[78, 64, 80, 78, 45, 80, 60, 70, 62, 82],  
[35, 35, 80, 74, 82, 78, 66, 81, 81, 27],  
[40, 40, 40, 81, 78, 81, 39, 0, 10, 51],  
[75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

```
In [82]: Pdict['Rahul']
```

```
Out[82]: 1
```

```
In [83]: Games[1]
```

```
Out[83]: array([82, 57, 82, 79, 76, 72, 60, 72, 79, 80])
```

Games

```
In [84]: Games[Pdict['Rahul']]
```

```
Out[84]: array([82, 57, 82, 79, 76, 72, 60, 72, 79, 80])
```

```
In [85]: Points
```

```
Out[85]: array([[2832, 2430, 2323, 2201, 1970, 2078, 1616, 2133, 83, 782],  
[1653, 1426, 1779, 1688, 1619, 1312, 1129, 1170, 1245, 1154],  
[2478, 2132, 2250, 2304, 2258, 2111, 1683, 2036, 2089, 1743],  
[2122, 1881, 1978, 1504, 1943, 1970, 1245, 1920, 2112, 966],  
[1292, 1443, 1695, 1624, 1503, 1784, 1113, 1296, 1297, 646],  
[1572, 1561, 1496, 1746, 1678, 1438, 1025, 1232, 1281, 928],  
[1258, 1104, 1684, 1781, 841, 1268, 1189, 1186, 1185, 1564],  
[903, 903, 1624, 1871, 2472, 2161, 1850, 2280, 2593, 686],  
[597, 597, 597, 1361, 1619, 2026, 852, 0, 159, 904],  
[2040, 1397, 1254, 2386, 2045, 1941, 1082, 1463, 1028, 1331]])
```

In [86]: Salary

```
Out[86]: array([[15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
   25244493, 27849149, 30453805, 23500000],
   [12000000, 12744189, 13488377, 14232567, 14976754, 16324500,
   18038573, 19752645, 21466718, 23180790],
   [ 4621800,  5828090, 13041250, 14410581, 15779912, 14500000,
   16022500, 17545000, 19067500, 20644400],
   [ 3713640,  4694041, 13041250, 14410581, 15779912, 17149243,
   18518574, 19450000, 22407474, 22458000],
   [ 4493160,  4806720, 6061274, 13758000, 15202590, 16647180,
   18091770, 19536360, 20513178, 21436271],
   [ 3348000,  4235220, 12455000, 14410581, 15779912, 14500000,
   16022500, 17545000, 19067500, 20644400],
   [ 3144240,  3380160, 3615960, 4574189, 13520500, 14940153,
   16359805, 17779458, 18668431, 20068563],
   [ 0, 0, 4171200, 4484040, 4796880, 6053663,
   15506632, 16669630, 17832627, 18995624],
   [ 0, 0, 0, 4822800, 5184480, 5546160,
   6993708, 16402500, 17632688, 18862875],
   [ 3031920, 3841443, 13041250, 14410581, 15779912, 14200000,
   15691000, 17182000, 18673000, 15000000]])
```

In [87]: Salary[2,4]

```
Out[87]: 15779912
```

In [88]: Salary

```
Out[88]: array([[15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
   25244493, 27849149, 30453805, 23500000],
   [12000000, 12744189, 13488377, 14232567, 14976754, 16324500,
   18038573, 19752645, 21466718, 23180790],
   [ 4621800,  5828090, 13041250, 14410581, 15779912, 14500000,
   16022500, 17545000, 19067500, 20644400],
   [ 3713640,  4694041, 13041250, 14410581, 15779912, 17149243,
   18518574, 19450000, 22407474, 22458000],
   [ 4493160,  4806720, 6061274, 13758000, 15202590, 16647180,
   18091770, 19536360, 20513178, 21436271],
   [ 3348000,  4235220, 12455000, 14410581, 15779912, 14500000,
   16022500, 17545000, 19067500, 20644400],
   [ 3144240,  3380160, 3615960, 4574189, 13520500, 14940153,
   16359805, 17779458, 18668431, 20068563],
   [ 0, 0, 4171200, 4484040, 4796880, 6053663,
   15506632, 16669630, 17832627, 18995624],
   [ 0, 0, 0, 4822800, 5184480, 5546160,
   6993708, 16402500, 17632688, 18862875],
   [ 3031920, 3841443, 13041250, 14410581, 15779912, 14200000,
   15691000, 17182000, 18673000, 15000000]])
```

In [89]: Salary[Pdict['Sky']][Sdict['2019']]

```
Out[89]: 15000000
```

```
In [90]: Salary[Sdict['2019']]
```

```
Out[90]: array([ 3031920, 3841443, 13041250, 14410581, 15779912, 14200000,  
   15691000, 17182000, 18673000, 15000000])
```

```
In [91]: Games
```

```
Out[91]: array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],  
   [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],  
   [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],  
   [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],  
   [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],  
   [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],  
   [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],  
   [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],  
   [40, 40, 40, 81, 78, 81, 39, 0, 10, 51],  
   [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

In [92]: Salary/Games

```
C:\Users\arnak\AppData\Local\Temp\ipykernel_22972\3709746658.py:1: RuntimeWarning: divide by zero encountered in divide
    Salary/Games
```

Out[92]: array([[199335.9375 , 230113.63636364, 237690.54878049,
 259298.7804878 , 315539.38356164, 302515.24390244,
 435249.87931034, 357040.37179487, 5075634.16666667,
 671428.57142857],
 [146341.46341463, 223582.26315789, 164492.40243902,
 180159.07594937, 197062.55263158, 226729.16666667,
 300642.88333333, 274342.29166667, 271730.60759494,
 289759.875],
 [58503.79746835, 74719.1025641 , 173883.33333333,
 177908.40740741, 207630.42105263, 183544.30379747,
 258427.41935484, 230855.26315789, 247629.87012987,
 299194.20289855],
 [46420.5 , 72216.01538462, 169366.88311688,
 218342.13636364, 228694.37681159, 222717.44155844,
 336701.34545455, 290298.50746269, 291006.15584416,
 561450.],
 [54794.63414634, 58618.53658537, 73917.97560976,
 174151.89873418, 185397.43902439, 213425.38461538,
 335032.77777778, 257057.36842105, 288918. ,
 522835.87804878],
 [47828.57142857, 61380. , 185895.52238806,
 187150.4025974 , 225427.31428571, 188311.68831169,
 281096.49122807, 237094.59459459, 241360.75949367,
 469190.90909091],
 [40310.76923077, 52815. , 45199.5 ,
 58643.44871795, 300455.55555556, 186751.9125 ,
 272663.41666667, 253992.25714286, 301103.72580645,
 244738.57317073],
 [0. , 0. , 52140. ,
 60595.13513514, 58498.53658537, 77611.06410256,
 234948.96969697, 205797.90123457, 220155.88888889,
 703541.62962963],
 [0. , 0. , 0. ,
 59540.74074074, 66467.69230769, 68471.11111111,
 179325.84615385, inf, 1763268.8 ,
 369860.29411765],
 [40425.6 , 75322.41176471, 255710.78431373,
 182412.41772152, 204933.92207792, 186842.10526316,
 320224.48979592, 249014.49275362, 345796.2962963 ,
 241935.48387097]])

```
In [93]: np.round(Salary/Games)
```

```
C:\Users\arnak\AppData\Local\Temp\ipykernel_22972\2909567671.py:1: RuntimeWarning:  
g: divide by zero encountered in divide  
    np.round(Salary/Games)
```

```
Out[93]: array([[ 199336.,  230114.,  237691.,  259299.,  315539.,  302515.,  
        435250.,  357040.,  5075634.,  671429.],  
       [ 146341.,  223582.,  164492.,  180159.,  197063.,  226729.,  
        300643.,  274342.,  271731.,  289760.],  
       [ 58504.,   74719.,  173883.,  177908.,  207630.,  183544.,  
        258427.,  230855.,  247630.,  299194.],  
       [ 46420.,   72216.,  169367.,  218342.,  228694.,  222717.,  
        336701.,  290299.,  291006.,  561450.],  
       [ 54795.,   58619.,  73918.,  174152.,  185397.,  213425.,  
        335033.,  257057.,  288918.,  522836.],  
       [ 47829.,   61380.,  185896.,  187150.,  225427.,  188312.,  
        281096.,  237095.,  241361.,  469191.],  
       [ 40311.,   52815.,  45200.,  58643.,  300456.,  186752.,  
        272663.,  253992.,  301104.,  244739.],  
       [     0.,       0.,   52140.,   60595.,   58499.,   77611.,  
        234949.,  205798.,  220156.,  703542.],  
       [     0.,       0.,       0.,   59541.,   66468.,   68471.,  
        179326.,      inf,  1763269.,  369860.],  
       [ 40426.,   75322.,  255711.,  182412.,  204934.,  186842.,  
        320224.,  249014.,  345796.,  241935.]])
```

```
In [94]: import warnings  
warnings.filterwarnings("ignore")
```

```
In [96]: import matplotlib.pyplot as plt
```

```
In [97]: %matplotlib inline
```

```
In [98]: 1 Salary
```

```
Out[98]: array([[15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
 25244493, 27849149, 30453805, 23500000],
[12000000, 12744189, 13488377, 14232567, 14976754, 16324500,
 18038573, 19752645, 21466718, 23180790],
[ 4621800,  5828090, 13041250, 14410581, 15779912, 14500000,
 16022500, 17545000, 19067500, 20644400],
[ 3713640,  4694041, 13041250, 14410581, 15779912, 17149243,
 18518574, 19450000, 22407474, 22458000],
[ 4493160,  4806720, 6061274, 13758000, 15202590, 16647180,
 18091770, 19536360, 20513178, 21436271],
[ 3348000,  4235220, 12455000, 14410581, 15779912, 14500000,
 16022500, 17545000, 19067500, 20644400],
[ 3144240,  3380160, 3615960, 4574189, 13520500, 14940153,
 16359805, 17779458, 18668431, 20068563],
[      0,          0, 4171200, 4484040, 4796880, 6053663,
 15506632, 16669630, 17832627, 18995624],
[      0,          0,          0, 4822800, 5184480, 5546160,
 6993708, 16402500, 17632688, 18862875],
[ 3031920,  3841443, 13041250, 14410581, 15779912, 14200000,
 15691000, 17182000, 18673000, 15000000]])
```

```
In [101]: Salary[0]
```

```
Out[101]: array([15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
 25244493, 27849149, 30453805, 23500000])
```

```
In [103]: Pdict
```

```
Out[103]: {'Sachin': 0,
 'Rahul': 1,
 'Smith': 2,
 'Sami': 3,
 'Pollard': 4,
 'Morris': 5,
 'Samson': 6,
 'Dhoni': 7,
 'Kohli': 8,
 'Sky': 9}
```

```
In [104]: Games[5]
```

```
Out[104]: array([70, 69, 67, 77, 70, 77, 57, 74, 79, 44])
```

```
In [149]: Pdict
```

```
Out[149]: {'Sachin': 0,  
           'Rahul': 1,  
           'Smith': 2,  
           'Sami': 3,  
           'Pollard': 4,  
           'Morris': 5,  
           'Samson': 6,  
           'Dhoni': 7,  
           'Kohli': 8,  
           'Sky': 9}
```

```
In [150]: Games[Pdict['Dhoni']]
```

```
Out[150]: array([35, 35, 80, 74, 82, 78, 66, 81, 81, 27])
```

```
In [151]: Points[6]
```

```
Out[151]: array([1258, 1104, 1684, 1781, 841, 1268, 1189, 1186, 1185, 1564])
```

```
In [185]: import warnings  
warnings.filterwarnings('ignore')
```

```
In [186]: import numpy as np  
import matplotlib.pyplot as plt
```

```
In [187]: %matplotlib inline
```

```
In [188]: Salary
```

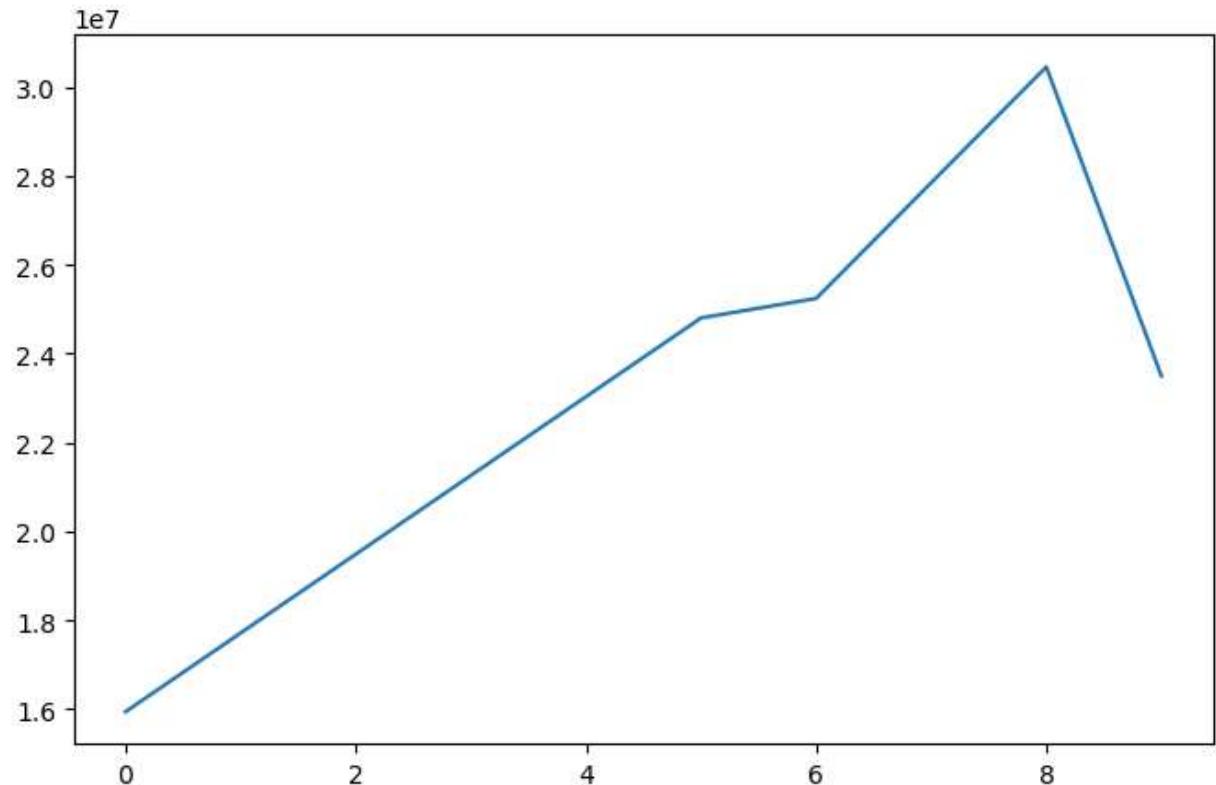
```
Out[188]: array([[15946875, 17718750, 19490625, 21262500, 23034375, 24806250,  
                  25244493, 27849149, 30453805, 23500000],  
                  [12000000, 12744189, 13488377, 14232567, 14976754, 16324500,  
                   18038573, 19752645, 21466718, 23180790],  
                  [ 4621800,  5828090, 13041250, 14410581, 15779912, 14500000,  
                   16022500, 17545000, 19067500, 20644400],  
                  [ 3713640,  4694041, 13041250, 14410581, 15779912, 17149243,  
                   18518574, 19450000, 22407474, 22458000],  
                  [ 4493160,  4806720,  6061274, 13758000, 15202590, 16647180,  
                   18091770, 19536360, 20513178, 21436271],  
                  [ 3348000,  4235220, 12455000, 14410581, 15779912, 14500000,  
                   16022500, 17545000, 19067500, 20644400],  
                  [ 3144240,  3380160, 3615960, 4574189, 13520500, 14940153,  
                   16359805, 17779458, 18668431, 20068563],  
                  [      0,       0, 4171200, 4484040, 4796880, 6053663,  
                   15506632, 16669630, 17832627, 18995624],  
                  [      0,       0,       0, 4822800, 5184480, 5546160,  
                   6993708, 16402500, 17632688, 18862875],  
                  [ 3031920, 3841443, 13041250, 14410581, 15779912, 14200000,  
                   15691000, 17182000, 18673000, 15000000]])
```

```
In [189]: Salary[0]
```

```
Out[189]: array([15946875, 17718750, 19490625, 21262500, 23034375, 24806250,  
25244493, 27849149, 30453805, 23500000])
```

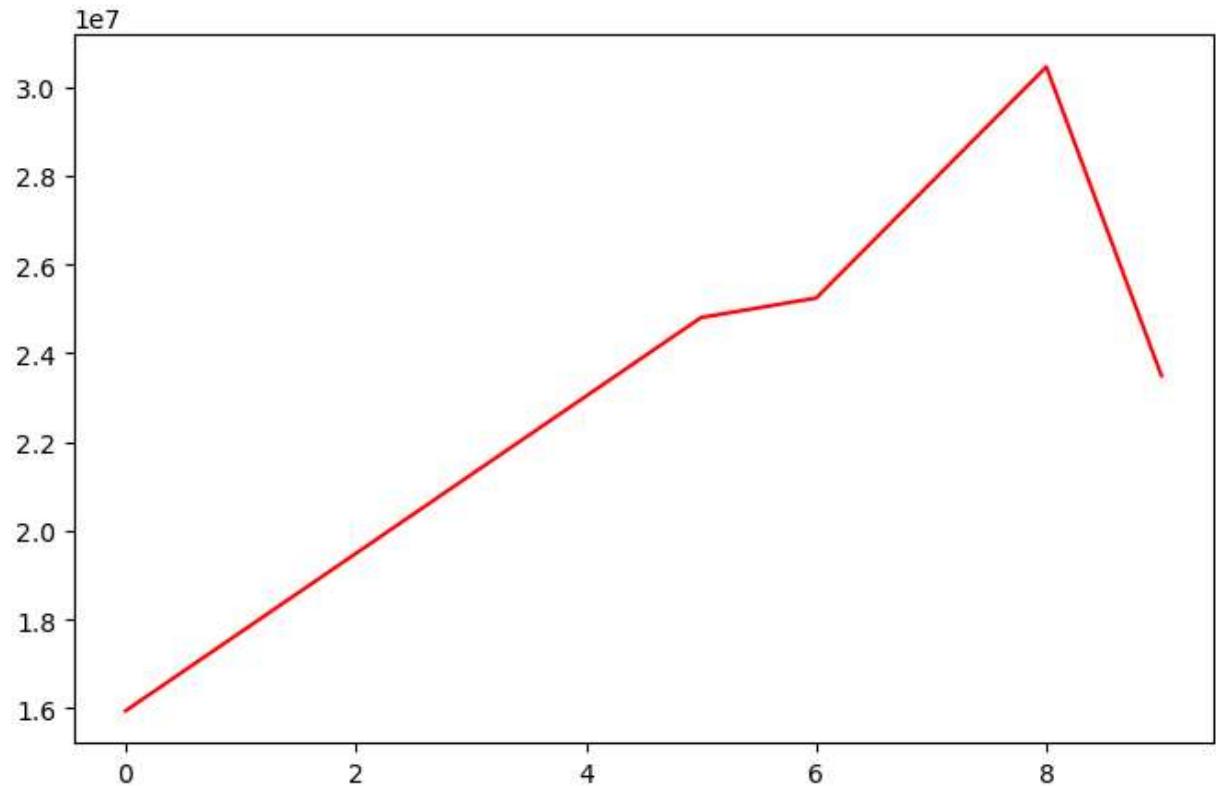
```
In [190]: plt.plot(Salary[0])
```

```
Out[190]: [<matplotlib.lines.Line2D at 0x24285b5d0d0>]
```



```
In [191]: plt.plot(Salary[0], c='red')
```

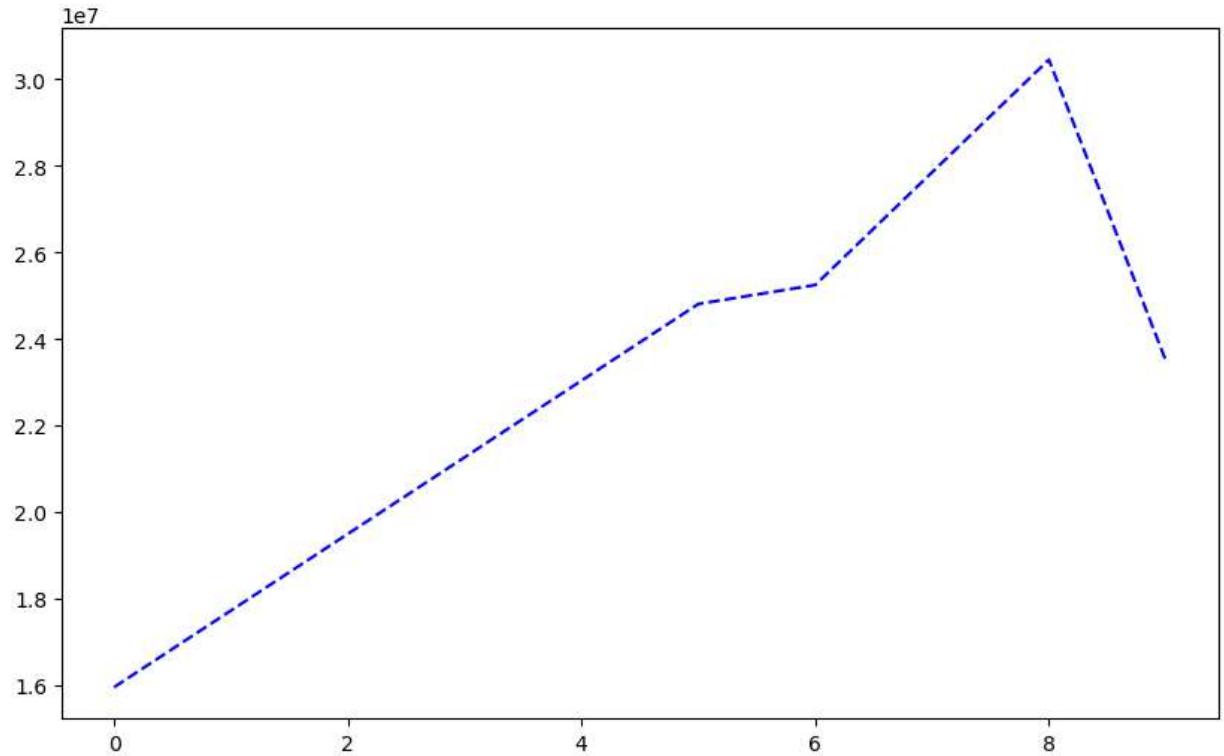
```
Out[191]: [<matplotlib.lines.Line2D at 0x24285bca410>]
```



```
In [192]: %matplotlib inline  
plt.rcParams['figure.figsize'] = 10,6
```

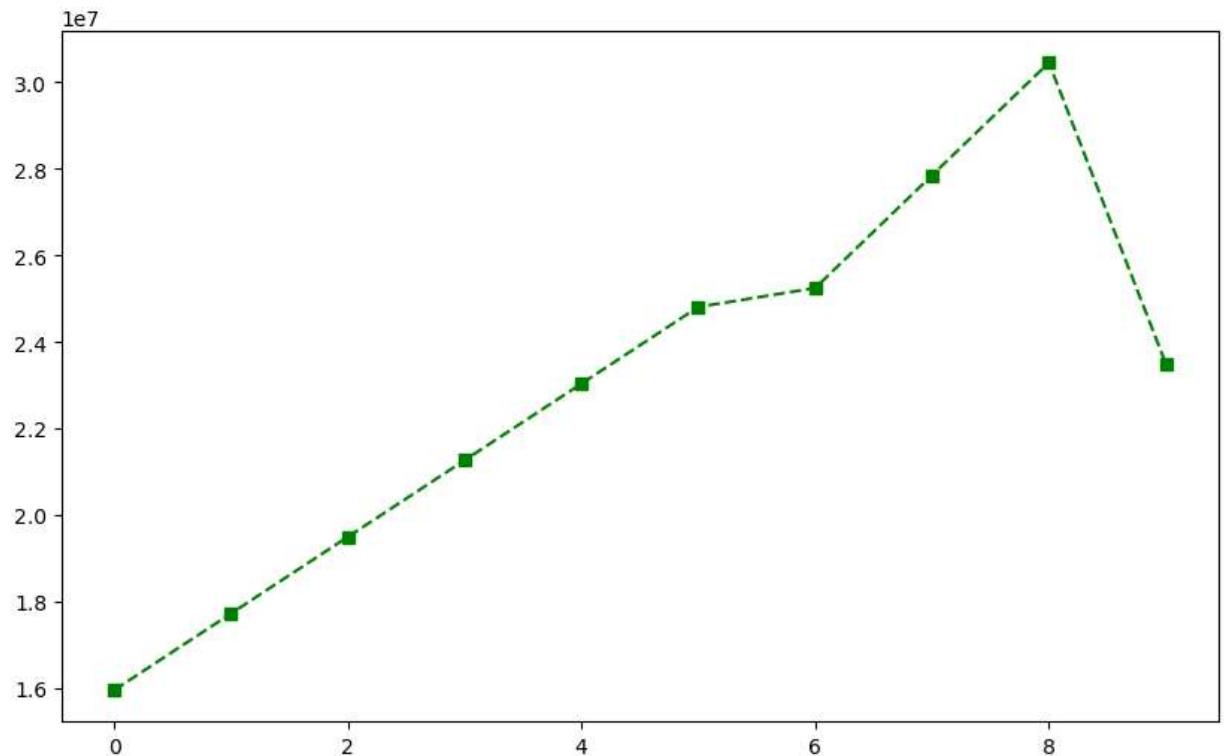
```
In [193]: plt.plot(Salary[0], c='Blue', ls = 'dashed')
```

```
Out[193]: [<matplotlib.lines.Line2D at 0x24285279cd0>]
```



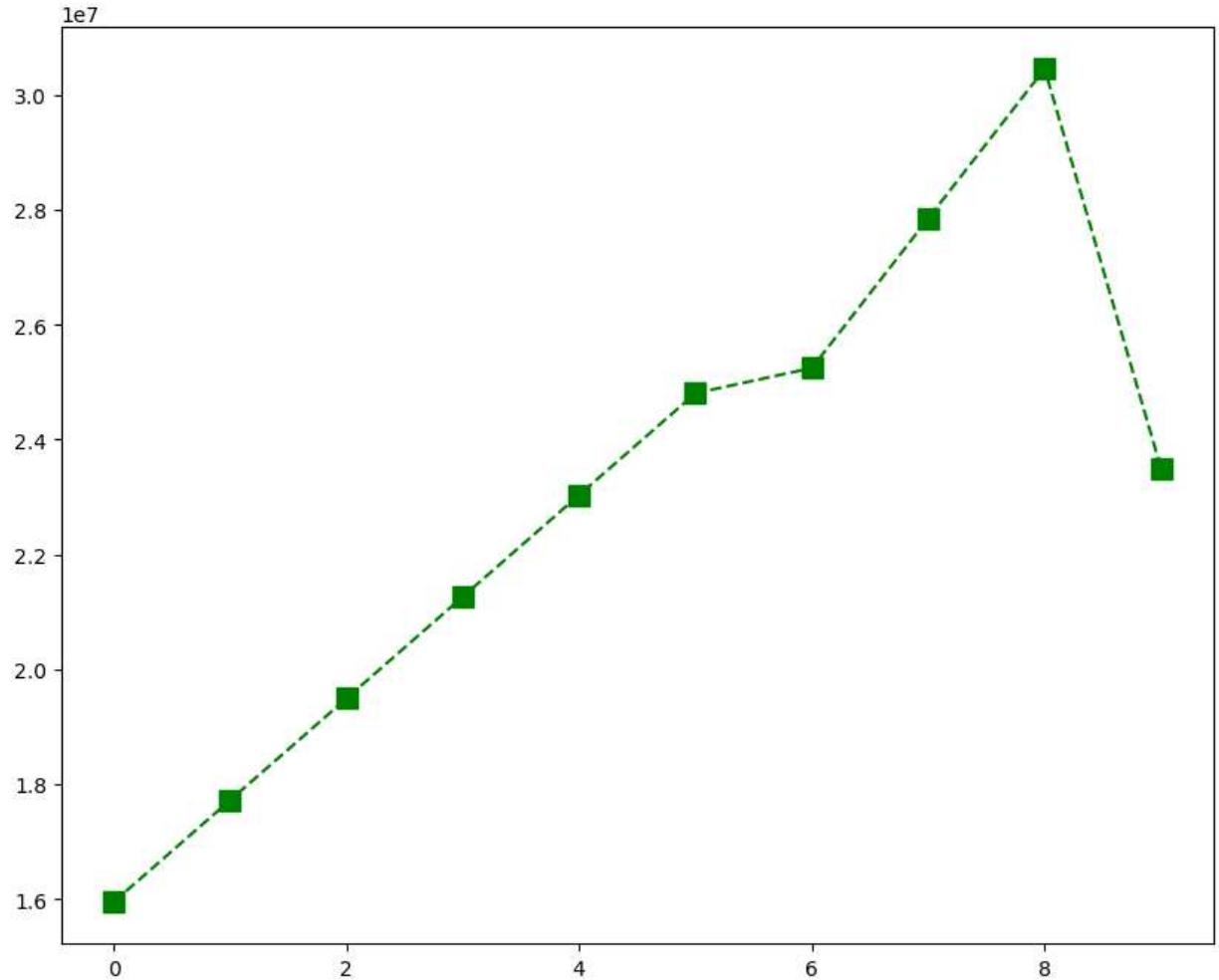
```
In [194]: plt.plot(Salary[0], c='Green', ls = '--', marker = 's')
```

```
Out[194]: [<matplotlib.lines.Line2D at 0x242852eab50>]
```



```
In [195]: %matplotlib inline  
plt.rcParams['figure.figsize'] = 10,8
```

```
In [196]: plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 10)  
plt.show()
```



```
In [197]: list(range(0,10))
```

```
Out[197]: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
```

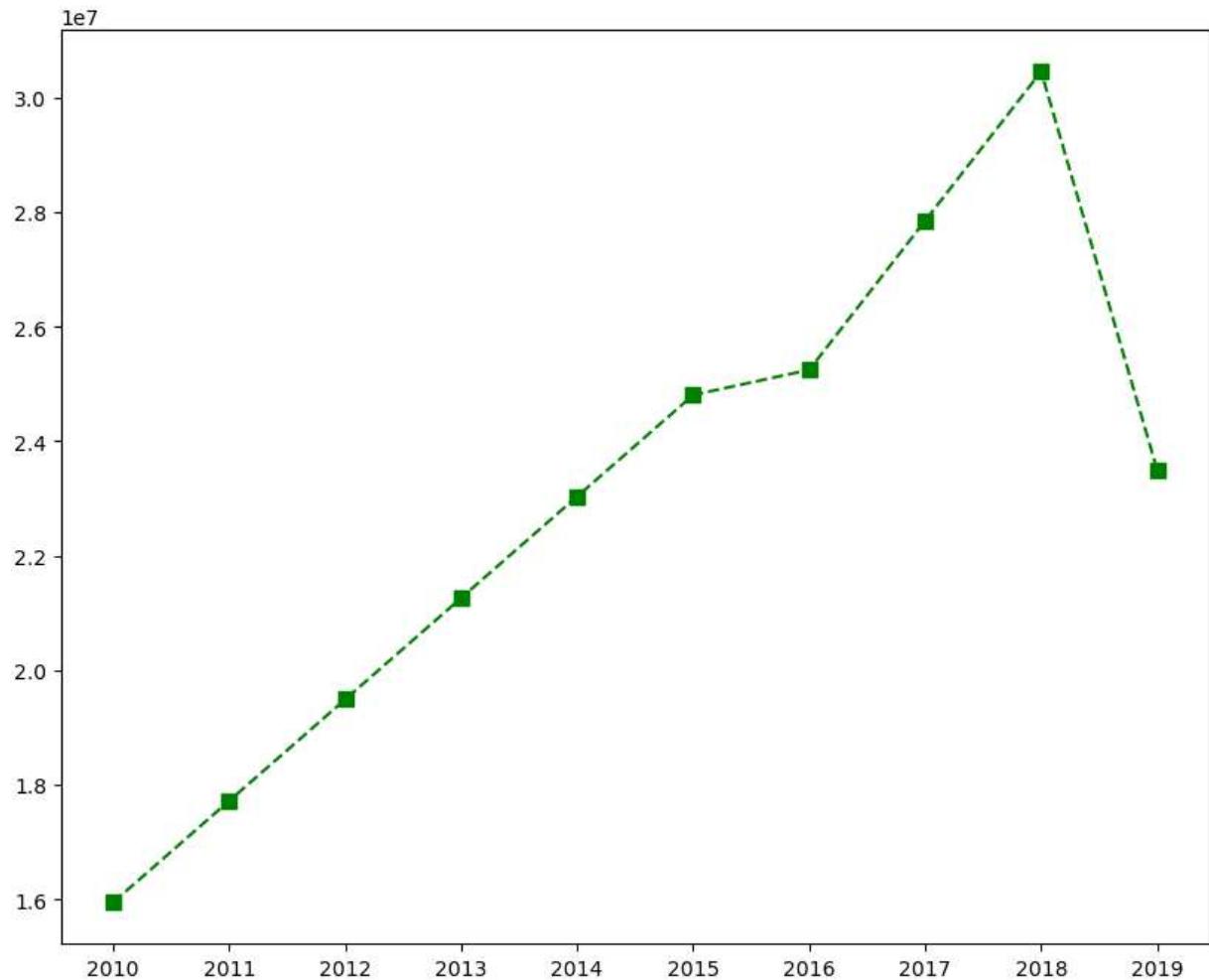
```
In [198]: Sdict
```

```
Out[198]: {'2010': 0,  
           '2011': 1,  
           '2012': 2,  
           '2013': 3,  
           '2014': 4,  
           '2015': 5,  
           '2016': 6,  
           '2017': 7,  
           '2018': 8,  
           '2019': 9}
```

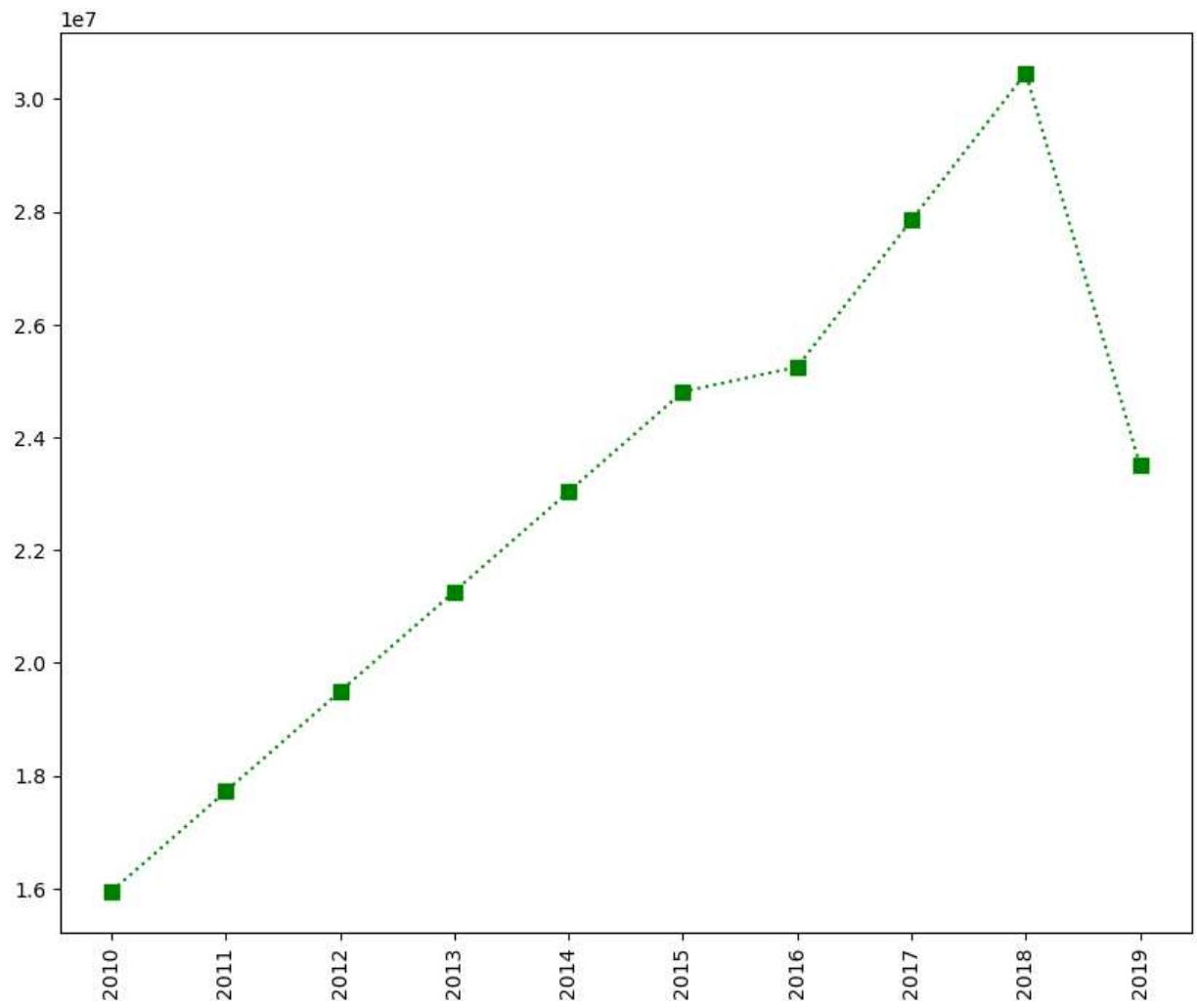
In [199]: Pdict

```
Out[199]: {'Sachin': 0,
 'Rahul': 1,
 'Smith': 2,
 'Sami': 3,
 'Pollard': 4,
 'Morris': 5,
 'Samson': 6,
 'Dhoni': 7,
 'Kohli': 8,
 'Sky': 9}
```

In [200]: plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7)
plt.xticks(list(range(0,10)), Seasons)
plt.show()



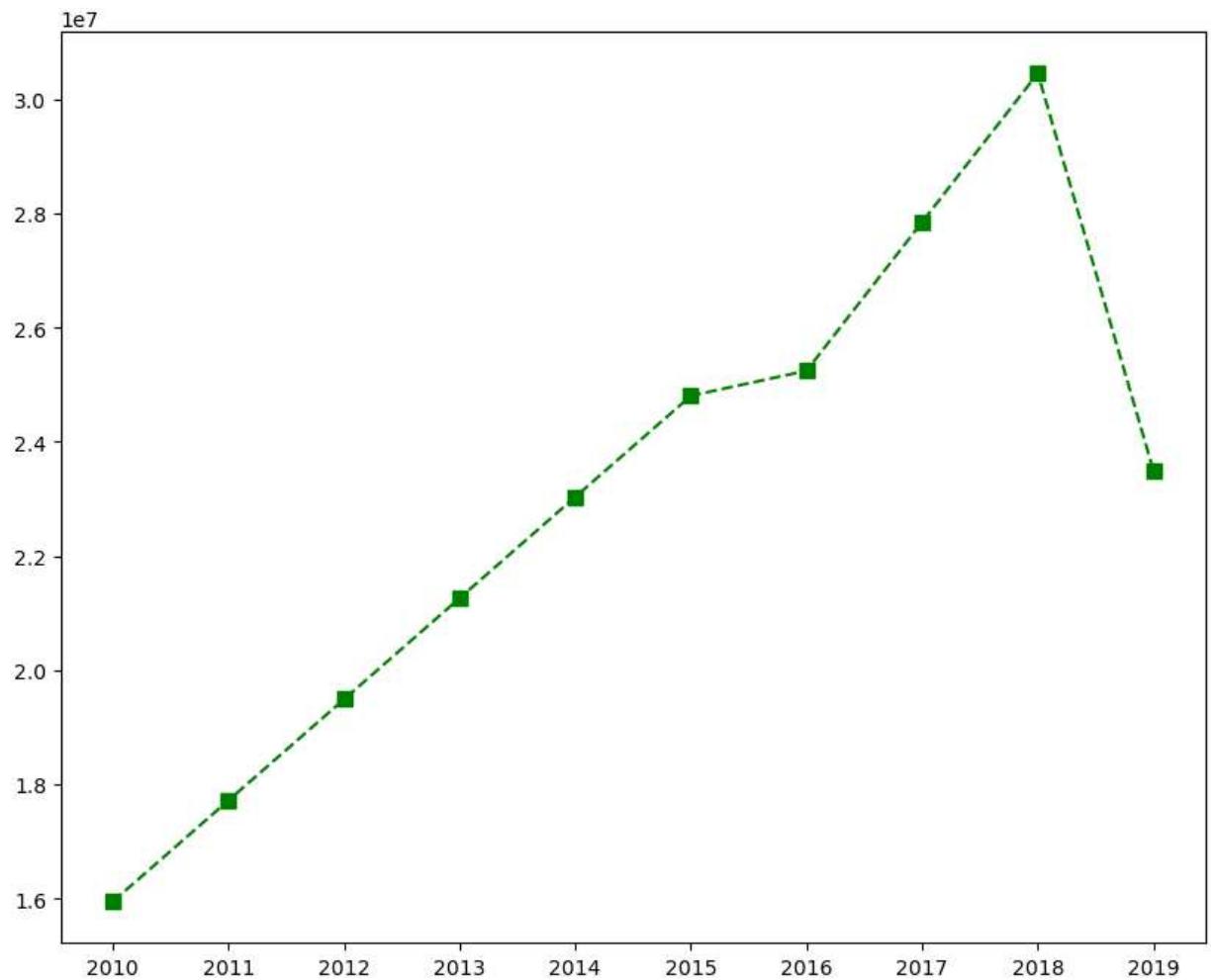
```
In [201]: plt.plot(Salary[0], c='Green', ls = ':', marker = 's', ms = 7, label = Players[0])
plt.xticks(list(range(0,10)), Seasons, rotation='vertical')
plt.show()
```



```
In [202]: Games
```

```
Out[202]: array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],
 [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],
 [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],
 [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],
 [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],
 [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],
 [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],
 [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],
 [40, 40, 40, 81, 78, 81, 39, 0, 10, 51],
 [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

```
In [203]: plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[0])
plt.xticks(list(range(0,10)), Seasons, rotation='horizontal')
plt.show()
```



```
In [204]: Salary[0]
```

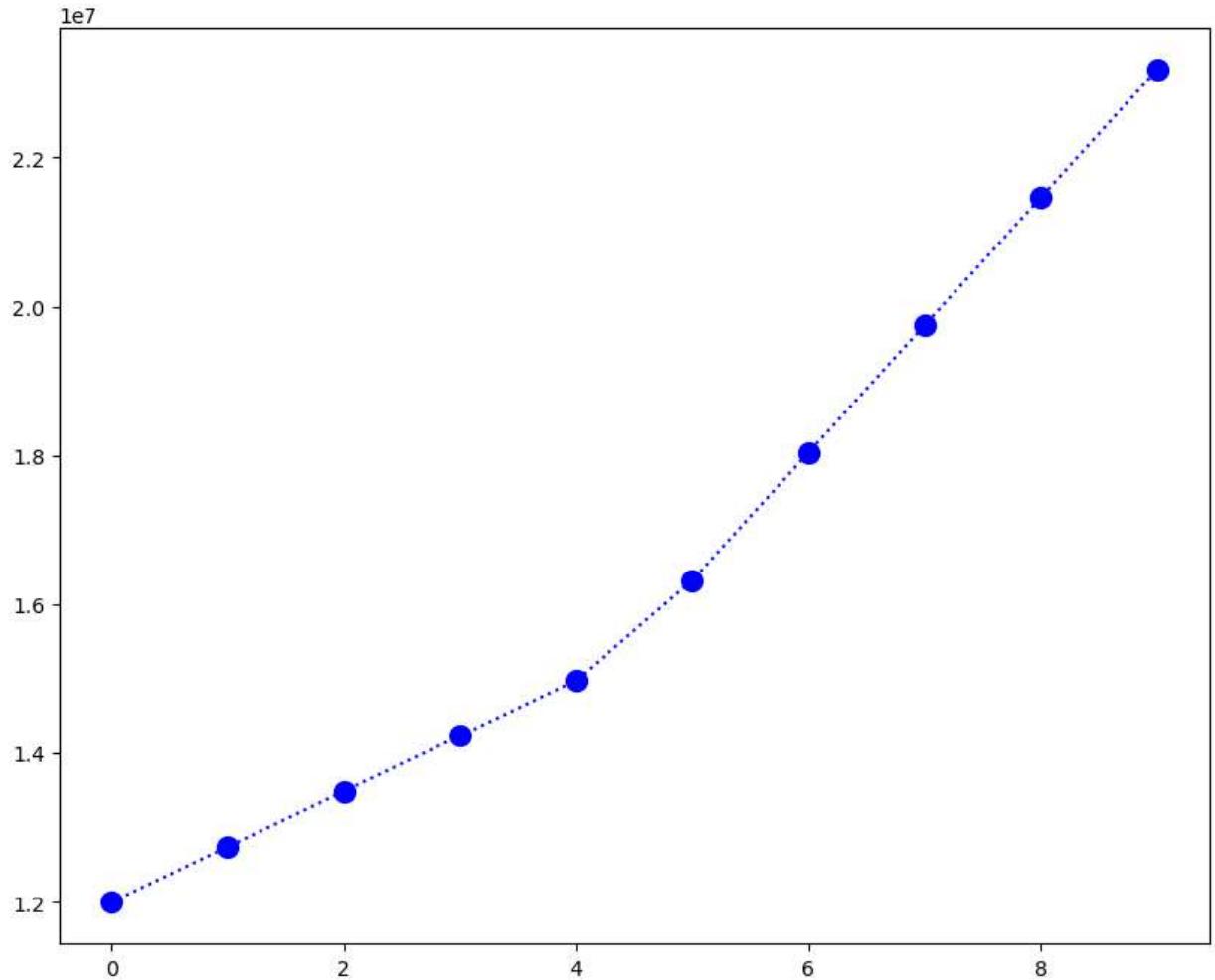
```
Out[204]: array([15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
 25244493, 27849149, 30453805, 23500000])
```

```
In [205]: Salary[1]
```

```
Out[205]: array([12000000, 12744189, 13488377, 14232567, 14976754, 16324500,
 18038573, 19752645, 21466718, 23180790])
```

```
In [206]: plt.plot(Salary[1], c='Blue', ls = ':', marker = 'o', ms = 10, label = Players[1])
```

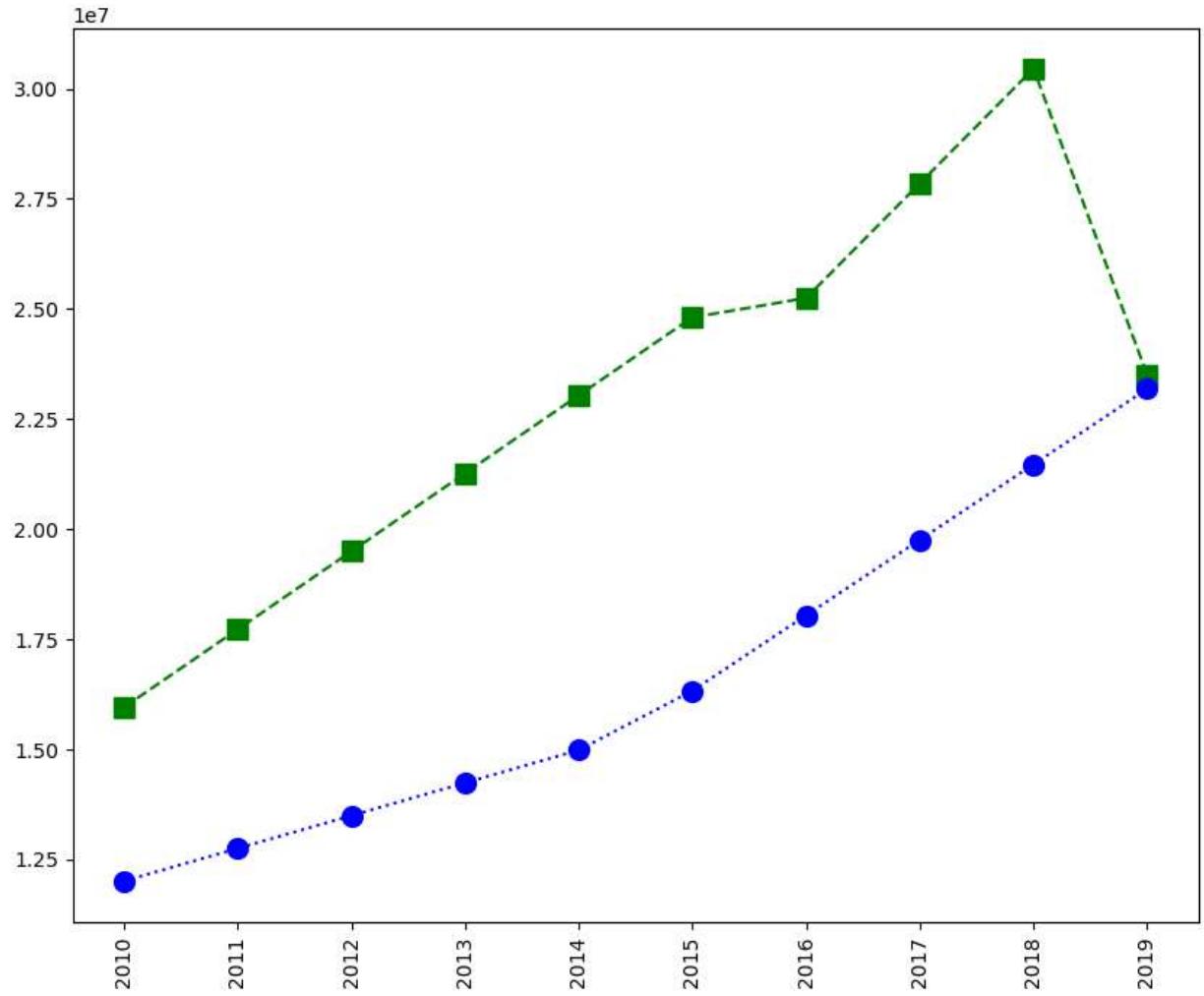
```
Out[206]: [<matplotlib.lines.Line2D at 0x2428673b050>]
```



```
In [207]: plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 10, label = Players[0])
plt.plot(Salary[1], c='Blue', ls = ':', marker = 'o', ms = 10, label = Players[1])

plt.xticks(list(range(0,10)), Seasons, rotation='vertical')

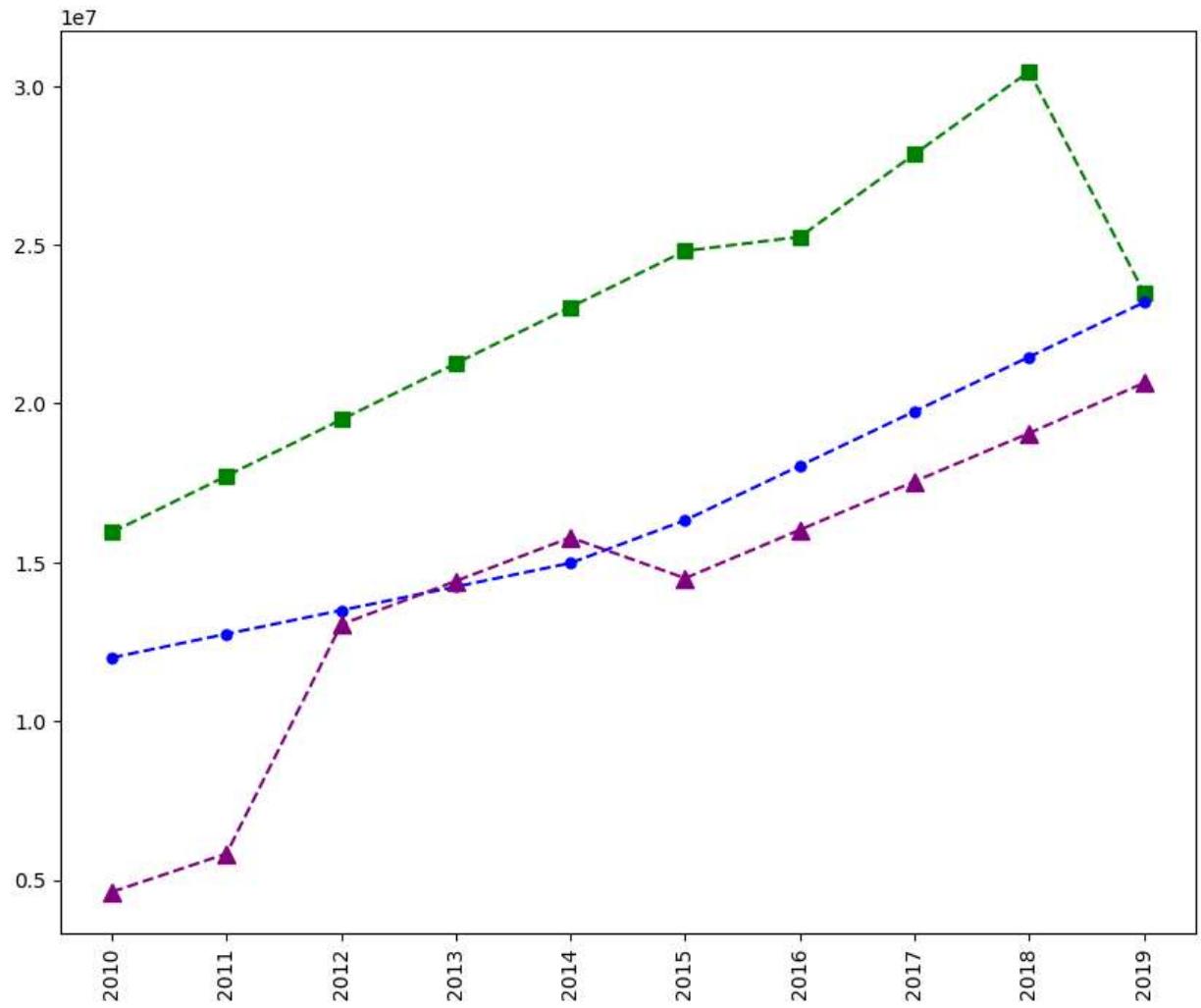
plt.show()
```



```
In [208]: plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[0]
plt.plot(Salary[1], c='Blue', ls = '--', marker = 'o', ms = 5, label = Players[1]
plt.plot(Salary[2], c='purple', ls = '--', marker = '^', ms = 8, label = Players[2]

plt.xticks(list(range(0,10)), Seasons, rotation='vertical')

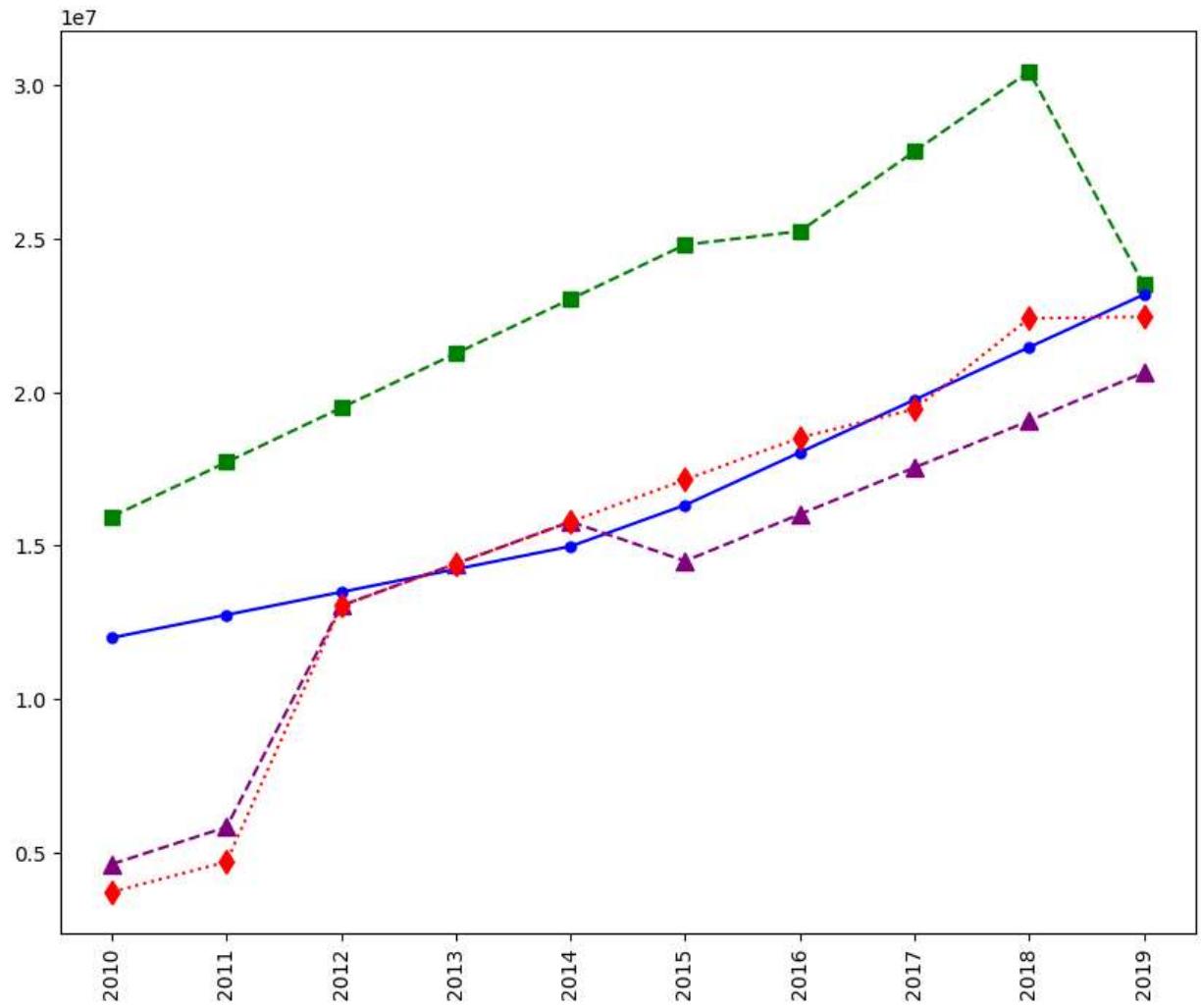
plt.show()
```



```
In [209]: plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[0])
plt.plot(Salary[1], c='Blue', ls = '-.', marker = 'o', ms = 5, label = Players[1])
plt.plot(Salary[2], c='purple', ls = '--', marker = '^', ms = 8, label = Players[2])
plt.plot(Salary[3], c='Red', ls = ':', marker = 'd', ms = 8, label = Players[3])

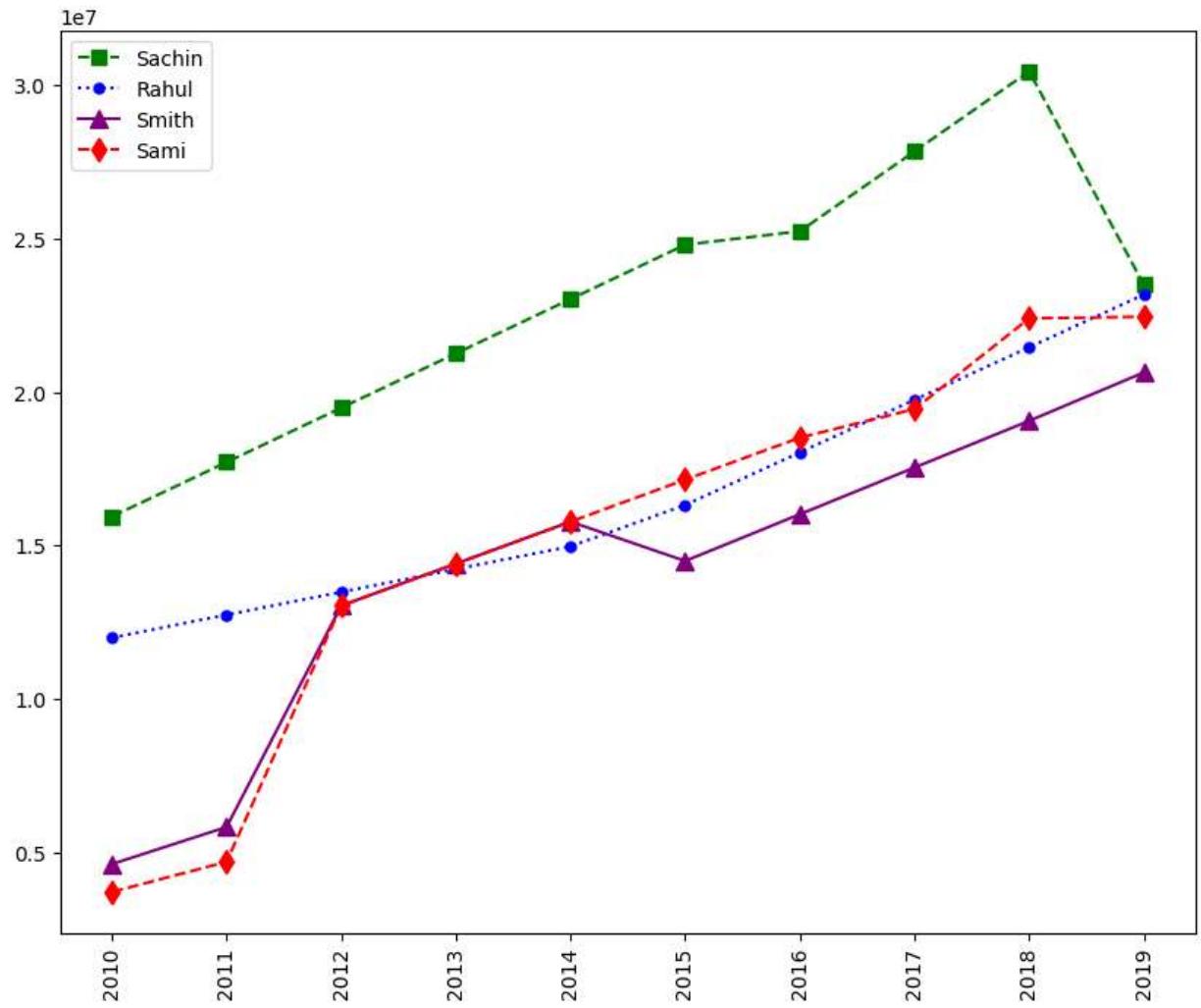
plt.xticks(list(range(0,10)), Seasons, rotation='vertical')

plt.show()
```



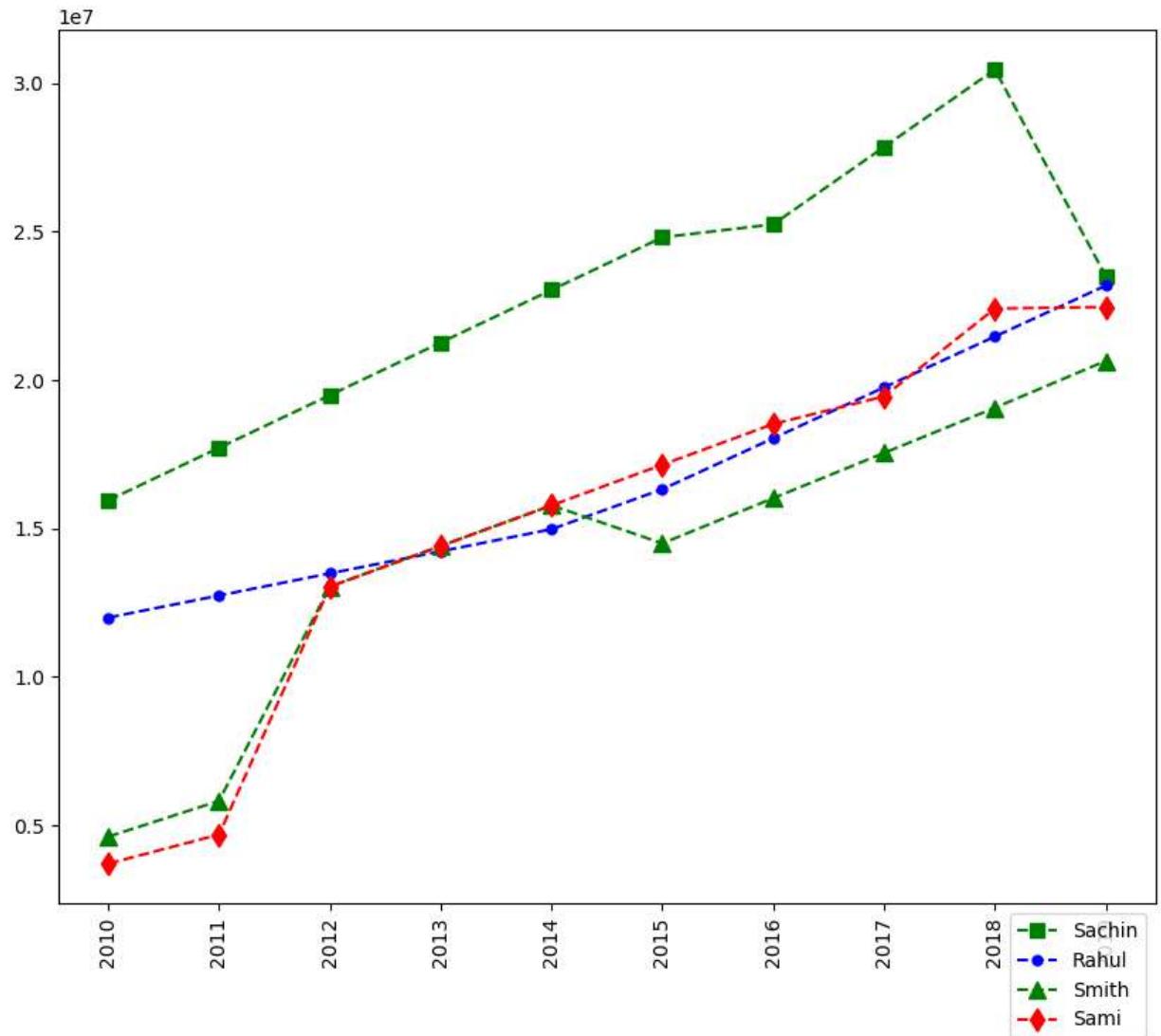
```
In [210]: plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[0]
plt.plot(Salary[1], c='Blue', ls = ':', marker = 'o', ms = 5, label = Players[1])
plt.plot(Salary[2], c='purple', ls = '-.', marker = '^', ms = 8, label = Players[2]
plt.plot(Salary[3], c='Red', ls = '--', marker = 'd', ms = 8, label = Players[3])
plt.legend()
plt.xticks(list(range(0,10)), Seasons, rotation='vertical')

plt.show()
```



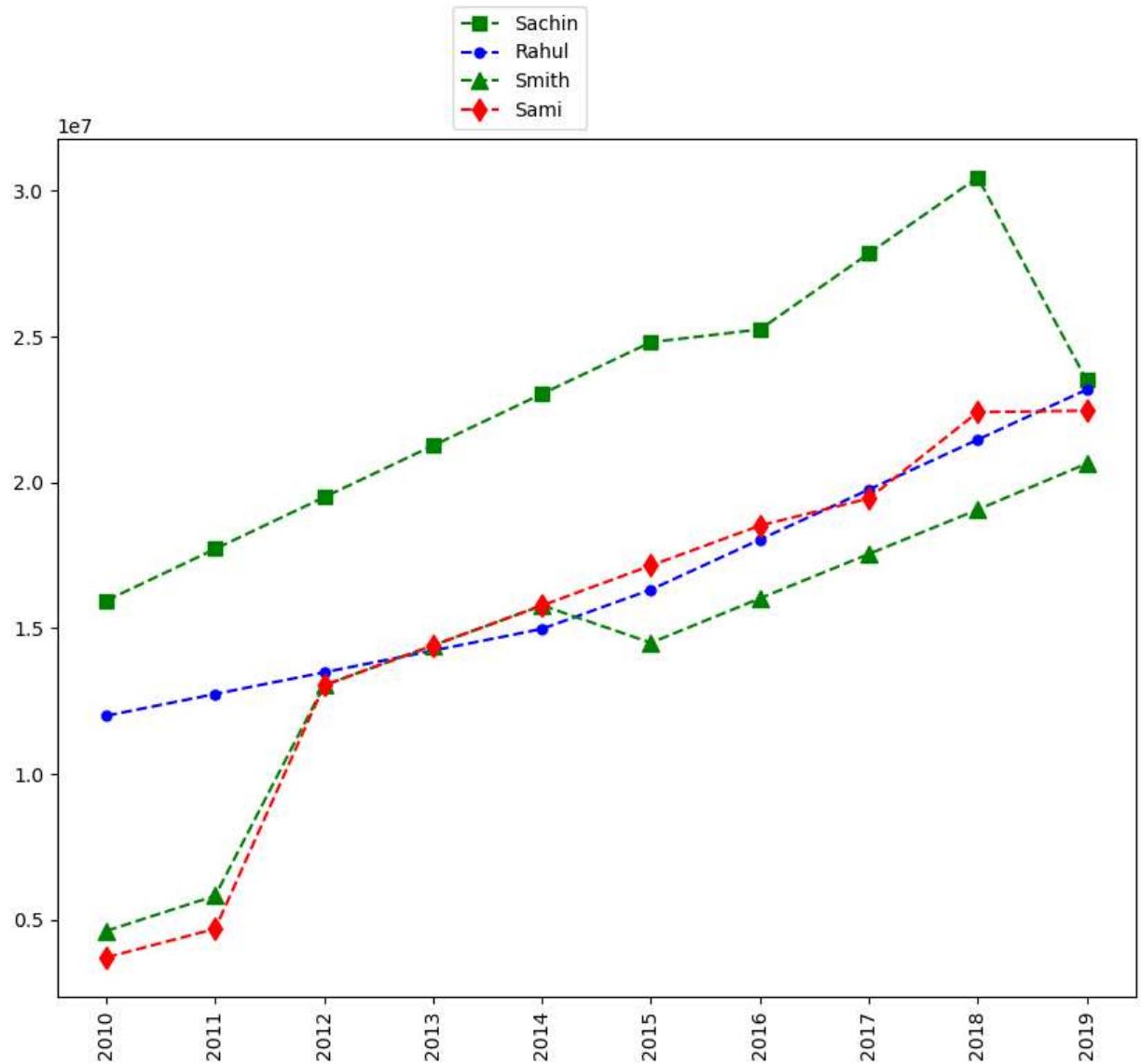
```
In [211]: plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[0]
plt.plot(Salary[1], c='Blue', ls = '--', marker = 'o', ms = 5, label = Players[1]
plt.plot(Salary[2], c='Green', ls = '--', marker = '^', ms = 8, label = Players[2]
plt.plot(Salary[3], c='Red', ls = '--', marker = 'd', ms = 8, label = Players[3])
plt.legend(loc = 'upper right',bbox_to_anchor=(1,0) )
plt.xticks(list(range(0,10)), Seasons, rotation='vertical')

plt.show()
```



```
In [212]: plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[0]
plt.plot(Salary[1], c='Blue', ls = '--', marker = 'o', ms = 5, label = Players[1]
plt.plot(Salary[2], c='Green', ls = '--', marker = '^', ms = 8, label = Players[2]
plt.plot(Salary[3], c='Red', ls = '--', marker = 'd', ms = 8, label = Players[3])
plt.legend(loc = 'lower right',bbox_to_anchor=(0.5,1) )
plt.xticks(list(range(0,10)), Seasons, rotation='vertical')

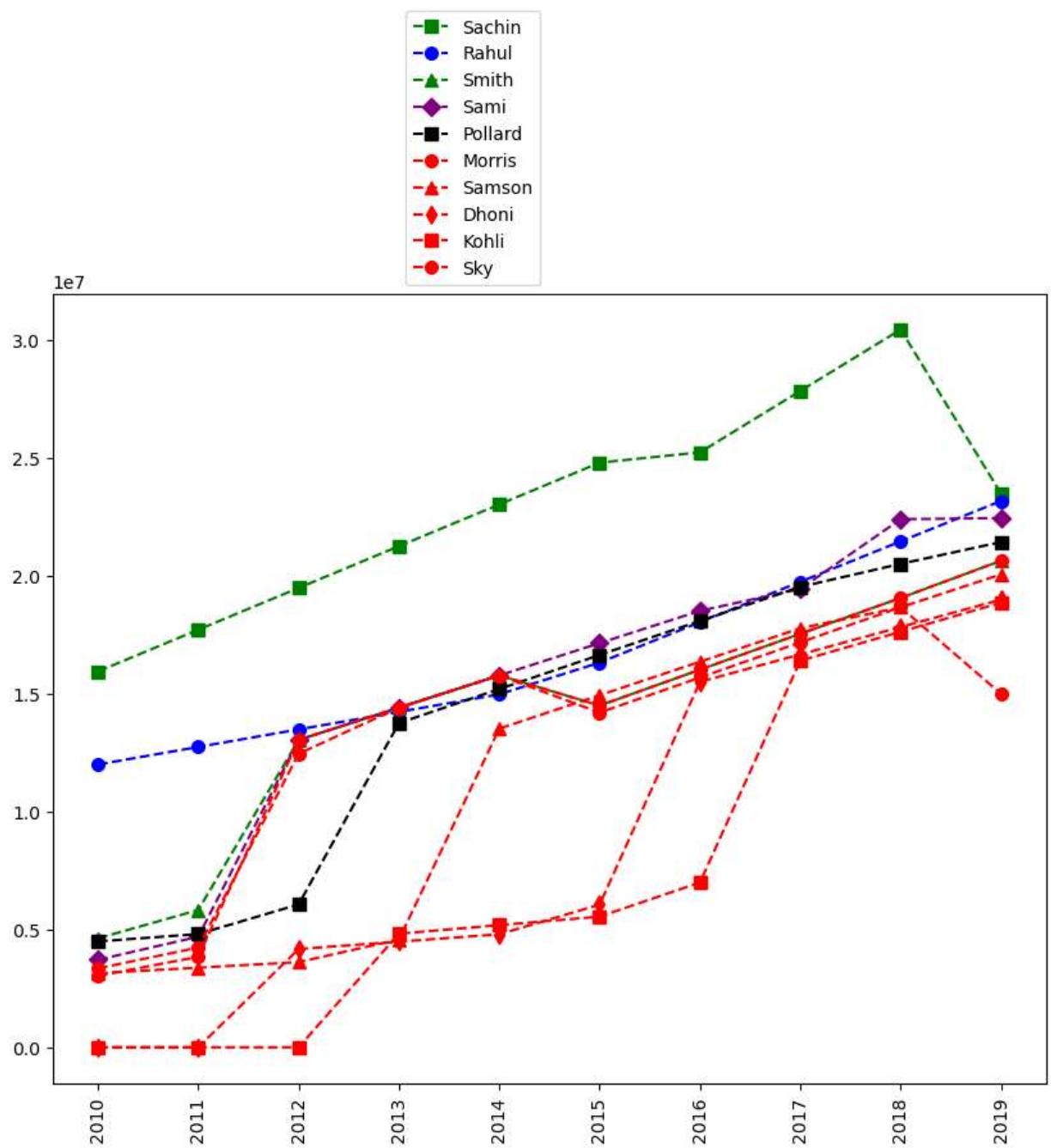
plt.show()
```



```
In [219]: plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[0]
plt.plot(Salary[1], c='Blue', ls = '--', marker = 'o', ms = 7, label = Players[1]
plt.plot(Salary[2], c='Green', ls = '--', marker = '^', ms = 7, label = Players[2]
plt.plot(Salary[3], c='Purple', ls = '--', marker = 'D', ms = 7, label = Players[3]
plt.plot(Salary[4], c='Black', ls = '--', marker = 's', ms = 7, label = Players[4]
plt.plot(Salary[5], c='Red', ls = '--', marker = 'o', ms = 7, label = Players[5])
plt.plot(Salary[6], c='Red', ls = '--', marker = '^', ms = 7, label = Players[6])
plt.plot(Salary[7], c='Red', ls = '--', marker = 'd', ms = 7, label = Players[7])
plt.plot(Salary[8], c='Red', ls = '--', marker = 's', ms = 7, label = Players[8])
plt.plot(Salary[9], c='Red', ls = '--', marker = 'o', ms = 7, label = Players[9])

plt.legend(loc = 'lower right',bbox_to_anchor=(0.5,1) )
plt.xticks(list(range(0,10)), Seasons, rotation='vertical')

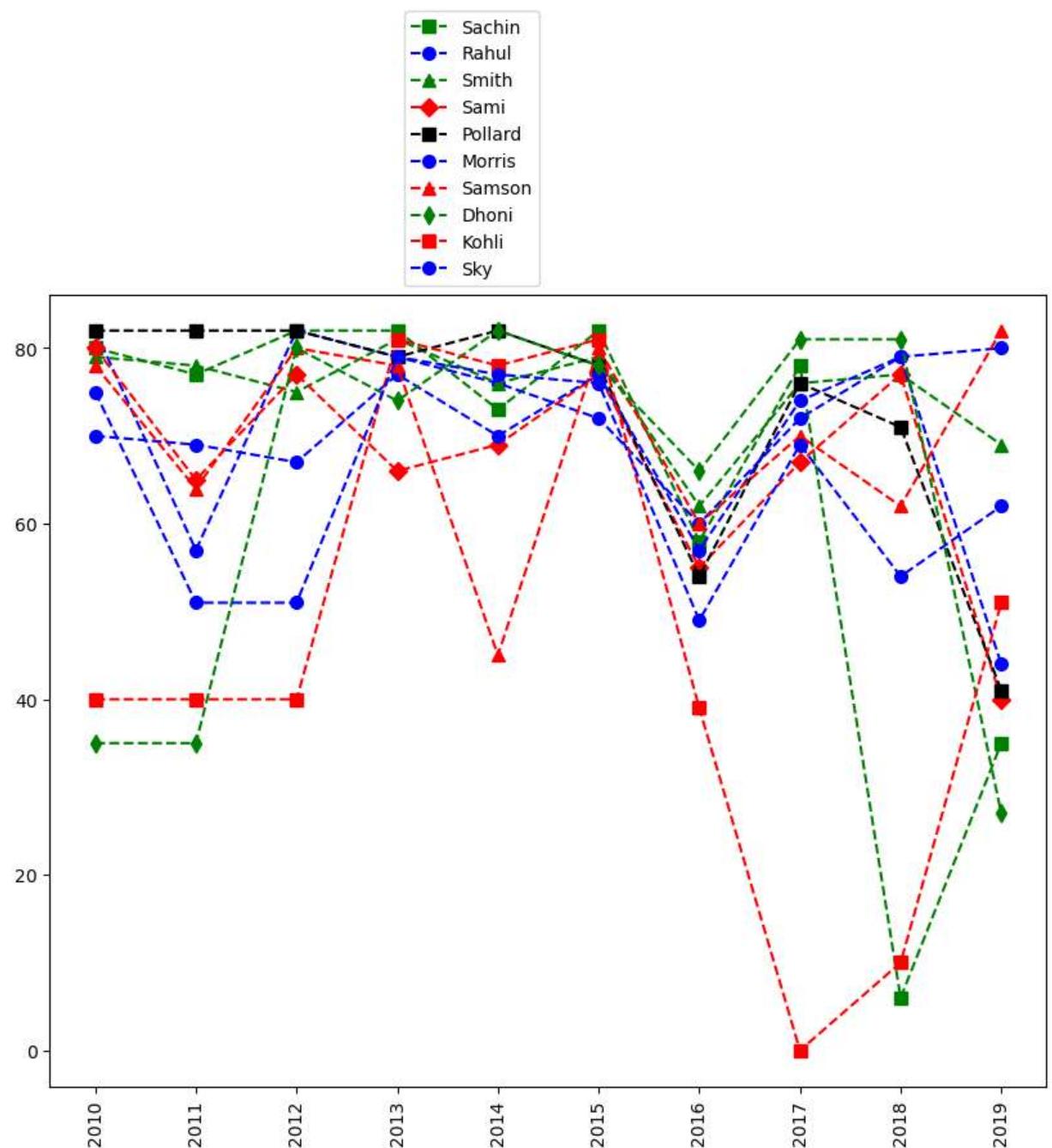
plt.show()
```



```
In [220]: plt.plot(Games[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[0])
plt.plot(Games[1], c='Blue', ls = '--', marker = 'o', ms = 7, label = Players[1])
plt.plot(Games[2], c='Green', ls = '--', marker = '^', ms = 7, label = Players[2])
plt.plot(Games[3], c='Red', ls = '--', marker = 'D', ms = 7, label = Players[3])
plt.plot(Games[4], c='Black', ls = '--', marker = 's', ms = 7, label = Players[4])
plt.plot(Games[5], c='Blue', ls = '--', marker = 'o', ms = 7, label = Players[5])
plt.plot(Games[6], c='red', ls = '--', marker = '^', ms = 7, label = Players[6])
plt.plot(Games[7], c='Green', ls = '--', marker = 'd', ms = 7, label = Players[7])
plt.plot(Games[8], c='Red', ls = '--', marker = 's', ms = 7, label = Players[8])
plt.plot(Games[9], c='Blue', ls = '--', marker = 'o', ms = 7, label = Players[9])

plt.legend(loc = 'lower right',bbox_to_anchor=(0.5,1) )
plt.xticks(list(range(0,10)), Seasons, rotation='vertical')

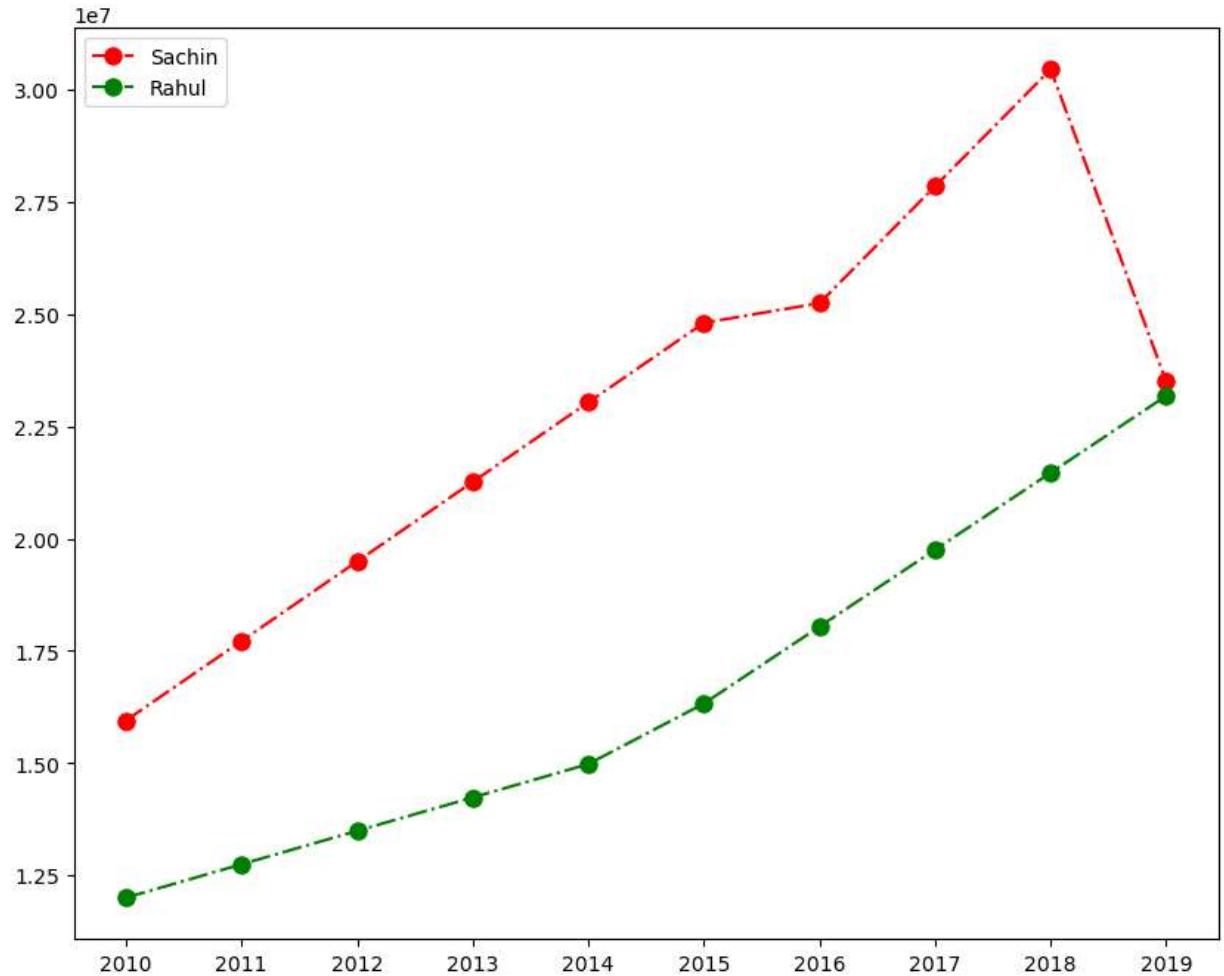
plt.show()
```



In []:

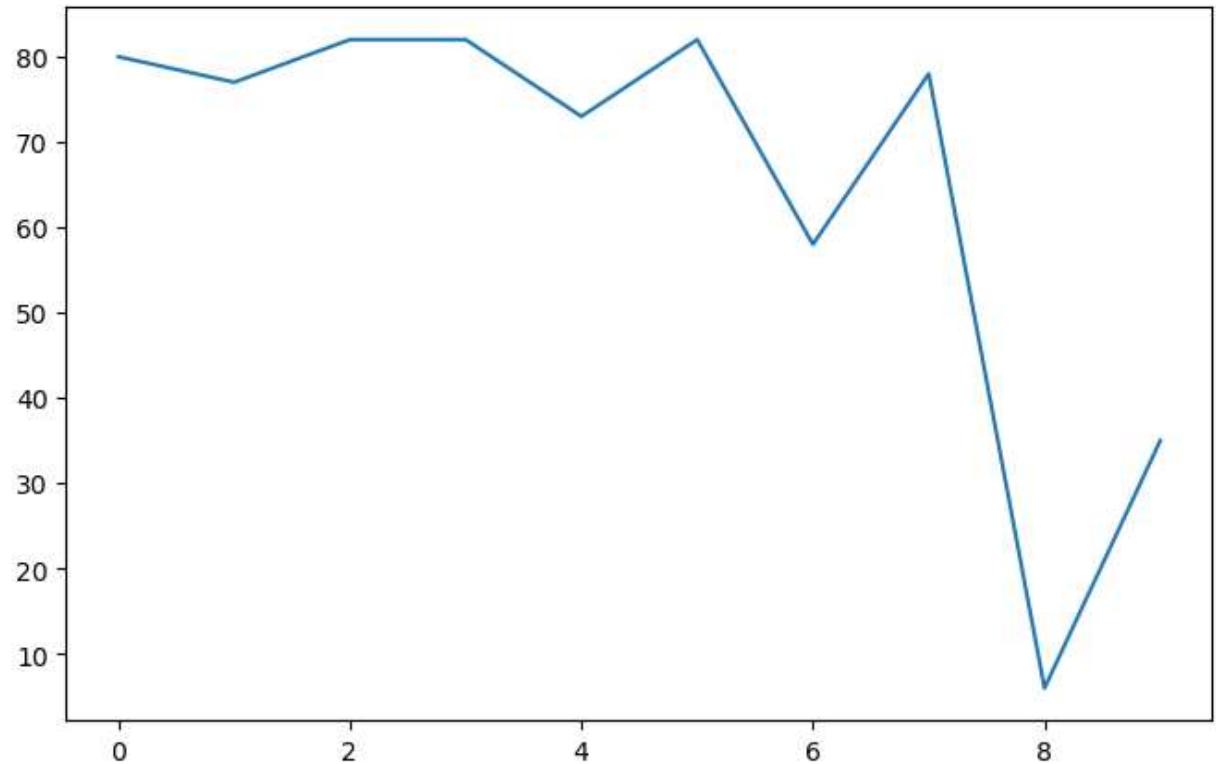
```
%matplotlib inline  
plt.rcParams['figure.figsize']=8,5
```

```
plt.plot(Salary[0],color='r',marker='o',linestyle='-.',ms=8,label=Players[0])  
plt.plot(Salary[1],color='g',marker='o',linestyle='-.',ms=8,label=Players[1])  
plt.legend(loc="upper left")  
plt.xticks(np.arange(0,10),Seasons)  
plt.show()
```



In [183]: `plt.plot(Games[0])`

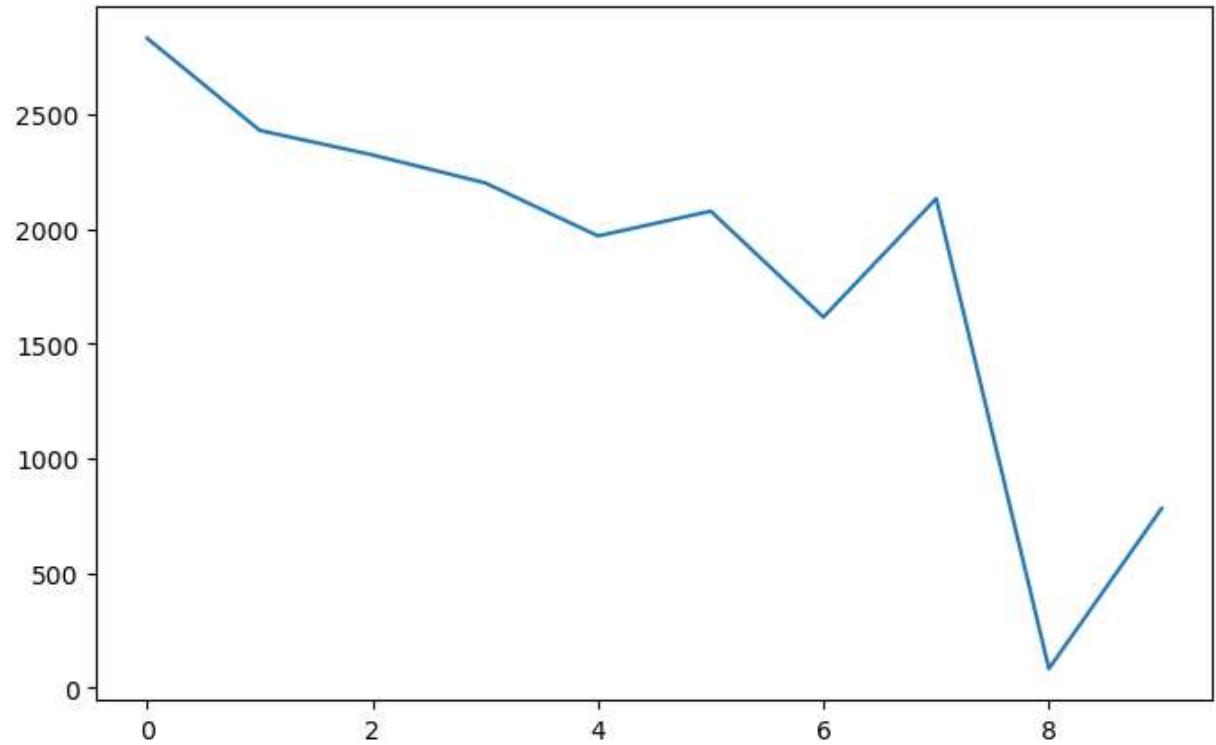
Out[183]: [`<matplotlib.lines.Line2D at 0x242856e07d0>`]



In []:

In [184]: plt.plot(Points[0])

Out[184]: [`<matplotlib.lines.Line2D at 0x242856415d0>`]



In []:

In []: