```
import numpy as np
import pandas as pd

# Loading the dataset
df = pd.read_csv('D:/ibm/datafile_02.csv')
print(df.columns)
df.head()
```

```
Index(['Port', 'Traffic in Eleventh Plan (MT) (2011-12)Proj.',
       'Traffic in Eleventh Plan (MT) (2011-12) Ach.',
       'Traffic in Eleventh Plan (MT) (2011-12) %',
       'Total Capacity  in Eleventh Plan (MT) (2011-12) Proj.',
       'Total Capacity  in Eleventh Plan (MT) (2011-12) Ach.',
       'Total Capacity  in Eleventh Plan (MT) (2011-12) %'],
      dtype='object')
```

```
            Port  Traffic in Eleventh Plan (MT) (2011-12)Proj.  \
0        Kolkata                                          1343   
1         Haldia                                          4450   
2       Paradeep                                          7640   
3  Visakhapatnam                                          8220   
4        Ennore                                           4700   

   Traffic in Eleventh Plan (MT) (2011-12) Ach.  \
0                                          1223   
1                                          3101   
2                                          5425   
3                                          6742   
4                                          1496   

   Traffic in Eleventh Plan (MT) (2011-12) %  \
0                                       9100   
1                                       7000   
2                                       7100   
3                                       8200   
4                                       3200   

   Total Capacity  in Eleventh Plan (MT) (2011-12) Proj.  \
0                                               3145       
1                                               6340       
2                                              10640       
3                                              10810       
4                                               6420       

   Total Capacity  in Eleventh Plan (MT) (2011-12) Ach.  \
0                                               1635      
1                                               5070      
2                                               7650      
3                                               7293      
4                                               3100      
```

```
   Total Capacity  in Eleventh Plan (MT) (2011-12) %
0                                               5100
1                                               7900
2                                               7100
3                                               6700
4                                               4800
```

```
# Preprocessing the dataset

# Renaming the columns
df.rename(columns = {'Traffic in Eleventh Plan (MT) (2011-
12)Proj.':'Traffic_Projected','Traffic in Eleventh Plan (MT) (2011-12)
Ach.':'Traffic_Achieved', 'Total Capacity  in Eleventh Plan (MT)
(2011-12) Proj.':'Total_Capacity_Projected', 'Total Capacity  in
Eleventh Plan (MT) (2011-12) Ach.':'Total_Capacity_Achieved'}, inplace
= True)
df
```

```
             Port  Traffic_Projected  Traffic_Achieved  \
0         Kolkata               1343              1223
1          Haldia               4450              3101
2        Paradeep               7640              5425
3   Visakhapatnam               8220              6742
4          Ennore               4700              1496
5         Chennai               5750              5571
6       Tuticorin               3172              2810
7          Cochin               3817              2010
8            NMPT               4881              3294
9        Mormugao               4455              3900
10         Mumbai               7105              5618
11           JNPT               6604              6575
12         Kandla               8672              8250

    Traffic in Eleventh Plan (MT) (2011-12) %
Total_Capacity_Projected  \
0                                        9100
3145
1                                        7000
6340
2                                        7100
10640
3                                        8200
10810
4                                        3200
6420
5                                        9700
7230
6                                        8900
6398
```

```
7                                         5300
5475
8                                         6800
6050
9                                         8800
6690
10                                        7900
9191
11                                       10000
9560
12                                        9500
12220

    Total_Capacity_Achieved  Total Capacity  in Eleventh Plan (MT)
(2011-12) %
0                       1635
5100
1                       5070
7900
2                       7650
7100
3                       7293
6700
4                       3100
4800
5                       7972
11000
6                       3334
5200
7                       4098
7400
8                       5097
8400
9                       4190
6200
10                      4453
4800
11                      6400
6600
12                      8691
7100
```

```
# Perparing the Calculations:

Traffic_Percent =
round((df.Traffic_Achieved/df.Traffic_Projected)*100,2)

Traffic_Percent
```

```
0     91.06
1     69.69
```

```
2     71.01
3     82.02
4     31.83
5     96.89
6     88.59
7     52.66
8     67.49
9     87.54
10    79.07
11    99.56
12    95.13
dtype: float64
```

```
Total_Percent =
round( (df.Total_Capacity_Achieved/df.Total_Capacity_Projected)*100,2)
Total_Percent
```

```
0      51.99
1      79.97
2      71.90
3      67.47
4      48.29
5     110.26
6      52.11
7      74.85
8      84.25
9      62.63
10     48.45
11     66.95
12     71.12
dtype: float64
```

```
# Replacing the existing columns with newly created columns
df.rename(columns = {'Traffic in Eleventh Plan (MT) (2011-12)
%':'Traffic_Percent','Total Capacity  in Eleventh Plan (MT) (2011-12)
%':'Total_Percent'}, inplace = True)
df.iloc[:,3:4] = Traffic_Percent
df.iloc[:,6:] = Total_Percent
df
```

```
             Port  Traffic_Projected  Traffic_Achieved
Traffic_Percent  \
0         Kolkata               1343              1223
91.06
1          Haldia               4450              3101
69.69
2        Paradeep               7640              5425
71.01
3   Visakhapatnam               8220              6742
82.02
4          Ennore               4700              1496
```

```
31.83
5         Chennai              5750             5571
96.89
6       Tuticorin              3172             2810
88.59
7          Cochin              3817             2010
52.66
8            NMPT              4881             3294
67.49
9        Mormugao              4455             3900
87.54
10         Mumbai              7105             5618
79.07
11           JNPT              6604             6575
99.56
12         Kandla              8672             8250
95.13

    Total_Capacity_Projected  Total_Capacity_Achieved  Total_Percent
0                       3145                     1635          51.99
1                       6340                     5070          79.97
2                      10640                     7650          71.90
3                      10810                     7293          67.47
4                       6420                     3100          48.29
5                       7230                     7972         110.26
6                       6398                     3334          52.11
7                       5475                     4098          74.85
8                       6050                     5097          84.25
9                       6690                     4190          62.63
10                      9191                     4453          48.45
11                      9560                     6400          66.95
12                     12220                     8691          71.12
```

```
df.shape
```

```
(13, 7)
```

```
# Checking for null values

df.isnull().sum()
```

```
Port                           0
Traffic_Projected              0
Traffic_Achieved               0
Traffic_Percent                0
Total_Capacity_Projected       0
Total_Capacity_Achieved        0
Total_Percent                  0
dtype: int64
```

```
# Summary of Dataset
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 13 entries, 0 to 12
Data columns (total 7 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Port                      13 non-null     object 
 1   Traffic_Projected         13 non-null     int64  
 2   Traffic_Achieved          13 non-null     int64  
 3   Traffic_Percent           13 non-null     float64
 4   Total_Capacity_Projected  13 non-null     int64  
 5   Total_Capacity_Achieved   13 non-null     int64  
 6   Total_Percent             13 non-null     float64
dtypes: float64(2), int64(4), object(1)
memory usage: 856.0+ bytes
```

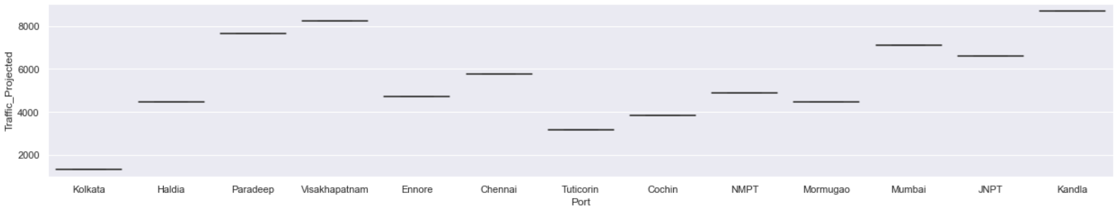
```
df.describe()
```

```
       Traffic_Projected  Traffic_Achieved  Traffic_Percent  \
count          13.000000         13.000000        13.000000   
mean         5446.846154       4308.846154        77.887692   
std          2133.280019       2212.894855        19.382398   
min          1343.000000       1223.000000        31.830000   
25%          4450.000000       2810.000000        69.690000   
50%          4881.000000       3900.000000        82.020000   
75%          7105.000000       5618.000000        91.060000   
max          8672.000000       8250.000000        99.560000   

       Total_Capacity_Projected  Total_Capacity_Achieved
Total_Percent  
count                 13.000000                13.000000
13.000000  
mean                7705.307692              5306.384615
68.480000  
std                 2570.242673              2140.254796
17.252637  
min                 3145.000000              1635.000000
48.290000  
25%                 6340.000000              4098.000000
52.110000  
50%                 6690.000000              5070.000000
67.470000  
75%                 9560.000000              7293.000000
74.850000  
max                12220.000000              8691.000000
110.260000  
```

```
#Finding Outliers anr replacing the outliers
```

```python
import seaborn as sns
import matplotlib.pyplot as plt
plt.rcParams["figure.figsize"] = [17.50, 3.50]
plt.rcParams["figure.autolayout"] = True

sns.boxplot(x='Port',y='Traffic_Projected',data=df)
```

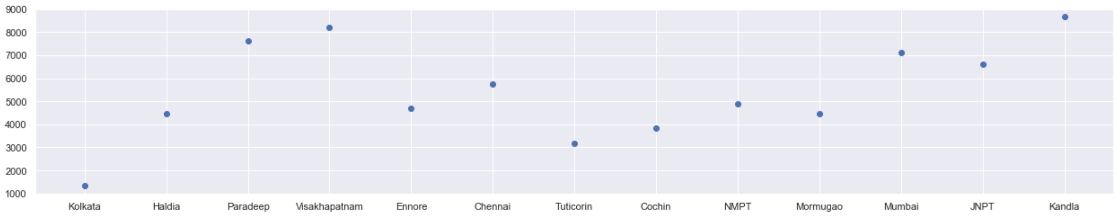
```
<AxesSubplot:xlabel='Port', ylabel='Traffic_Projected'>
```



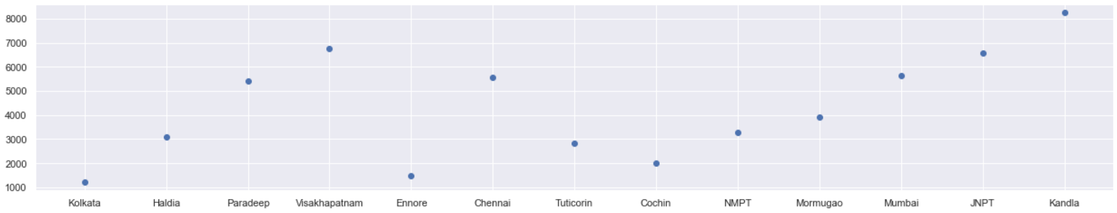
```python
# Visualization using various plots
```

```python
import matplotlib.pyplot as plt
import seaborn as sns
```

```python
import matplotlib.pyplot as plt
import seaborn as sns

plt.scatter(df.Port,df.Traffic_Projected)
sns.set()
```

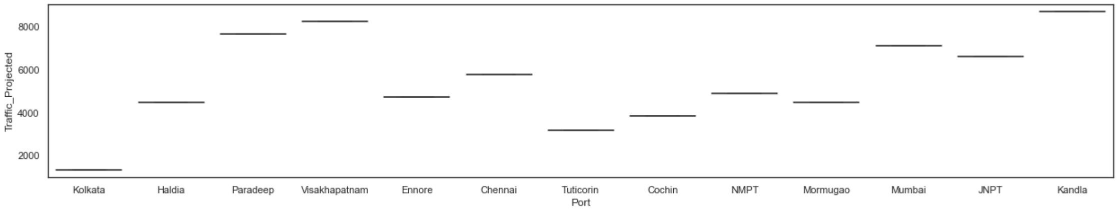


```python
plt.scatter(df.Port,df.Traffic_Achieved)
sns.set_style('white')
sns.set_context('notebook')
```



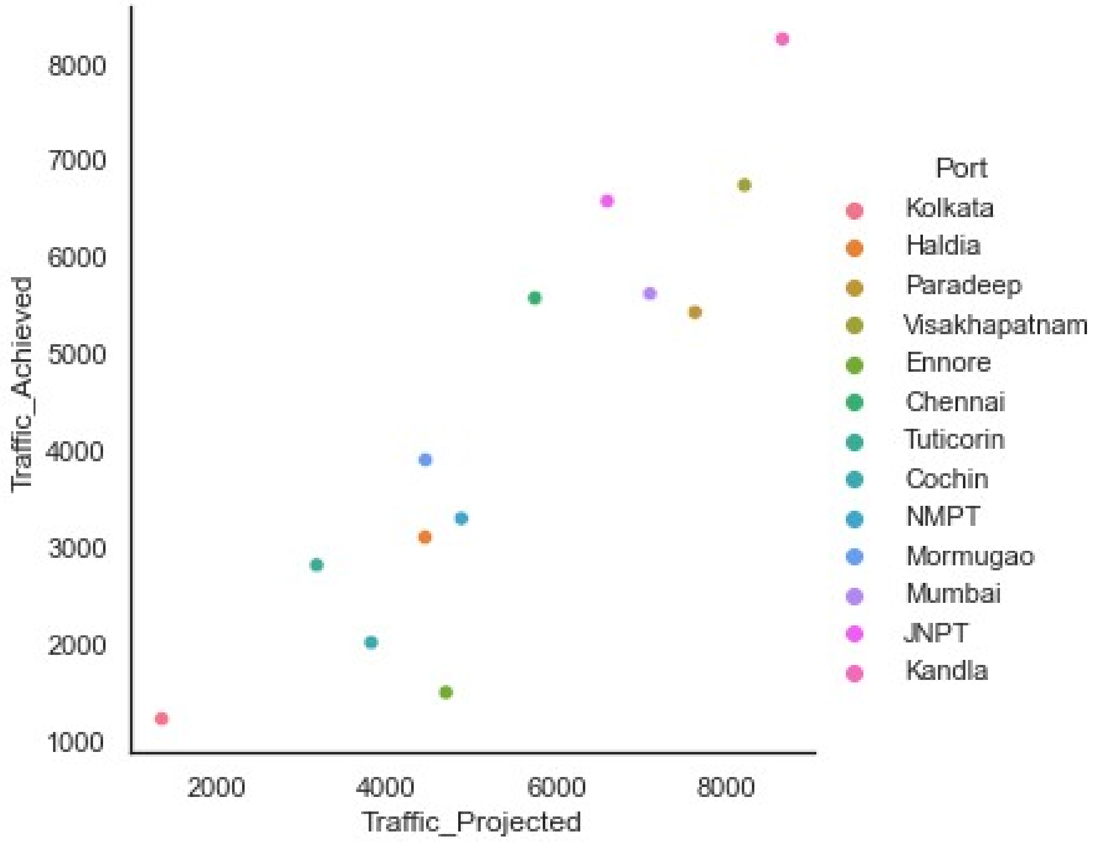
```
sns.boxplot(x='Port',y='Traffic_Projected',data=df)
```

```
<AxesSubplot:xlabel='Port', ylabel='Traffic_Projected'>
```



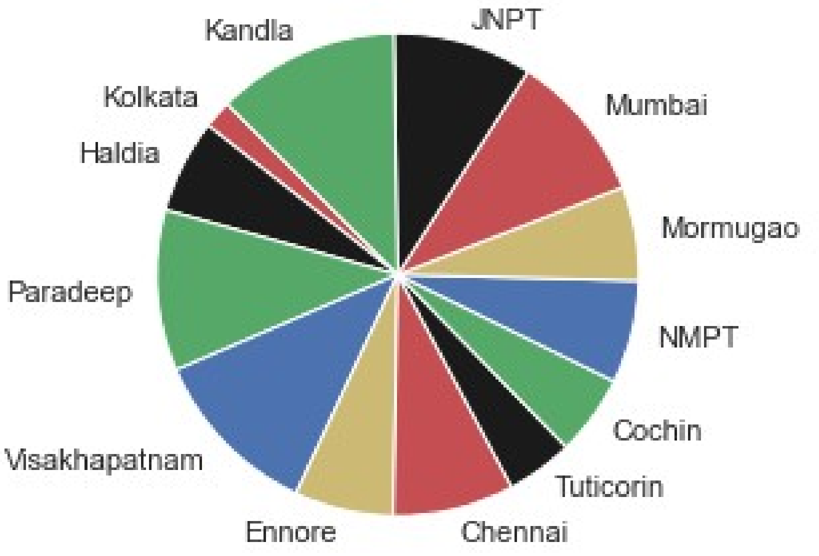
```
sns.relplot(data=df,x="Traffic_Projected",y='Traffic_Achieved',hue='Port')
```

```
<seaborn.axisgrid.FacetGrid at 0x1a33a579940>
```



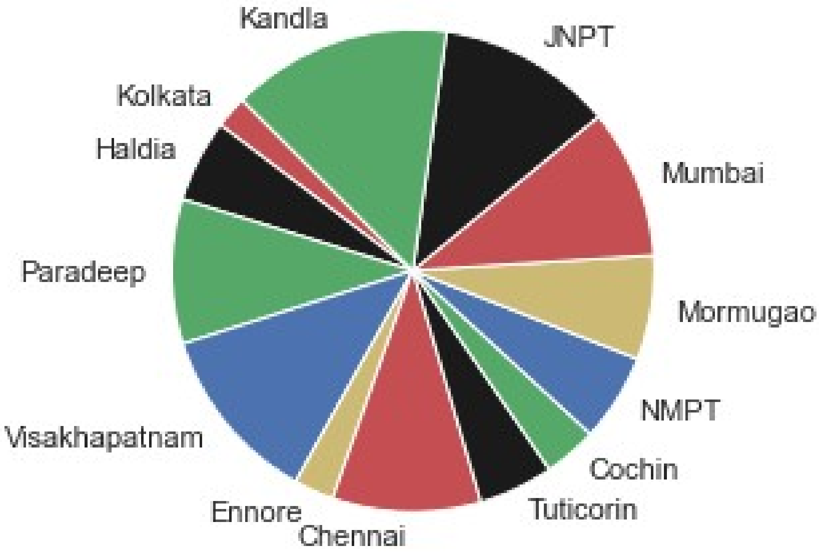
```
colors=['r','k','g','b','y']
plt.pie(df.Traffic_Projected,labels=df.Port,colors=colors,startangle=135)
```

```
([<matplotlib.patches.Wedge at 0x1a339ebce80>,
  <matplotlib.patches.Wedge at 0x1a339ebc2b0>,
  <matplotlib.patches.Wedge at 0x1a339eaba30>,
  <matplotlib.patches.Wedge at 0x1a339eab250>,
  <matplotlib.patches.Wedge at 0x1a339eab190>,
  <matplotlib.patches.Wedge at 0x1a339ebcf10>,
  <matplotlib.patches.Wedge at 0x1a339f12d60>,
  <matplotlib.patches.Wedge at 0x1a339f125b0>,
  <matplotlib.patches.Wedge at 0x1a339b77040>,
  <matplotlib.patches.Wedge at 0x1a339e9dd90>,
  <matplotlib.patches.Wedge at 0x1a339e9d490>,
  <matplotlib.patches.Wedge at 0x1a336bf5d90>,
  <matplotlib.patches.Wedge at 0x1a339e7a940>],
 [Text(-0.8227559810574577, 0.7301182066173808, 'Kolkata'),
  Text(-0.9813250715975654, 0.49699205612769437, 'Haldia'),
  Text(-1.0974872598930092, -0.07430823892769065, 'Paradeep'),
  Text(-0.7887307236408752, -0.7667488803936667, 'Visakhapatnam'),
  Text(-0.24681684658019215, -1.0719521650914328, 'Ennore'),
  Text(0.2586200998460918, -1.0691658636318304, 'Chennai'),
  Text(0.6508775584042567, -0.8867685176897709, 'Tuticorin'),
  Text(0.8904218552781084, -0.645870667891871, 'Cochin'),
  Text(1.068042956118005, -0.2632190036580062, 'NMPT'),
  Text(1.083660055487473, 0.18889384357592884, 'Mormugao'),
  Text(0.85153993640342, 0.6963330644957625, 'Mumbai'),
  Text(0.3009306210259454, 1.058036275998578, 'JNPT'),
  Text(-0.4290148932653011, 1.0128900341876024, 'Kandla')])
```



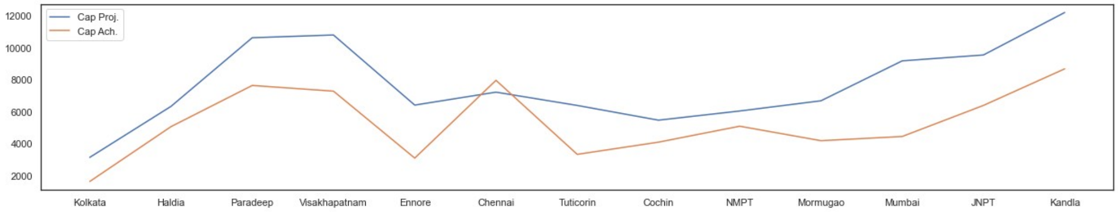
```
plt.pie(df.Traffic_Achieved,labels=df.Port,colors=colors,startangle=13
5)
```

```
([<matplotlib.patches.Wedge at 0x1a339e83d90>,
  <matplotlib.patches.Wedge at 0x1a339e83370>,
  <matplotlib.patches.Wedge at 0x1a339cdffd0>,
  <matplotlib.patches.Wedge at 0x1a339e891f0>,
  <matplotlib.patches.Wedge at 0x1a339e898e0>,
  <matplotlib.patches.Wedge at 0x1a339e83460>,
  <matplotlib.patches.Wedge at 0x1a339e23e80>,
  <matplotlib.patches.Wedge at 0x1a339f9ab80>,
  <matplotlib.patches.Wedge at 0x1a339f9a490>,
  <matplotlib.patches.Wedge at 0x1a339f9a760>,
  <matplotlib.patches.Wedge at 0x1a339e4dc70>,
  <matplotlib.patches.Wedge at 0x1a33a21e580>,
  <matplotlib.patches.Wedge at 0x1a33a21ee20>],
 [Text(-0.8292984732192152, 0.7226783809664425, 'Kolkata'),
  Text(-0.9785761523202932, 0.5023830352529937, 'Haldia'),
  Text(-1.0999917035067, -0.004272261278115301, 'Paradeep'),
  Text(-0.8509776584186843, -0.6970201036356506, 'Visakhapatnam'),
  Text(-0.4510472262335761, -1.0032728440992498, 'Ennore'),
  Text(-0.02876119418292548, -1.0996239328557615, 'Chennai'),
  Text(0.472408825560159, -0.9933931253702492, 'Tuticorin'),
  Text(0.720536507722156, -0.831160117570351, 'Cochin'),
  Text(0.932508592180857, -0.5834618458038848, 'NMPT'),
  Text(1.086706953339725, -0.1704933944852213, 'Mormugao'),
  Text(1.022266221308968, 0.406167173428238, 'Mumbai'),
  Text(0.535803745383295, 0.9606843115369551, 'JNPT'),
  Text(-0.3488393338981779, 1.0432215100952797, 'Kandla')])
```

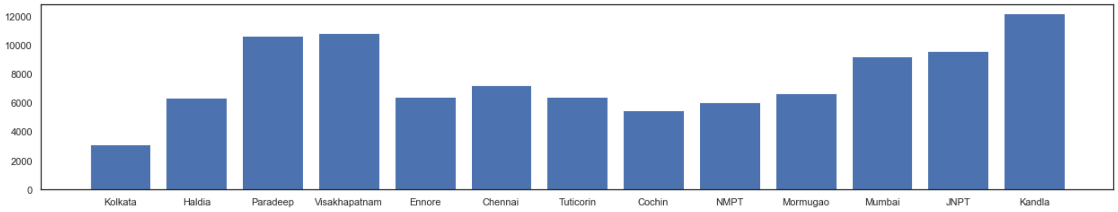


```
plt.plot(df.Port,df.Total_Capacity_Projected,label='Cap Proj.')
plt.plot(df.Port,df.Total_Capacity_Achieved,label='Cap Ach.')
plt.legend()
```

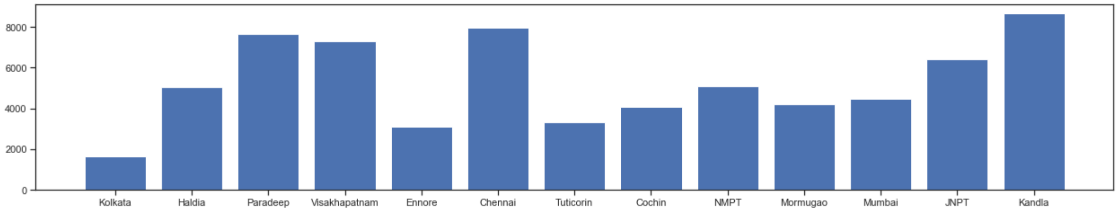
```
<matplotlib.legend.Legend at 0x1a33a256460>
```



```
plt.bar(df.Port,df.Total_Capacity_Projected)
sns.set_style('ticks')
```

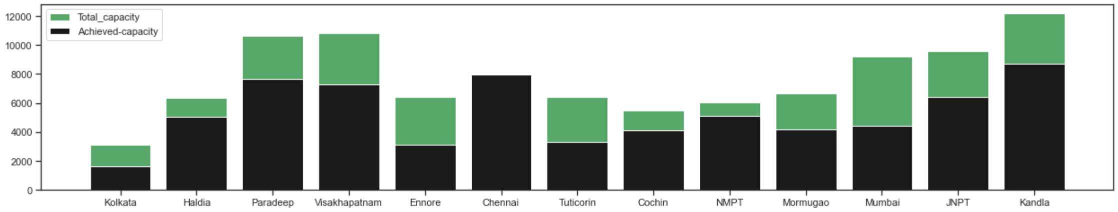


```
plt.bar(df.Port,df.Total_Capacity_Achieved)
sns.set_style('ticks')
```



```
plt.bar(df.Port,df.Total_Capacity_Projected,label='Total_capacity',col
or='g')
plt.bar(df.Port,df.Total_Capacity_Achieved,label='Achieved-
capacity',color='k')
plt.legend()
```

```
<matplotlib.legend.Legend at 0x1a33a2bb460>
```


Total_capacity
Achieved-capacity
Kolkata
Haldia
Paradeep
Visakhapatnam
Ennore
Chennai
Tuticorin
Cochin
NMPT
Mormugao
Mumbai
JNPT
Kandla