In [1]:
```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error
from sklearn.metrics import r2_score
%matplotlib inline
```

In [2]:
```python
data=pd.read_csv("day.csv")
data.head()
```

Out[2]:

	instant	dteday	season	yr	mnth	holiday	weekday	workingday	weathersit	temp	atemp	hum	windspeed
0	1	01-01-2018	1	0	1	0	6	0	2	14.110847	18.18125	80.5833	10.749882
1	2	02-01-2018	1	0	1	0	0	0	2	14.902598	17.68695	69.6087	16.652113
2	3	03-01-2018	1	0	1	0	1	1	1	8.050924	9.47025	43.7273	16.636703
3	4	04-01-2018	1	0	1	0	2	1	1	8.200000	10.60610	59.0435	10.739832
4	5	05-01-2018	1	0	1	0	3	1	1	9.305237	11.46350	43.6957	12.522300

In [3]:
```python
data.keys()
```

Out[3]:
```
Index(['instant', 'dteday', 'season', 'yr', 'mnth', 'holiday', 'weekday',
       'workingday', 'weathersit', 'temp', 'atemp', 'hum', 'windspeed',
       'casual', 'registered', 'cnt'],
      dtype='object')
```

In [4]:
```python
data.shape
```

Out[4]: (499, 16)

In [5]:
```python
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 499 entries, 0 to 498
Data columns (total 16 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   instant     499 non-null    int64
 1   dteday      499 non-null    object
 2   season      499 non-null    int64
 3   yr          499 non-null    int64
 4   mnth        499 non-null    int64
 5   holiday     499 non-null    int64
 6   weekday     499 non-null    int64
 7   workingday  499 non-null    int64
 8   weathersit  499 non-null    int64
 9   temp        499 non-null    float64
 10  atemp       499 non-null    float64
 11  hum         499 non-null    float64
 12  windspeed   499 non-null    float64
 13  casual      499 non-null    int64
 14  registered  499 non-null    int64
 15  cnt         499 non-null    int64
dtypes: float64(4), int64(11), object(1)
memory usage: 62.5+ KB
```

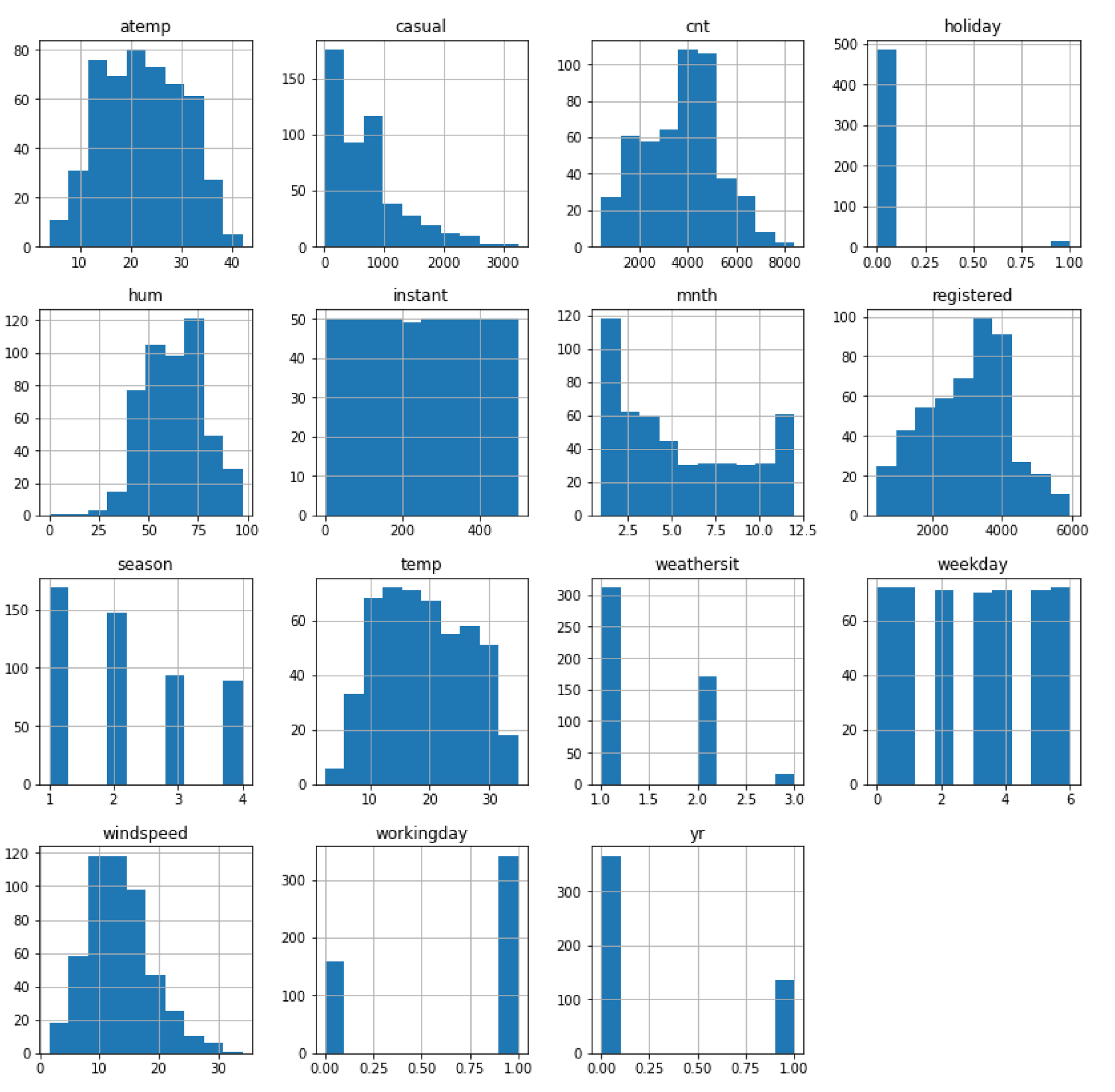
In [6]:
```python
data.describe()
```

Out[6]:

	instant	season	yr	mnth	holiday	weekday	workingday	weathersit	temp
count	499.000000	499.000000	499.000000	499.000000	499.000000	499.000000	499.000000	499.000000	499.000000
mean	250.000000	2.206413	0.268537	5.515030	0.028056	2.995992	0.683367	1.408818	18.979325
std	144.193157	1.095573	0.443643	3.459066	0.165299	2.009012	0.465630	0.557175	7.350670
min	1.000000	1.000000	0.000000	1.000000	0.000000	0.000000	0.000000	1.000000	2.424346
25%	125.500000	1.000000	0.000000	3.000000	0.000000	1.000000	0.000000	1.000000	12.998189
50%	250.000000	2.000000	0.000000	5.000000	0.000000	3.000000	1.000000	1.000000	18.518347
75%	374.500000	3.000000	1.000000	8.000000	0.000000	5.000000	1.000000	2.000000	25.215000
max	499.000000	4.000000	1.000000	12.000000	1.000000	6.000000	1.000000	3.000000	34.815847

In [7]:
```python
data.hist(figsize=(14,14))
```

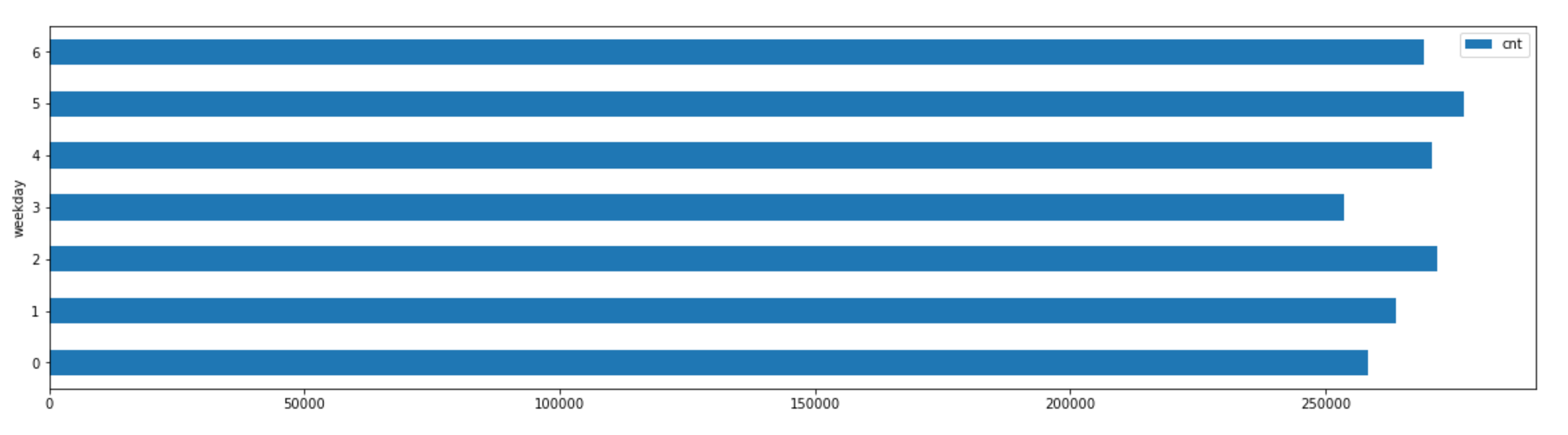
Out[7]:
```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x0000021154B849A0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x0000021155261E50>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x000002115529B2E0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x00000211552C4760>],
       [<matplotlib.axes._subplots.AxesSubplot object at 0x00000211552F2BB0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x00000211553210A0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x000002115532E070>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x0000021155359520>],
       [<matplotlib.axes._subplots.AxesSubplot object at 0x00000211553B1D30>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x00000211553E81C0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x0000021155415640>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x0000021155440A90>],
       [<matplotlib.axes._subplots.AxesSubplot object at 0x000002115546FEE0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x00000211554A6370>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x00000211554D47C0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x00000211554FFB80>]],
      dtype=object)
```



All weekdays's contribution for shared bike demand are almost same but in weekend day demand is more than.

In [8]:
```python
data[['weekday', 'cnt']].groupby(['weekday']).sum().plot(kind='barh', figsize=(20, 5))
```

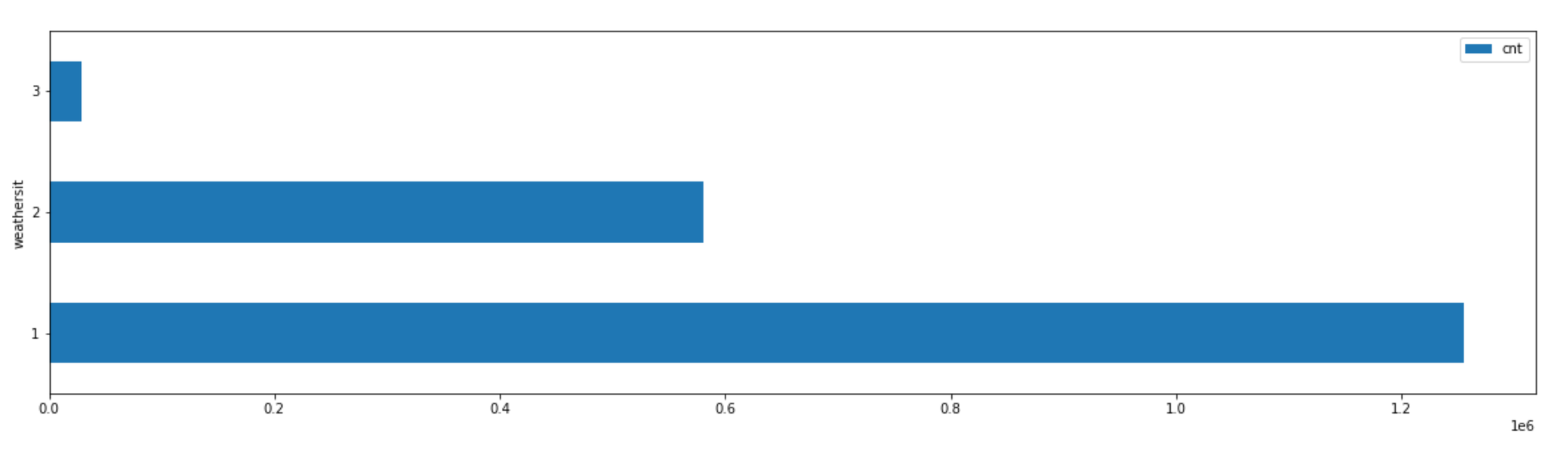
Out[8]: <matplotlib.axes._subplots.AxesSubplot at 0x21154b03220>



Highest contribution for shared bike demand in clear weather.

In [9]:
```python
data[['weathersit', 'cnt']].groupby(['weathersit']).sum().plot(kind='barh', figsize=(20, 5))
```

Out[9]: <matplotlib.axes._subplots.AxesSubplot at 0x21154b03520>



In [10]:
```python
corr=data.corr()
corr["cnt"].sort_values(ascending=False)
```

Out[10]:
```
cnt           1.000000
registered    0.930240
casual        0.697908
atemp         0.629020
temp          0.617873
instant       0.537315
yr            0.355828
season        0.283648
mnth          0.193226
workingday    0.053859
weekday       0.043256
holiday      -0.067509
hum          -0.091001
windspeed    -0.184454
weathersit   -0.293301
Name: cnt, dtype: float64
```

In [11]:
```python
corrmat=data.corr()
corrmat
```

Out[11]:

	instant	season	yr	mnth	holiday	weekday	workingday	weathersit	temp	atemp
instant	1.000000	0.137967	0.767644	0.187995	0.014996	-0.000049	-0.004666	-0.023169	0.034553	0.048313
season	0.137967	1.000000	-0.440651	0.865255	-0.009866	-0.001448	0.010286	0.048987	0.443957	0.447903
yr	0.767644	-0.440651	1.000000	-0.482860	0.006585	-0.010055	-0.005552	-0.038843	-0.218894	-0.210723
mnth	0.187995	0.865255	-0.482860	1.000000	0.009797	0.015901	0.002961	0.029104	0.383480	0.390125
holiday	0.014996	-0.009866	0.006585	0.009797	1.000000	-0.102455	-0.249598	-0.037576	-0.028749	-0.038892
weekday	-0.000049	-0.001448	-0.010055	0.015901	-0.102455	1.000000	0.035133	0.058871	-0.012603	-0.012535
workingday	-0.004666	0.010286	-0.005552	0.002961	-0.249598	0.035133	1.000000	0.058771	0.058716	0.063088
weathersit	-0.023169	0.048987	-0.038843	0.029104	-0.037576	0.058871	0.058771	1.000000	-0.070571	-0.072851
temp	0.034553	0.443957	-0.218894	0.383480	-0.028749	-0.012603	0.058716	-0.070571	1.000000	0.996325
atemp	0.048313	0.447903	-0.210723	0.390125	-0.038892	-0.012535	0.063088	-0.072851	0.996325	1.000000
hum	-0.017807	0.262581	-0.190814	0.264647	-0.049892	-0.027003	0.026035	0.584478	0.184930	0.195306
windspeed	-0.032241	-0.226985	0.121607	-0.232266	0.035696	0.016162	-0.009758	0.026112	-0.132151	-0.157681
casual	0.189794	0.212756	0.078743	0.143103	0.040028	0.026341	-0.502092	-0.216683	0.527648	0.531608
registered	0.594723	0.256280	0.417900	0.175519	-0.107448	0.042210	0.326616	-0.266699	0.525363	0.537689
cnt	0.537315	0.283648	0.355828	0.193226	-0.067509	0.043256	0.053859	-0.293301	0.617873	0.629020

In [12]:
```python
data.drop(['dteday'], axis = 1, inplace=True)
data.head()
```

Out[12]:

	instant	season	yr	mnth	holiday	weekday	workingday	weathersit	temp	atemp	hum	windspeed	casual
0	1	1	0	1	0	6	0	2	14.110847	18.18125	80.5833	10.749882	331
1	2	1	0	1	0	0	0	2	14.902598	17.68695	69.6087	16.652113	131
2	3	1	0	1	0	1	1	1	8.050924	9.47025	43.7273	16.636703	120
3	4	1	0	1	0	2	1	1	8.200000	10.60610	59.0435	10.739832	108
4	5	1	0	1	0	3	1	1	9.305237	11.46350	43.6957	12.522300	82

In [13]:
```python
x=data.drop(["cnt"],axis=1).values
y=data["cnt"].values
```

In [14]:
```python
 x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.20, random_state=30)
```

In [15]:
```python
regressor=LinearRegression()
regressor.fit(x_train,y_train)
```

Out[15]: LinearRegression()

In [16]:
```python
y_pred=regressor.predict(x_test)
y_pred
```

Out[16]:
```
array([ 981., 4334., 3267., 2429.,  986., 1360., 6370., 4985., 5511.,
       3348., 5026., 4068., 5342.,  985., 4575., 4661., 2169., 5515.,
        431., 2227., 1891., 4826., 5130., 3523., 2710., 5585., 3368.,
       3598., 6296., 3830., 4648., 4058., 3542., 5362., 1421., 4862.,
       3272., 3239., 4595., 4105., 6273., 4433., 4153., 4509., 3068.,
       5698., 3387., 2134., 1685., 3409., 1985., 6304., 4484., 2192.,
       4378., 4098., 4390., 2432., 2423., 4367., 4881., 2376., 3331.,
       4401., 1301., 4458., 4844., 3487., 2455., 5298., 3190., 4845.,
       4189., 5936., 4833., 4339., 3663., 3767., 4773., 4649., 4294.,
       3422., 3249., 4835., 1472., 4792., 3784., 3577., 4602., 4187.,
       2914., 6235., 4362., 3659., 4758., 5058., 4660., 1562., 6398.,
       1746.])
```

In [17]:
```python
r2_score(y_test,y_pred)
```

Out[17]: 1.0

In [18]:
```python
mean_squared_error(y_test, y_pred)
```

Out[18]: 1.0733960917582648e-24

Test the model on test file

In [19]:
```python
test_x=pd.read_csv("test.csv")
test_x.head()
```

Out[19]:

	instant	dteday	season	yr	mnth	holiday	weekday	workingday	weathersit	temp	atemp	hum	windspeed
0	501	16-05-2019	2	1	5	0	3	1	1	26.103347	29.79875	69.7917	8.208304
1	502	17-05-2019	2	1	5	0	4	1	1	24.326653	28.63065	52.0000	15.374825
2	503	18-05-2019	2	1	5	0	5	1	1	23.130847	27.55605	52.3333	9.166739
3	504	19-05-2019	2	1	5	0	6	0	1	24.600000	28.34540	45.6250	5.626325
4	505	20-05-2019	2	1	5	0	0	0	1	25.454153	29.19835	53.0417	17.042589

In [20]:
```python
test_x.drop(['dteday'], axis = 1, inplace=True)
test_x.head()
```

Out[20]:

	instant	season	yr	mnth	holiday	weekday	workingday	weathersit	temp	atemp	hum	windspeed	casual
0	501	2	1	5	0	3	1	1	26.103347	29.79875	69.7917	8.208304	991
1	502	2	1	5	0	4	1	1	24.326653	28.63065	52.0000	15.374825	1242
2	503	2	1	5	0	5	1	1	23.130847	27.55605	52.3333	9.166739	1521
3	504	2	1	5	0	6	0	1	24.600000	28.34540	45.6250	5.626325	3410
4	505	2	1	5	0	0	0	1	25.454153	29.19835	53.0417	17.042589	2704

In [21]:
```python
test_y_pred=regressor.predict(test_x)
test_y_pred
```

Out[21]:
```
array([7424., 7384., 7639., 8294., 7129., 4359., 6073., 5260., 6770.,
       6734., 6536., 6591., 6043., 5743., 6855., 7338., 4127., 8120.,
       7641., 6998., 7001., 7055., 7494., 7736., 7498., 6598., 6664.,
       4972., 7421., 7363., 7665., 7702., 6978., 5099., 6825., 6211.,
       5905., 5823., 7458., 6891., 6779., 7442., 7335., 6879., 5463.,
       5687., 5531., 6227., 6660., 7403., 6241., 6207., 4840., 4672.,
       6569., 6290., 7264., 7446., 7499., 6969., 6031., 6830., 6786.,
       5713., 6591., 5870., 4459., 7410., 6966., 7592., 8173., 6861.,
       6904., 6685., 6597., 7105., 7216., 7580., 7261., 7175., 6824.,
       5464., 7013., 7273., 7534., 7286., 5786., 6299., 6544., 6883.,
       6784., 7347., 7605., 7148., 7865., 4549., 6530., 7006., 7375.,
       7765., 7582., 6053., 5255., 6917., 7040., 7697., 7713., 7350.,
       6140., 5810., 6034., 6864., 7112., 6203., 7504., 5976., 8227.,
       7525., 7767., 7870., 7804., 8009., 8714., 7333., 6869., 4073.,
       7591., 7720., 8167., 8395., 7907., 7436., 7538., 7733., 7393.,
       7415., 8555., 6889., 6778., 4639., 7572., 7328., 8156., 7965.,
       3510., 5478., 6392., 7691., 7570., 7282., 7109., 6639., 5875.,
       7534., 7461., 7509., 5424., 8090., 6824., 7058., 7466., 7693.,
       7359., 7444., 7852., 4459.,   22., 1096., 5566., 5986., 5847.,
       5138., 5107., 5259., 5686., 5035., 5315., 5992., 6536., 6852.,
       6269., 4094., 5495., 5445., 5698., 5629., 4669., 5499., 5634.,
       5146., 2425., 3910., 2277., 2424., 5087., 3959., 5260., 5323.,
       5668., 5191., 4649., 6234., 6606., 5729., 5375., 5008., 5582.,
       3228., 5170., 5501., 5319., 5532., 5611., 5047., 3786., 4585.,
       5557., 5267., 4128., 3623., 1749., 1787.,  920., 1013.,  441.,
       2114., 3095., 1341., 1796., 2729.])
```

In [ ]: