Feature Scaling

1.Standardization

2.Nomalization Min-Max Scaler

3.Unit Vector

In [1]:
```
import seaborn as sns
```

In [2]:
```
df = sns.load_dataset('tips')
```

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

Out[3]:

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
4	24.59	3.61	Female	No	Sun	Dinner	4

In [4]:
```
import numpy as np
mean=np.mean(df['total_bill'])
std=np.std(df['total_bill'])
print(mean,std)
```

```
19.78594262295082 8.88415057777113
```

In [5]:
```
normalized_data=[]
for i in list(df['total_bill']):
    z_score=(i-mean)/std
    normalized_data.append(z_score)
```

In [6]:
```
normalized_data
```

Out[6]:
```
[-0.31471130509049433,
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```

```
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```

```
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```

```
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```

```
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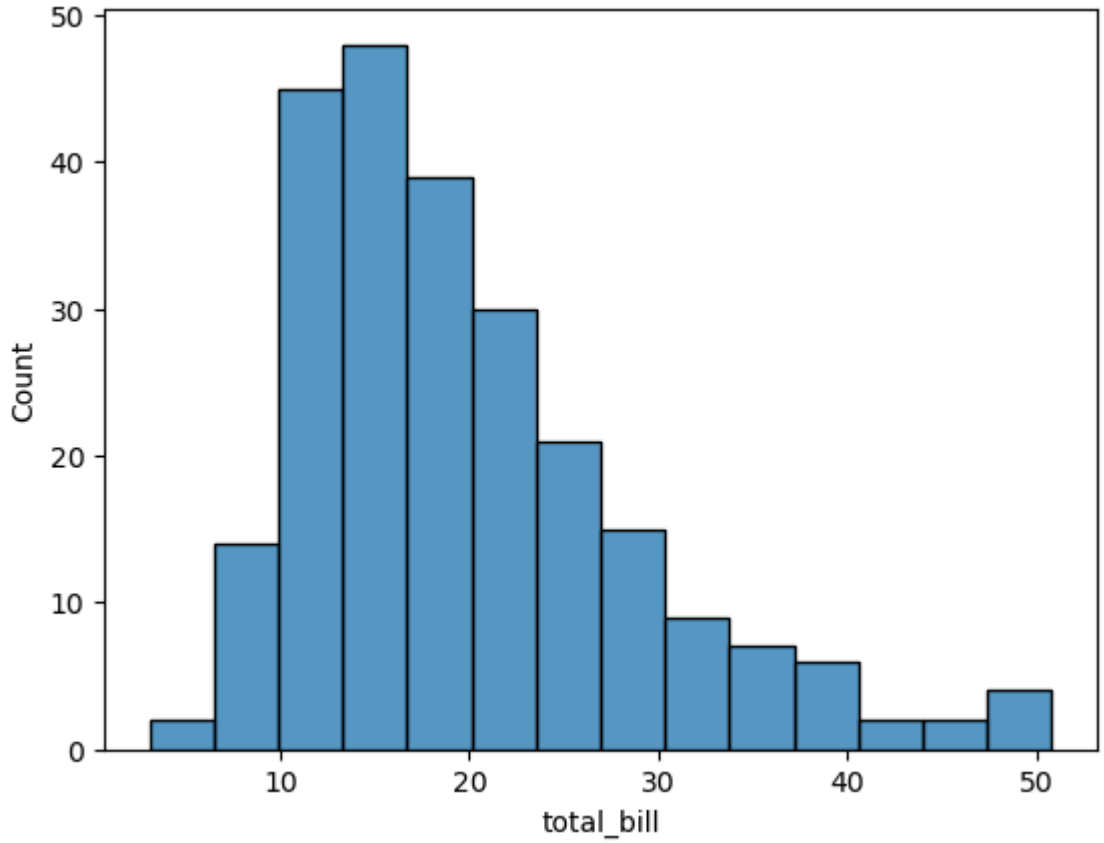
-0.11322890288102158]
```

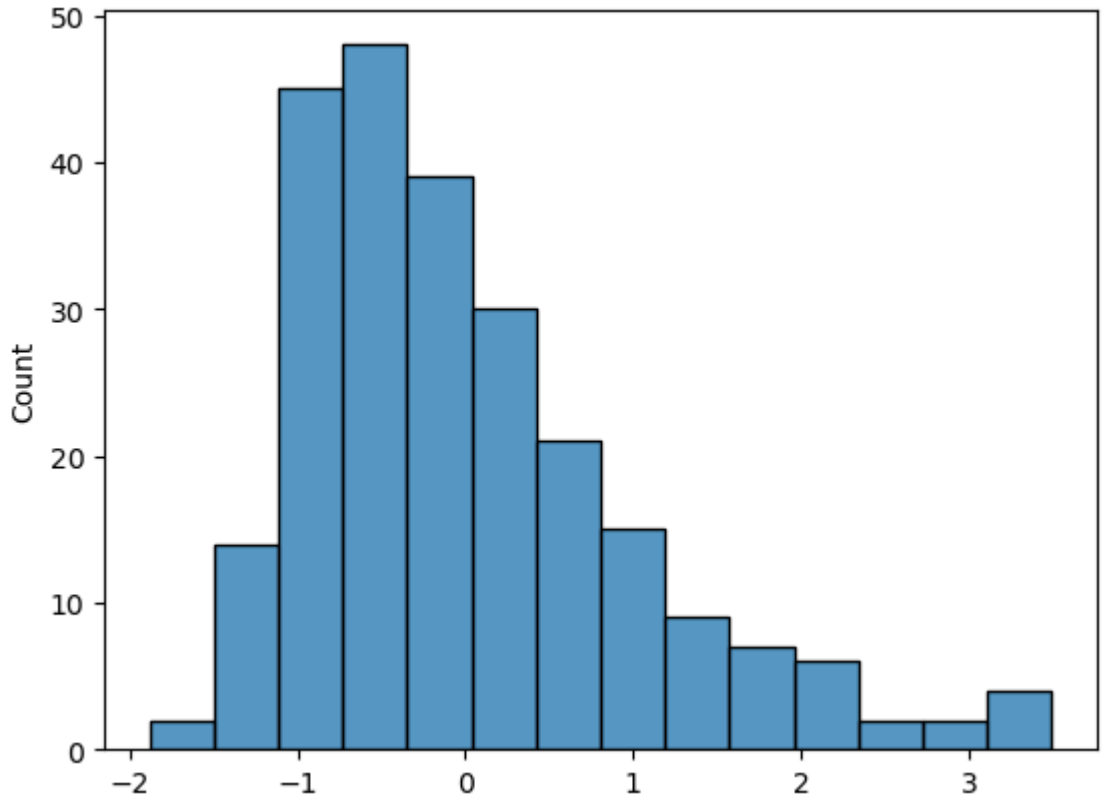
In [7]:
```
sns.histplot(df['total_bill'])
```

Out[7]:
```
<AxesSubplot: xlabel='total_bill', ylabel='Count'>
```



In [8]:
```
sns.histplot(normalized_data)
```

Out[8]:
```
<AxesSubplot: ylabel='Count'>
```



In [9]:
```
from sklearn.preprocessing import StandardScaler
```

In [10]:
```
scaler = StandardScaler()
```

In [13]:
```
scaler
```

Out[13]:
```
StandardScaler
StandardScaler()
```

In [14]:
```
scaler.fit(df[['total_bill']])
```

Out[14]:
```
StandardScaler
StandardScaler()
```

In [15]:
```
scaler.transform(df[['total_bill']])
```

Out[15]:
```
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       [ 3.20616553e+00],
```

```
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```

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```

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       [-2.21286504e-01],
       [-1.13228903e-01]])
```

In [16]:
```
scaler.fit_transform(df[['total_bill']])
```

Out[16]:
```
array([[-3.14711305e-01],
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```

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```

```
       [ 8.32275107e-01],
       [ 3.24629502e-01],
       [-2.21286504e-01],
       [-1.13228903e-01]])
```

In [17]:
```
df.head()
```

Out[17]:

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
4	24.59	3.61	Female	No	Sun	Dinner	4

In [18]:
```
import pandas as pd
pd.DataFrame(scaler.fit_transform(df[['total_bill','tip']]),columns=['total_bill
```

Out[18]:

	total_bill	tip
0	-0.314711	-1.439947
1	-1.063235	-0.969205
2	0.137780	0.363356
3	0.438315	0.225754
4	0.540745	0.443020
...	...	...
239	1.040511	2.115963
240	0.832275	-0.722971
241	0.324630	-0.722971
242	-0.221287	-0.904026
243	-0.113229	0.001247

244 rows × 2 columns

In [19]:
```
scaler.transform([[13,4]])
```

```
/opt/conda/lib/python3.10/site-packages/sklearn/base.py:409: UserWarning: X doe
s not have valid feature names, but StandardScaler was fitted with feature name
s
  warnings.warn(
```

Out[19]:
```
array([[-0.76382571,  0.72546447]])
```

Normalization--Min_max Scaler

In [20]:
```
df = sns.load_dataset('taxis')
df.head()
```

Out[20]:

	pickup	dropoff	passengers	distance	fare	tip	tolls	total	color	payment	pickup_zo
0	2019-03-23 20:21:09	2019-03-23 20:27:24	1	1.60	7.0	2.15	0.0	12.95	yellow	credit card	Lenox W
1	2019-03-04 16:11:55	2019-03-04 16:19:00	1	0.79	5.0	0.00	0.0	9.30	yellow	cash	Upper W Side Sou
2	2019-03-27 17:53:01	2019-03-27 18:00:25	1	1.37	7.5	2.36	0.0	14.16	yellow	credit card	Alphal C
3	2019-03-10 01:23:59	2019-03-10 01:49:51	1	7.70	27.0	6.15	0.0	36.95	yellow	credit card	Hudson
4	2019-03-30 13:27:42	2019-03-30 13:37:14	3	2.16	9.0	1.10	0.0	13.40	yellow	credit card	Midto E

In [21]:
```
from sklearn.preprocessing import MinMaxScaler
```

In [22]:
```
min_max = MinMaxScaler()
```

In [23]:
```
min_max.fit_transform(df[['distance','fare','tip']])
```

Out[23]:
```
array([[0.04359673, 0.04026846, 0.06475904],
       [0.02152589, 0.02684564, 0.        ],
       [0.0373297 , 0.04362416, 0.07108434],
       ...,
       [0.11280654, 0.10067114, 0.        ],
       [0.03051771, 0.03355705, 0.        ],
       [0.10490463, 0.09395973, 0.10120482]])
```

In [24]:
```
min_max.fit(df[['distance','fare','tip']])
```

Out[24]:
```
MinMaxScaler()
```

In [25]:
```
min_max.transform(df[['distance','fare','tip']])
```

Out[25]:
```
array([[0.04359673, 0.04026846, 0.06475904],
       [0.02152589, 0.02684564, 0.        ],
       [0.0373297 , 0.04362416, 0.07108434],
       ...,
       [0.11280654, 0.10067114, 0.        ],
       [0.03051771, 0.03355705, 0.        ],
       [0.10490463, 0.09395973, 0.10120482]])
```

In [26]:
```
min_max.transform([[1.60,7.0,2.15]])
```

```
/opt/conda/lib/python3.10/site-packages/sklearn/base.py:409: UserWarning: X doe
s not have valid feature names, but MinMaxScaler was fitted with feature names
  warnings.warn(
```

Out[26]:
```
array([[0.04359673, 0.04026846, 0.06475904]])
```

Unit Vector

In [27]:
```
from sklearn.preprocessing import normalize
```

In [28]:
```
normalize(df[['distance','fare','tip']])
```

Out[28]:
```
array([[0.21346145, 0.93389384, 0.28683882],
       [0.15606402, 0.98774694, 0.        ],
       [0.1716575 , 0.93973084, 0.29570197],
       ...,
       [0.25050016, 0.96811656, 0.        ],
       [0.18349711, 0.98302025, 0.        ],
       [0.2429556 , 0.94658025, 0.21203398]])
```

In [29]:
```
pd.DataFrame(normalize(df[['distance','fare','tip']]))
```

Out[29]:

	0	1	2
0	0.213461	0.933894	0.286839
1	0.156064	0.987747	0.000000
2	0.171657	0.939731	0.295702
3	0.267899	0.939386	0.213971
4	0.231742	0.965592	0.118017
...	...	...	...
6428	0.160133	0.960800	0.226322
6429	0.307453	0.951563	0.000000
6430	0.250500	0.968117	0.000000
6431	0.183497	0.983020	0.000000
6432	0.242956	0.946580	0.212034

6433 rows × 3 columns