NAME:Dayanithi v
ROLL NO:230701064
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:30.07.2024

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
```

```
data=pd.read_csv('/content/Iris_Dataset.csv')
data
```

```
        Id SepalLengthCm SepalWidthCm PetalLengthCm PetalWidthCm variety
    0 1 5.1 3.5 1.4 0.2 Iris-setosa
    1 2 4.9 3.0 1.4 0.2 Iris-setosa
    2 3 4.7 3.2 1.3 0.2 Iris-setosa
    3 4 4.6 3.1 1.5 0.2 Iris-setosa
    4 5 5.0 3.6 1.4 0.2 Iris-setosa
    ... ... ... ... ... ... ...
  145 146 6.7 3.0 5.2 2.3 Iris-virginica
  146 147 6.3 2.5 5.0 1.9 Iris-virginica
  147 148 6.5 3.0 5.2 2.0 Iris-virginica
  148 149 6.2 3.4 5.4 2.3 Iris-virginica
  149 150 5.9 3.0 5.1 1.8 Iris-virginica
150 rows × 6 columns
```

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 6 columns):
 # Column Non-Null Count Dtype
--- ------ -------------- -----
 0 Id 150 non-null int64
 1 SepalLengthCm 150 non-null float64
 2 SepalWidthCm 150 non-null float64
 3 PetalLengthCm 150 non-null float64
 4 PetalWidthCm 150 non-null float64
 5 variety 150 non-null object
dtypes: float64(4), int64(1), object(1)
memory usage: 7.2+ KB
```

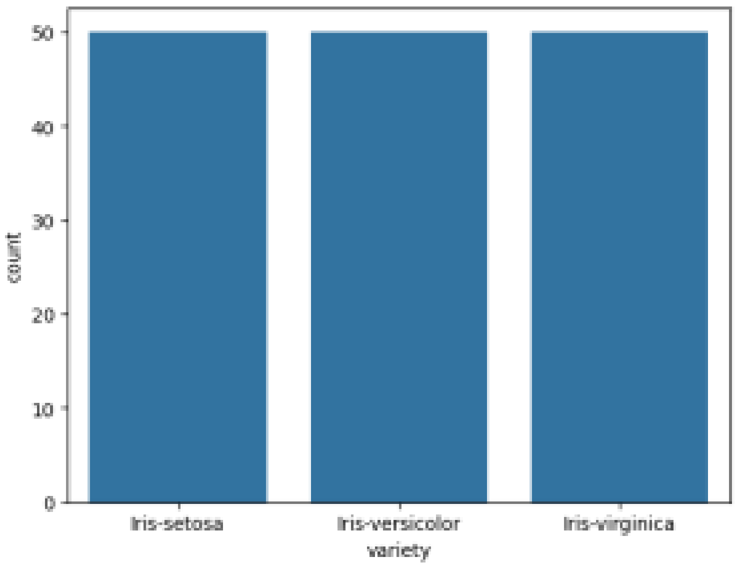
```
data.describe()
```

```
            Id SepalLengthCm SepalWidthCm PetalLengthCm PetalWidthCm
  count 150.000000 150.000000 150.000000 150.000000 150.000000
   mean 75.500000 5.843333 3.054000 3.758667 1.198667
    std 43.445368 0.828066 0.433594 1.764420 0.763161
    min 1.000000 4.300000 2.000000 1.000000 0.100000
    25% 38.250000 5.100000 2.800000 1.600000 0.300000
    50% 75.500000 5.800000 3.000000 4.350000 1.300000
    75% 112.750000 6.400000 3.300000 5.100000 1.800000
    max 150 000000 7 900000 4 400000 6 900000 2 500000
```

```
data.value_counts('variety')
```

```
                count
        variety
   Iris-setosa 50
Iris-versicolor 50
 Iris-virginica 50
```

```
sns.countplot(x='variety',data=data,)
plt.show()
```



```
dummies=pd.get_dummies(data.variety)
```

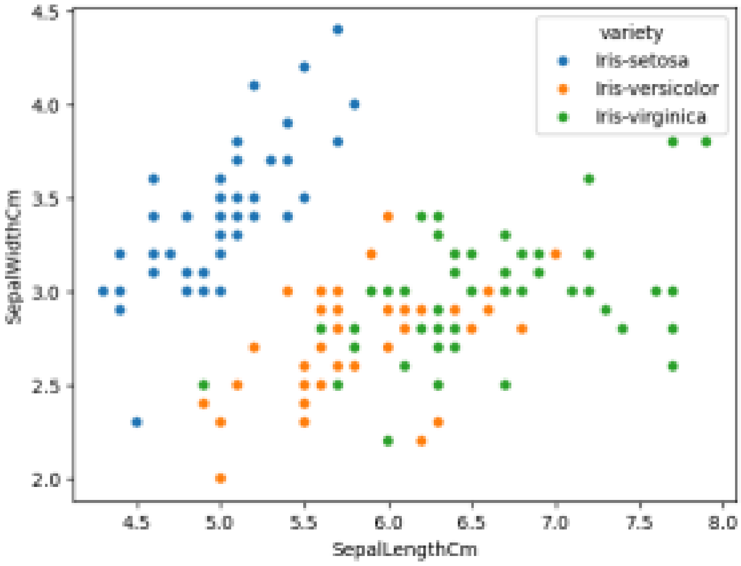
```
FinalDataset=pd.concat([pd.get_dummies(data.variety),data.iloc[:,[0,1,2,3]]],axis=1)
```

```
FinalDataset.head()
```

Iris-setosa Iris-versicolor Iris-virginica Id SepalLengthCm SepalWidthCm PetalLengthCm 0 True False False 1 5.1 3.5 1.4 **1** True False False 2 4.9 3.0 1.4 **2** True False False 3 4.7 3.2 1.3 **3** True False False 4 4.6 3.1 1.5 **4** True False False 5 5 0 3 6 1 4

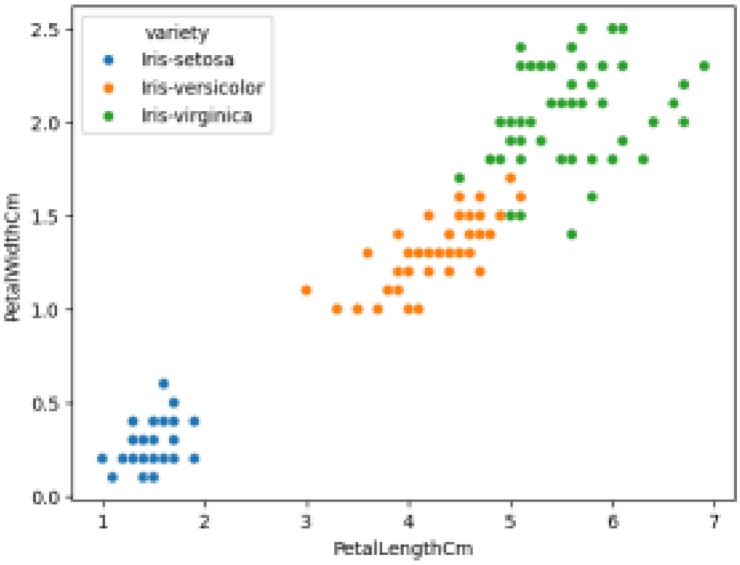
```
sns.scatterplot(x='SepalLengthCm',y='SepalWidthCm',hue='variety',data=data,)
```

```
<Axes: xlabel='SepalLengthCm', ylabel='SepalWidthCm'>
```

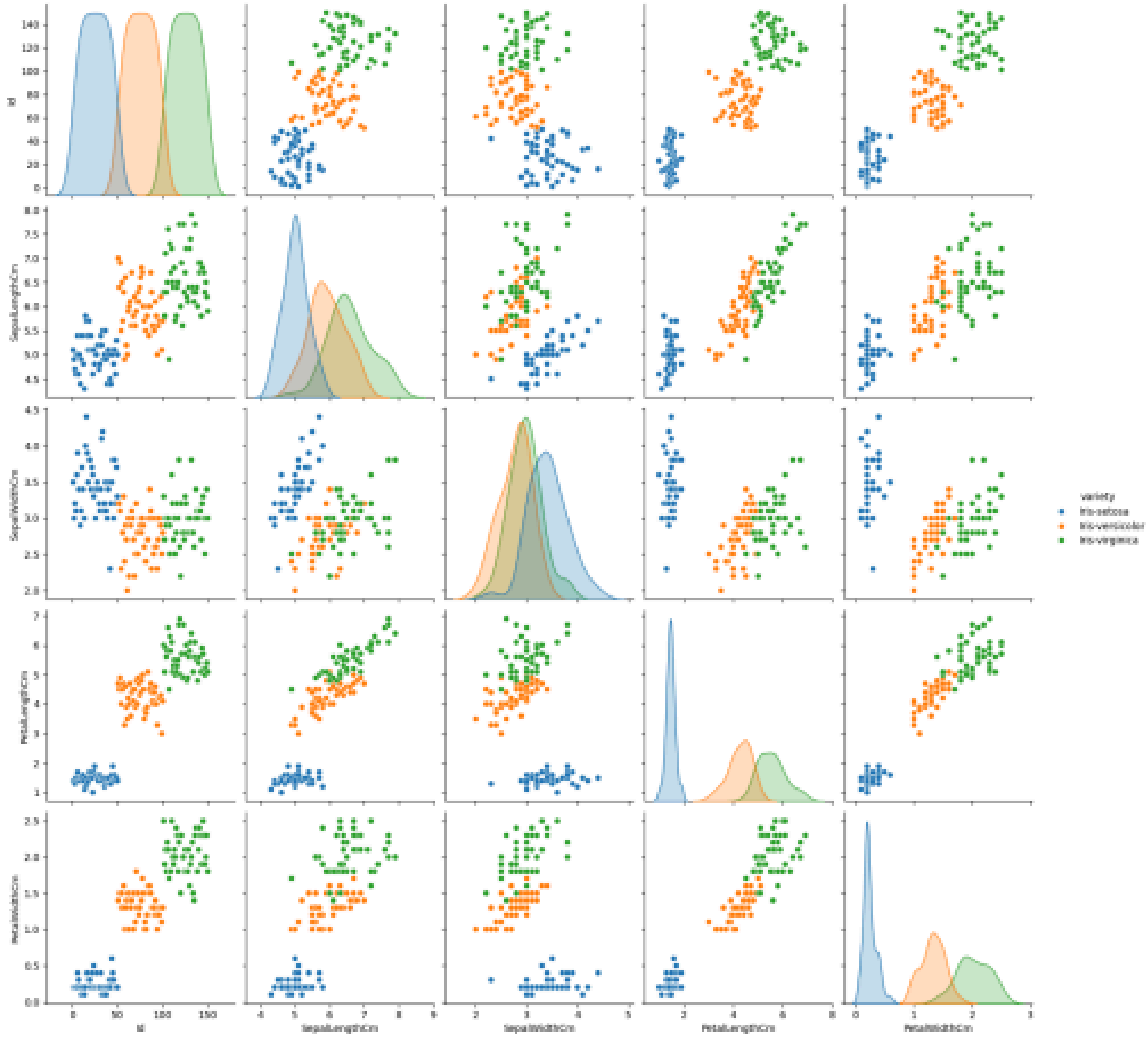


```
sns.scatterplot(x='PetalLengthCm',y='PetalWidthCm',hue='variety',data=data,)
```

```
<Axes: xlabel='PetalLengthCm', ylabel='PetalWidthCm'>
```

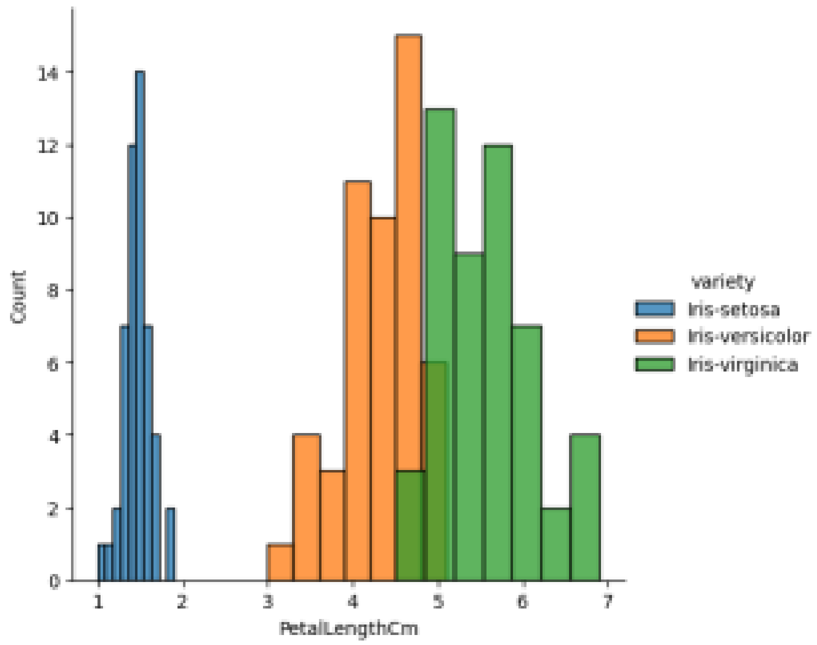


```
sns.pairplot(data,hue='variety',height=3);
```

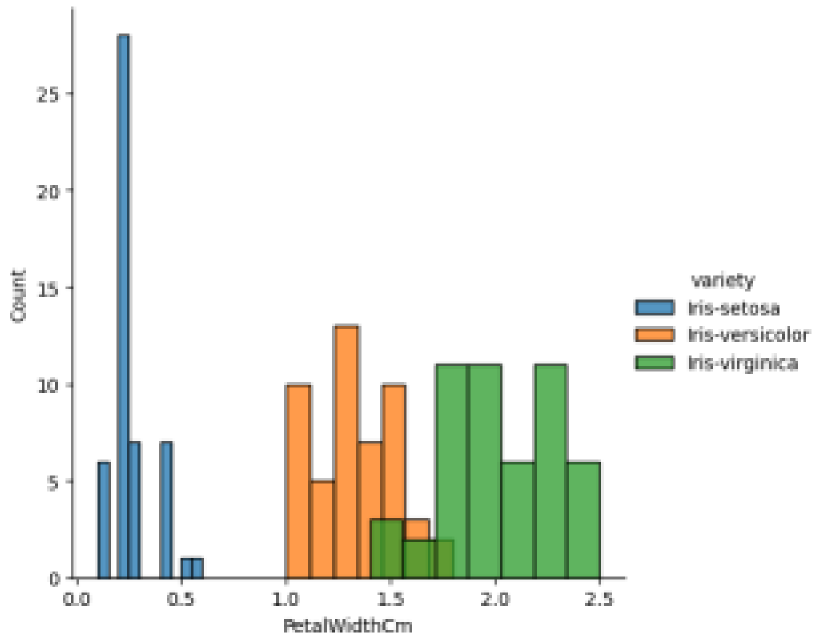


```
plt.show()
```

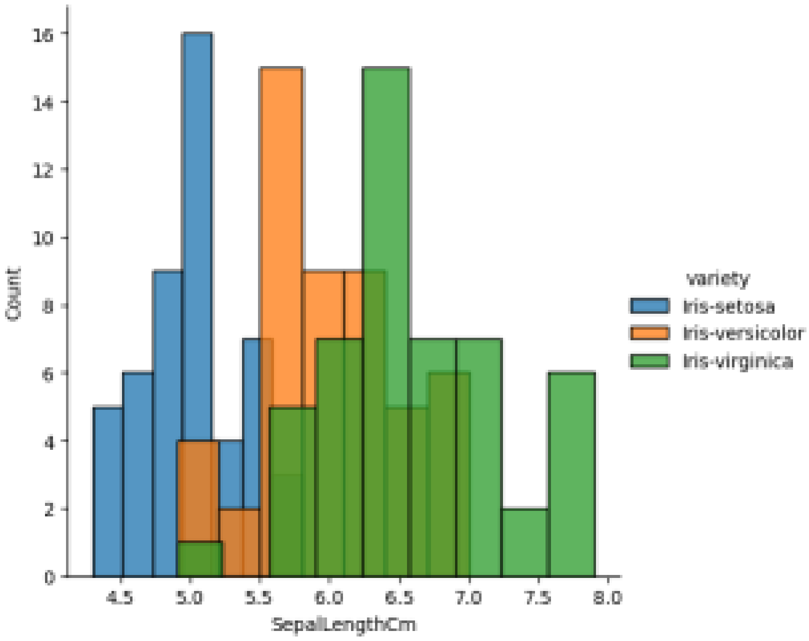
```
sns.FacetGrid(data,hue='variety',height=5).map(sns.histplot,'PetalLengthCm').add_legend();
plt.show();
```



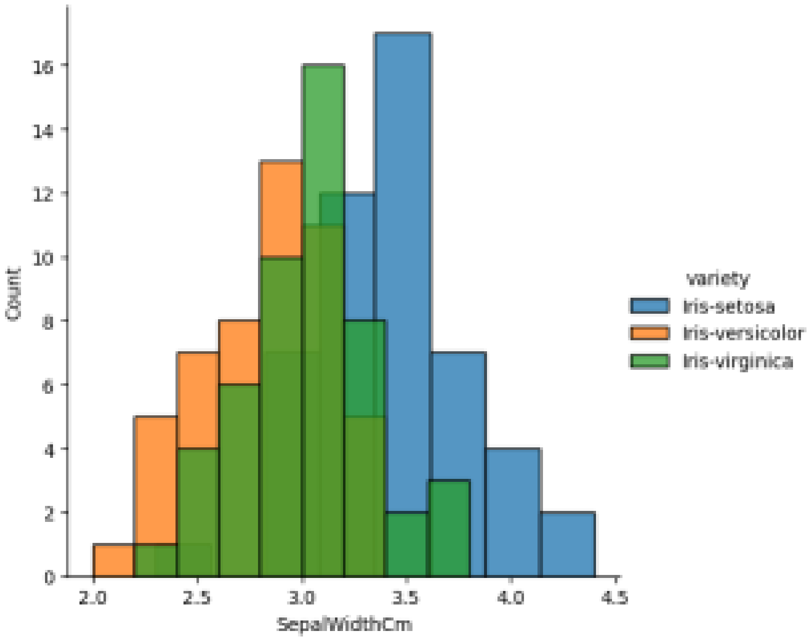
```
sns.FacetGrid(data,hue='variety',height=5).map(sns.histplot,'PetalWidthCm').add_legend();
plt.show();
```



```
sns.FacetGrid(data,hue='variety',height=5).map(sns.histplot,'SepalLengthCm').add_legend();
plt.show();
```



```
sns.FacetGrid(data,hue='variety',height=5).map(sns.histplot,'SepalWidthCm').add_legend();
plt.show();
```



NAME:Dayanithi v
ROLL NO:23070164
SUBJECT NAME:CS23332-FUNDAMENTALS O F DATA SCIENCE
DATE:06.08.2024

```
import numpy as np
array=np.random.randint(1,100,9)
array

     array([83, 25, 19, 47, 62, 15, 96, 39, 51])
```

```
np.sqrt(array)

     array([9.11043358, 5.        , 4.35889894, 6.8556546 , 7.87400787,
      3.87298335, 9.79795897, 6.244998  , 7.14142843])
```

```
array.ndim

     1
```

```
new_array=array.reshape(3,3)
```

```
new_array

     array([[83, 25, 19],
      [47, 62, 15],
      [96, 39, 51]])
```

```
new_array.ndim

     2
```

```
new_array.ravel()

     array([83, 25, 19, 47, 62, 15, 96, 39, 51])
```

```
newm=new_array.reshape(3,3)
```

```
newm

     array([[83, 25, 19],
      [47, 62, 15],
      [96, 39, 51]])
```

```
newm[2,1:3]

     array([39, 51])
```

```
newm[1:2,1:3]

     array([[62, 15]])
```

```
new_array[0:3,0:0]

     array([], shape=(3, 0), dtype=int64)
```

```
new_array[0:2,0:1]

     array([[83],
      [47]])
```

```
new_array[0:3,0:1]

     array([[83],
      [47],
      [96]])
```

```
new_array[1:3]

     array([[47, 62, 15],
      [96, 39, 51]])
```

Type your text

NAME:Dayanithi v
ROLL NO:230701064
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:13.08.2024

```
import numpy as np
import pandas as pd
list=[[1,'Smith',50000],[2,'Jones',60000]]
```

```
df=pd.DataFrame(list)
df
```

```
      0 1 2
    0 1 Smith 50000
    1 2 Jones 60000
```

```
df.columns=['Empd','Name','Salary']
df
```

```
      Empd Name Salary
    0 1 Smith 50000
    1 2 Jones 60000
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2 entries, 0 to 1
Data columns (total 3 columns):
 # Column Non-Null Count Dtype
--- ------ -------------- -----
 0 Empd 2 non-null int64
 1 Name 2 non-null object
 2 Salary 2 non-null int64
dtypes: int64(2), object(1)
memory usage: 176.0+ bytes
```

```
df=pd.read_csv("/content/50_Startups.csv")
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 50 entries, 0 to 49
Data columns (total 5 columns):
 # Column Non-Null Count Dtype
--- ------ -------------- -----
 0 R&D Spend 50 non-null float64
 1 Administration 50 non-null float64
 2 Marketing Spend 50 non-null float64
 3 State 50 non-null object
 4 Profit 50 non-null float64
dtypes: float64(4), object(1)
memory usage: 2.1+ KB
```

```
df.head()
```

```
      R&D Spend Administration Marketing Spend State Profit
    0 165349.20 136897.80 471784.10 New York 192261.83
    1 162597.70 151377.59 443898.53 California 191792.06
    2 153441.51 101145.55 407934.54 Florida 191050.39
    3 144372.41 118671.85 383199.62 New York 182901.99
    4 142107 34 91391 77 366168 42 Florida 166187 94
```

```
df.tail()
```

```
       R&D Spend Administration Marketing Spend State Profit
    45 1000.23 124153.04 1903.93 New York 64926.08
    46 1315.46 115816.21 297114.46 Florida 49490.75
    47 0.00 135426.92 0.00 California 42559.73
    48 542.05 51743.15 0.00 New York 35673.41
    49 0 00 116983 80 45173 06 California 14681 40
```

```
import numpy as np
import pandas as pd
df=pd.read_csv("/content/employee.csv")
```

```
df.head()
```

emp id name salary

0 1 SREE VARSSINI K S 5000

1 2 SREEMATHI B 6000

2 3 SREYA G 7000

3 4 SREYASKARI MULLAPUDI 5000

4 5 SRI AKASH U G 8000

```
df.tail()
```

emp id name salary

2 3 SREYA G 7000

3 4 SREYASKARI MULLAPUDI 5000

4 5 SRI AKASH U G 8000

5 6 SRI HARSHAVARDHANAN R 3000

6 7 SRI HARSHAVARDHANAN R 6000

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7 entries, 0 to 6
Data columns (total 3 columns):
 # Column Non-Null Count Dtype
--- ------ -------------- -----
 0 emp id 7 non-null int64
 1 name 7 non-null object
 2 salary 7 non-null int64
dtypes: int64(2), object(1)
memory usage: 296.0+ bytes
```

```
df.salary
```

salary

0 5000

1 6000

2 7000

3 5000

4 8000

5 3000

6 6000

```
type(df.salary)
```

pandas.core.series.Series

```
def __init__(data=None, index=None, dtype: Dtype | None=None, name=None, copy: bool | None=None,
fastpath: bool=False) -> None

One-dimensional ndarray with axis labels (including time series).

Labels need not be unique but must be a hashable type. The object
supports both integer- and label-based indexing and provides a host of
methods for performing operations involving the index. Statistical
  th d f d h b idd t t ti ll l d
```

```
df.salary.mean()
```

```
5714.285714285715
```

```
df.salary.median()
```

```
6000.0
```

```
df.salary.mode()
```

```
   salary
0 5000
1 6000
```

```
df.salary.var()
```

```
2571428.5714285714
```

```
df.salary.std()
```

```
1603.5674514745463
```

```
df.describe()
```

```
       emp id salary
count 7.000000 7.000000
mean 4.000000 5714.285714
 std 2.160247 1603.567451
 min 1.000000 3000.000000
 25% 2.500000 5000.000000
 50% 4.000000 6000.000000
 75% 5.500000 6500.000000
 max 7 000000 8000 000000
```

```
df.describe(include='all')
```

```
        emp id name salary
count 7.000000 7 7.000000
unique NaN 6 NaN
  top NaN SRI HARSHAVARDHANAN R NaN
 freq NaN 2 NaN
 mean 4.000000 NaN 5714.285714
  std 2.160247 NaN 1603.567451
  min 1.000000 NaN 3000.000000
  25% 2.500000 NaN 5000.000000
  50% 4.000000 NaN 6000.000000
  75% 5.500000 NaN 6500.000000
  max 7 000000 NaN 8000 000000
```

```
empCol=df.columns
```

```
empCol
```

```
Index(['emp id', 'name ', 'salary'], dtype='object')
```

```
emparray=df.values
```

```
emparray
```

```
array([[1, 'SREE VARSSINI K S', 5000],
 [2, 'SREEMATHI B', 6000],
 [3, 'SREYA G', 7000],
 [4, 'SREYASKARI MULLAPUDI', 5000],
 [5, 'SRI AKASH U G', 8000],
```

```
 [6, 'SRI HARSHAVARDHANAN R', 3000],
 [7, 'SRI HARSHAVARDHANAN R', 6000]], dtype=object)
```

```
employee_DF=pd.DataFrame(emparray,columns=empCol)
```

```
employee_DF
```

```
   emp id name salary
0 1 SREE VARSSINI K S 5000
```

1	2	SREEMATHI B	6000
2	3	SREYA G	7000
3	4	SREYASKARI MULLAPUDI	5000
4	5	SRI AKASH U G	8000
5	6	SRI HARSHAVARDHANAN R	3000
6	7	SRI HARSHAVARDHANAN R	6000

```
Start coding or generate with AI.
```

NAME:Dayanithi V

ROLL NO:230701064

SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE

DATE:20.08.2024

```
#sample calculation for low range(lr) , upper range (ur),percentile
import numpy as np
array=np.random.randint(1,100,16) # randomly generate 16 numbers between 1 to 100
array
```

```
array([27, 50, 44, 6, 58, 61, 23, 86, 67, 20, 75, 7, 79, 61, 90, 54])
```

```
array.mean()
```

```
50.5
```

```
np.percentile(array,25)
```

```
26.0
```

```
np.percentile(array,50)
```

```
56.0
```

```
np.percentile(array,75)
```

```
69.0
```

```
np.percentile(array,100)
```

```
90.0
```

```
#outliers detection
def outDetection(array):
  sorted(array)
  Q1,Q3=np.percentile(array,[25,75])
  IQR=Q3-Q1
  lr=Q1-(1.5*IQR)
  ur=Q3+(1.5*IQR)
  return lr,ur
```

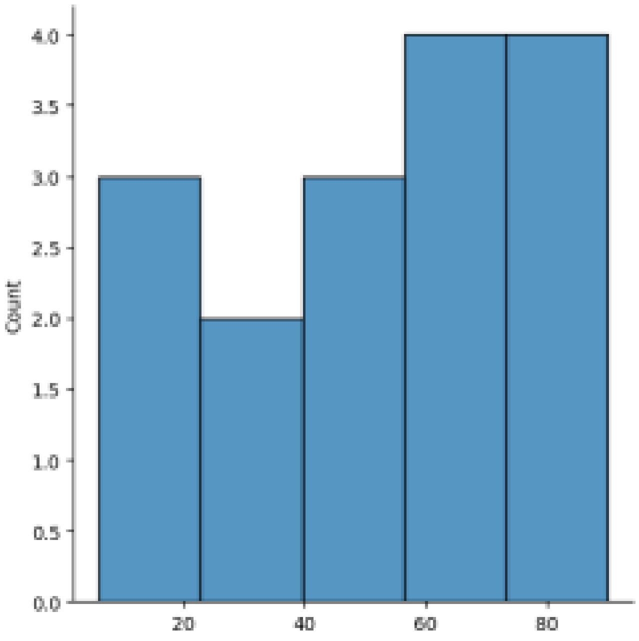
```
lr,ur=outDetection(array)
```

```
lr,ur
```

```
(-38.5, 133.5)
```

```
import seaborn as sns
%matplotlib inline
sns.displot(array)
```

```
<seaborn.axisgrid.FacetGrid at 0x78f3291c2710>
```



```
sns.distplot(array)
```

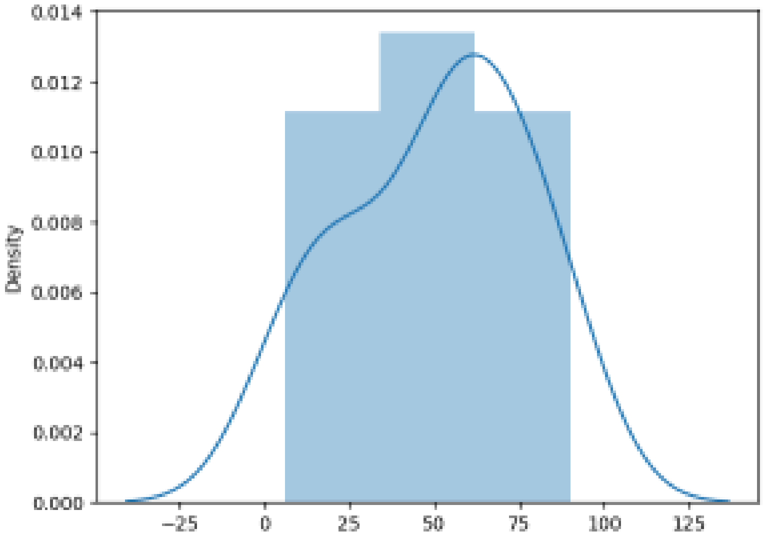
```
<ipython-input-19-d72101983c40>:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

 sns.distplot(array)
<Axes: ylabel='Density'>
```

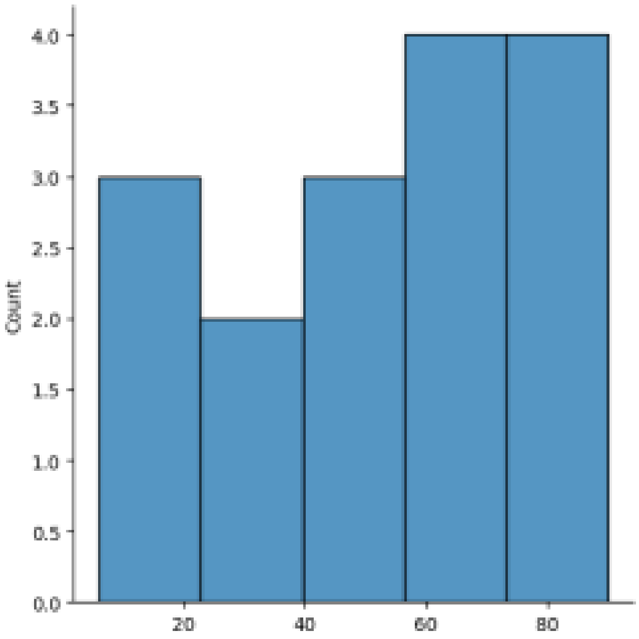


```
new_array=array[(array>lr) & (array<ur)]
new_array
```

```
array([27, 50, 44, 6, 58, 61, 23, 86, 67, 20, 75, 7, 79, 61, 90, 54])
```

```
sns.displot(new_array)
```

```
<seaborn.axisgrid.FacetGrid at 0x78f2e09bb580>
```



```
lr1,ur1=outDetection(new_array)
lr1,ur1
```

```
(-38.5, 133.5)
```

```
final_array=new_array[(new_array>lr1) & (new_array<ur1)]
final_array
```

```
array([27, 50, 44, 6, 58, 61, 23, 86, 67, 20, 75, 7, 79, 61, 90, 54])
```

```
sns.distplot(final_array)
```

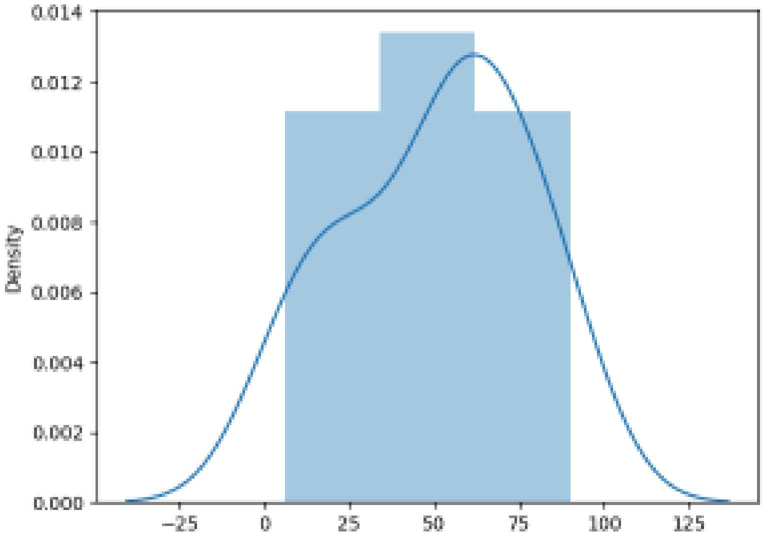
```
<ipython-input-18-7ba96ada5b76>:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

 sns.distplot(final_array)
<Axes: ylabel='Density'>
```



NAME:Dayanithi V
ROLL NO:230701064
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:27.08.2024

Handling Missing and Inappropriate Data in a Dataset

Aim: Demonstrate an experiment to handle missing data and inappropriate data in a Data set using Python Pandas Library for Data Preprocessing.

Dataset Given:

Hotel.csv

CustomerID	Age_Group	Rating(1-5)	Hotel	FoodPreference	Bill	NoOfPax	EstimatedSalary	Age_Group
1	20-25	4	Ibis	veg	1300	2	40000	20-25
2	30-35	5	LemonTree	Non-Veg	2000	3	59000	30-35
3	25-30	6	RedFox	Veg	1322	2	30000	25-30
4	20-25	-1	LemonTree	Veg	1234	2	120000	20-25
5	35+	3	Ibis	Vegetarian	989	2	45000	35+
6	35+	3	Ibys	Non-Veg	1909	2	122220	35+
7	35+	4	RedFox	Vegetarian	1000	-1	21122	35+
8	20-25	7	LemonTree	Veg	2999	-10	345673	20-25
9	25-30	2	Ibis	Non-Veg	3456	3	-99999	25-30
9	25-30	2	Ibis	Non-Veg	3456	3	-99999	25-30
10	30-35	5	RedFox	non-Veg	-6755	4	87777	30-35

About Dataset:

No.of Columns =9 (called as series – CustomerID, Age_Group, Rating(1-5),Hotel, FoodPreference, Bill, NoOfPax, EstimatedSalary)

CutomerID: Numerical Continuous data

Age: Categorical Data

Rating (1-5): Numerical Discrete Data

Hotel: Categorical Data

Food: Categorical Data

Bill: Numerical Continuous data

NoOfPax: Numerical Discrete

EstimatedSalary: Numerical Continuous data

Python Code:

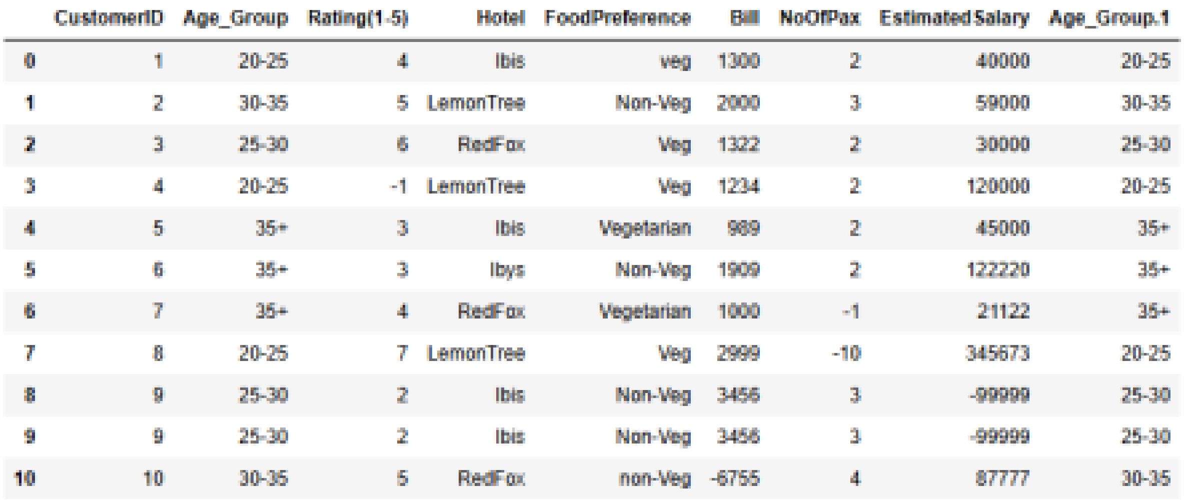
# Upload Hotel.csv and convert it into dataFrame

import numpy as np

import pandas as pd

df=pd.read_csv("Hotel_Dataset.csv")

df

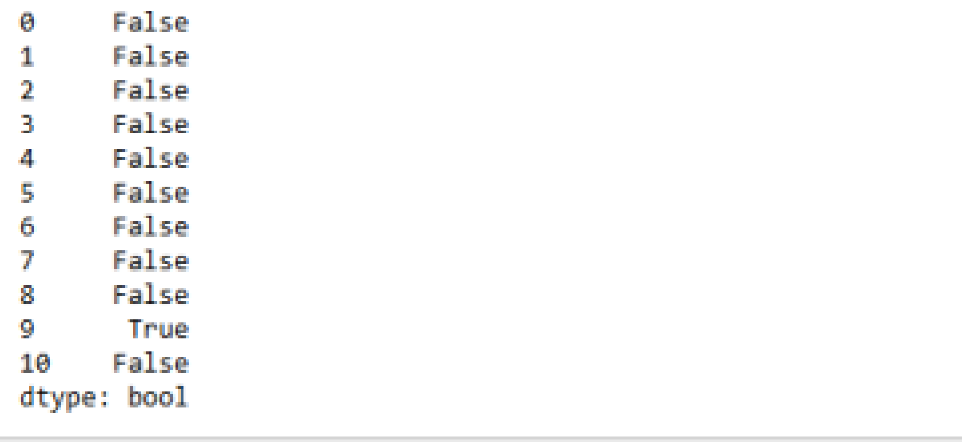


	CustomerID	Age_Group	Rating(1-5)	Hotel	FoodPreference	Bill	NoOfPax	EstimatedSalary	Age_Group.1
0	1	20-25	4	Ibis	veg	1300	2	40000	20-25
1	2	30-35	5	LemonTree	Non-Veg	2000	3	59000	30-35
2	3	25-30	6	RedFox	Veg	1322	2	30000	25-30
3	4	20-25	-1	LemonTree	Veg	1234	2	120000	20-25
4	5	35+	3	Ibis	Vegetarian	989	2	45000	35+
5	6	35+	3	Ibys	Non-Veg	1909	2	122220	35+
6	7	35+	4	RedFox	Vegetarian	1000	-1	21122	35+
7	8	20-25	7	LemonTree	Veg	2999	-10	345673	20-25
8	9	25-30	2	Ibis	Non-Veg	3456	3	-99999	25-30
9	9	25-30	2	Ibis	Non-Veg	3456	3	-99999	25-30
10	10	30-35	5	RedFox	non-Veg	-6755	4	87777	30-35

#From the dataframe identify the duplicate row(i.e row 9)

# The duplicated() method returns a Series with True and False values that describe which rows in the DataFrame are duplicated and not.

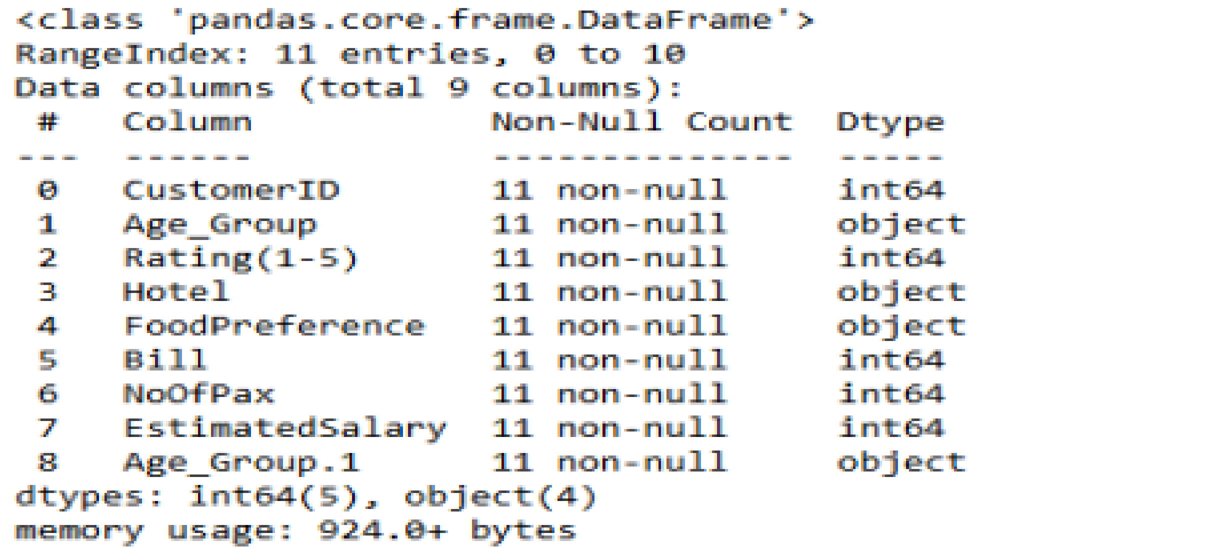
df.duplicated()



```
0     False
1     False
2     False
3     False
4     False
5     False
6     False
7     False
8     False
9      True
10    False
dtype: bool
```

# The info() method prints information about the DataFrame. The information contains the number of columns, column labels, column data types, memory usage, range index, and the number of cells in each column (non-null values).

df.info()

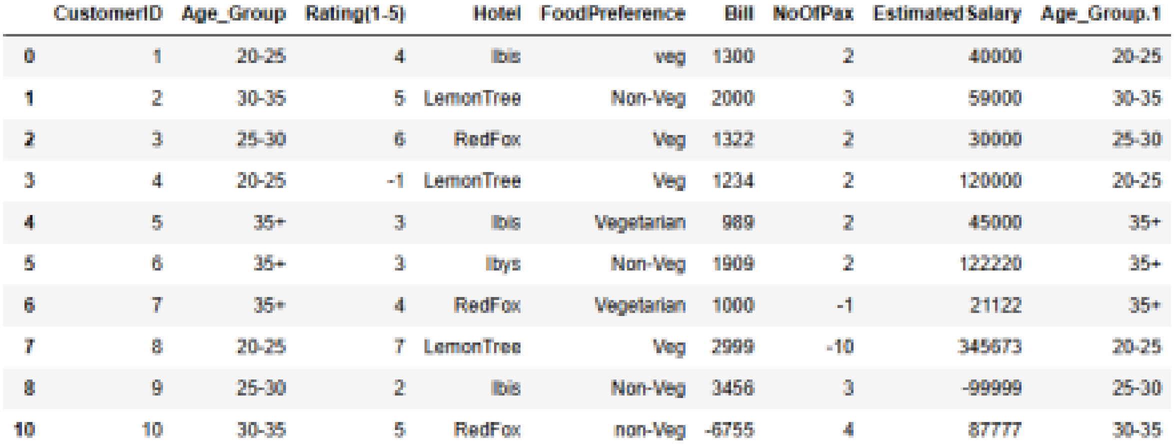


```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11 entries, 0 to 10
Data columns (total 9 columns):
 #   Column           Non-Null Count  Dtype 
---  ------           --------------  ----- 
 0   CustomerID       11 non-null     int64 
 1   Age_Group        11 non-null     object
 2   Rating(1-5)      11 non-null     int64 
 3   Hotel            11 non-null     object
 4   FoodPreference   11 non-null     object
 5   Bill             11 non-null     int64 
 6   NoOfPax          11 non-null     int64 
 7   EstimatedSalary  11 non-null     int64 
 8   Age_Group.1      11 non-null     object
dtypes: int64(5), object(4)
memory usage: 924.0+ bytes
```

# The drop_duplicates() method removes duplicate rows.

df.drop_duplicates(inplace=True)

df



	CustomerID	Age_Group	Rating(1-5)	Hotel	FoodPreference	Bill	NoOfPax	EstimatedSalary	Age_Group.1
0	1	20-25	4	Ibis	veg	1300	2	40000	20-25
1	2	30-35	5	LemonTree	Non-Veg	2000	3	59000	30-35
2	3	25-30	6	RedFox	Veg	1322	2	30000	25-30
3	4	20-25	-1	LemonTree	Veg	1234	2	120000	20-25
4	5	35+	3	Ibis	Vegetarian	989	2	45000	35+
5	6	35+	3	Ibys	Non-Veg	1909	2	122220	35+
6	7	35+	4	RedFox	Vegetarian	1000	-1	21122	35+
7	8	20-25	7	LemonTree	Veg	2999	-10	345673	20-25
8	9	25-30	2	Ibis	Non-Veg	3456	3	-99999	25-30
10	10	30-35	5	RedFox	non-Veg	-6755	4	87777	30-35

#While removing duplicate record row index also removed

# The len() function to return the length of an object. With a dataframe, the function returns the number of rows.

len(df)

10

#Reset the index

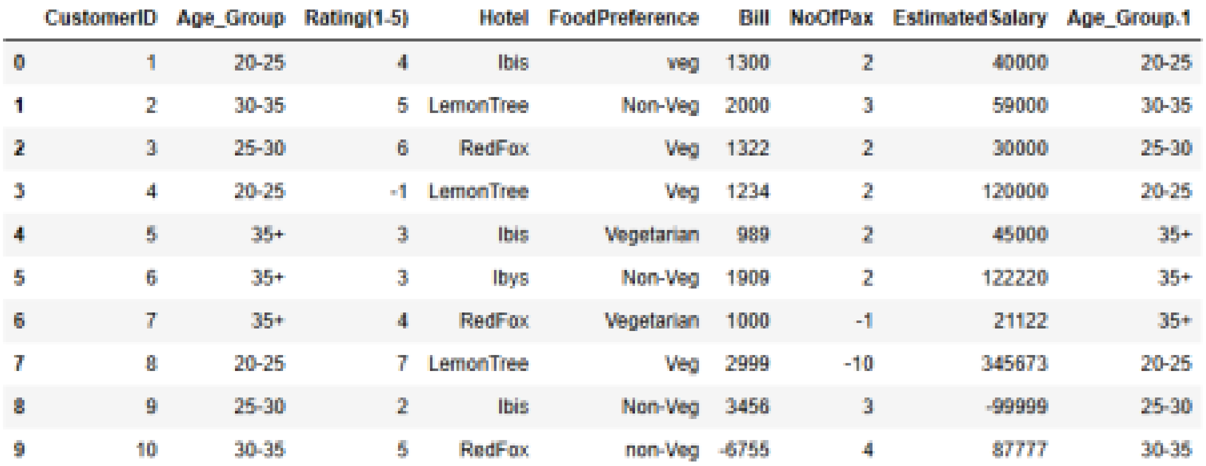
index=np.array(list(range(0,len(df))))

df.set_index(index,inplace=True)

index

```
array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9])
```

df

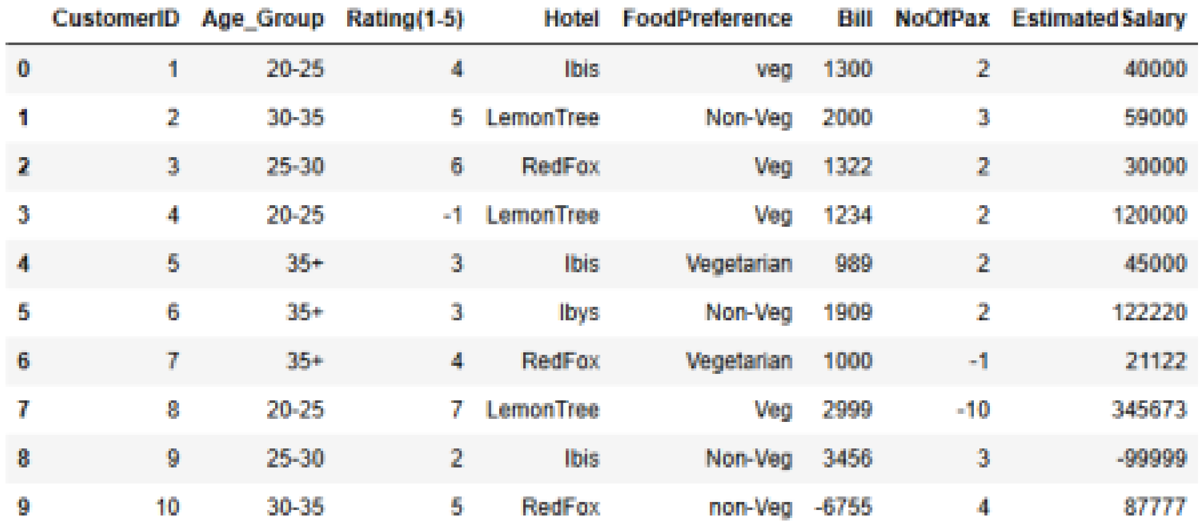


	CustomerID	Age_Group	Rating(1-5)	Hotel	FoodPreference	Bill	NoOfPax	EstimatedSalary	Age_Group.1
0	1	20-25	4	Ibis	veg	1300	2	40000	20-25
1	2	30-35	5	LemonTree	Non-Veg	2000	3	59000	30-35
2	3	25-30	6	RedFox	Veg	1322	2	30000	25-30
3	4	20-25	-1	LemonTree	Veg	1234	2	120000	20-25
4	5	35+	3	Ibis	Vegetarian	989	2	45000	35+
5	6	35+	3	Ibys	Non-Veg	1909	2	122220	35+
6	7	35+	4	RedFox	Vegetarian	1000	-1	21122	35+
7	8	20-25	7	LemonTree	Veg	2999	-10	345673	20-25
8	9	25-30	2	Ibis	Non-Veg	3456	3	-99999	25-30
9	10	30-35	5	RedFox	non-Veg	-6755	4	87777	30-35

# Axis refers to the dimensions of a DataFrame (index and columns) or Series (index only) Use axis=0 to apply functions row-wise along the index. Use axis=1 to apply functions column-wise across columns.

df.drop(['Age_Group.1'],axis=1,inplace=True)

df



	CustomerID	Age_Group	Rating(1-5)	Hotel	FoodPreference	Bill	NoOfPax	EstimatedSalary
0	1	20-25	4	Ibis	veg	1300	2	40000
1	2	30-35	5	LemonTree	Non-Veg	2000	3	59000
2	3	25-30	6	RedFox	Veg	1322	2	30000
3	4	20-25	-1	LemonTree	Veg	1234	2	120000
4	5	35+	3	Ibis	Vegetarian	989	2	45000
5	6	35+	3	Ibys	Non-Veg	1909	2	122220
6	7	35+	4	RedFox	Vegetarian	1000	-1	21122
7	8	20-25	7	LemonTree	Veg	2999	-10	345673
8	9	25-30	2	Ibis	Non-Veg	3456	3	-99999
9	10	30-35	5	RedFox	non-Veg	-6755	4	87777

# The function . loc is typically used for label indexing and can access multiple columns.
df.CustomerID.loc[df.CustomerID<0]=np.nan

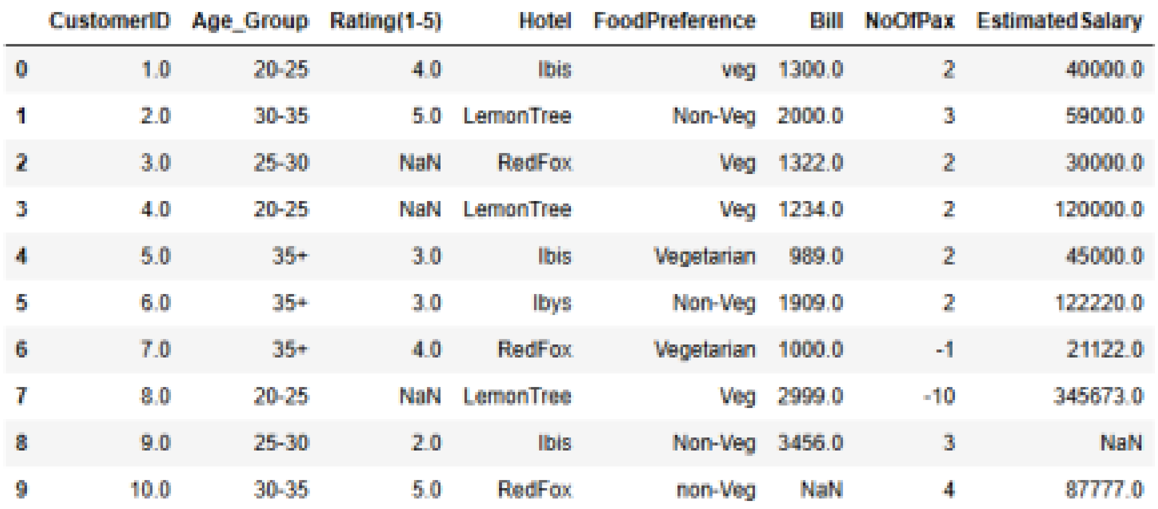
df.Bill.loc[df.Bill<0]=np.nan

df.EstimatedSalary.loc[df.EstimatedSalary<0]=np.nan

df

```
C:\Users\Ayyadurai\AppData\Local\Temp\ipykernel_5300\2580639570.py:1: S
ettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame See
the caveats in the documentation: https://pandas.pydata.org/pandas
```

```
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
df.CustomerID.loc[df.CustomerID<0]=np.nan
df.Bill.loc[df.Bill<0]=np.nan
C:\Users\Ayyadurai\AppData\Local\Temp\ipykernel_5300\2580639570.py:2: S
ettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame
df.EstimatedSalary.loc[df.EstimatedSalary<0]=np.nan
```



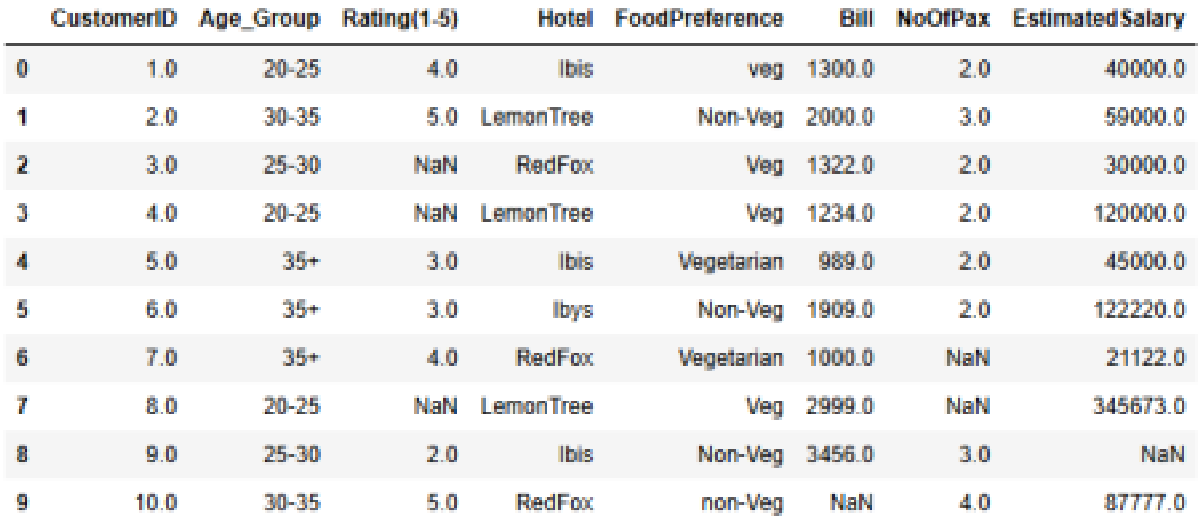
	CustomerID	Age_Group	Rating(1-5)	Hotel	FoodPreference	Bill	NoOfPax	EstimatedSalary
0	1.0	20-25	4.0	Ibis	veg	1300.0	2	40000.0
1	2.0	30-35	5.0	LemonTree	Non-Veg	2000.0	3	59000.0
2	3.0	25-30	NaN	RedFox	Veg	1322.0	2	30000.0
3	4.0	20-25	NaN	LemonTree	Veg	1234.0	2	120000.0
4	5.0	35+	3.0	Ibis	Vegetarian	989.0	2	45000.0
5	6.0	35+	3.0	Ibys	Non-Veg	1909.0	2	122220.0
6	7.0	35+	4.0	RedFox	Vegetarian	1000.0	-1	21122.0
7	8.0	20-25	NaN	LemonTree	Veg	2999.0	-10	345673.0
8	9.0	25-30	2.0	Ibis	Non-Veg	3456.0	3	NaN
9	10.0	30-35	5.0	RedFox	non-Veg	NaN	4	87777.0

df['NoOfPax'].loc[(df['NoOfPax']<1) | (df['NoOfPax']>20)]=np.nan

df

```
C:\Users\Ayyadurai\AppData\Local\Temp\ipykernel_5300\2129877948.py:1: S
ettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

 See the caveats in the documentation: https://pandas.pydata.org/pandas
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
df['NoOfPax'].loc[(df['NoOfPax']<1) | (df['NoOfPax']>20)]=np.nan
```



	CustomerID	Age_Group	Rating(1-5)	Hotel	FoodPreference	Bill	NoOfPax	EstimatedSalary
0	1.0	20-25	4.0	Ibis	veg	1300.0	2.0	40000.0
1	2.0	30-35	5.0	LemonTree	Non-Veg	2000.0	3.0	59000.0
2	3.0	25-30	NaN	RedFox	Veg	1322.0	2.0	30000.0
3	4.0	20-25	NaN	LemonTree	Veg	1234.0	2.0	120000.0
4	5.0	35+	3.0	Ibis	Vegetarian	989.0	2.0	45000.0
5	6.0	35+	3.0	Ibys	Non-Veg	1909.0	2.0	122220.0
6	7.0	35+	4.0	RedFox	Vegetarian	1000.0	NaN	21122.0
7	8.0	20-25	NaN	LemonTree	Veg	2999.0	NaN	345673.0
8	9.0	25-30	2.0	Ibis	Non-Veg	3456.0	3.0	NaN
9	10.0	30-35	5.0	RedFox	non-Veg	NaN	4.0	87777.0

df.Age_Group.unique()

```
array(['20-25', '30-35', '25-30', '35+'], dtype=object)
```

```
df.Hotel.unique()
```

```
array(['Ibis', 'LemonTree', 'RedFox', 'Ibys'], dtype=object)
```

# Using the inplace=True keyword in a pandas method changes the default behaviour such that the operation on the dataframe doesn't return anything, it instead 'modifies the underlying data

```
df.Hotel.replace(['Ibys'],'Ibis',inplace=True)
```

```
df.FoodPreference.unique
```

```
<bound method Series.unique of 0 veg
1 Non-Veg
2 Veg
3 Veg
4 Vegetarian
5 Non-Veg
6 Vegetarian
7 Veg
8 Non-Veg
9 non-Veg
Name: FoodPreference, dtype: object>
```

```
df.FoodPreference.replace(['Vegetarian','veg'],'Veg',inplace=True)
```

```
df.FoodPreference.replace(['non-Veg'],'Non-Veg',inplace=True)
```

# Fillna is a Pandas function to fill the NA/NaN values with the specified method.

# If column or feature is numerical continuous data then replace the missing(NaN) value by taking mean value.

# If column or feature is numerical discrete data then replace the missing(NaN) value by taking median value.
# If column or feature is non-numerical i.e Categorical data then replace the missing(NaN) value by taking mode value.

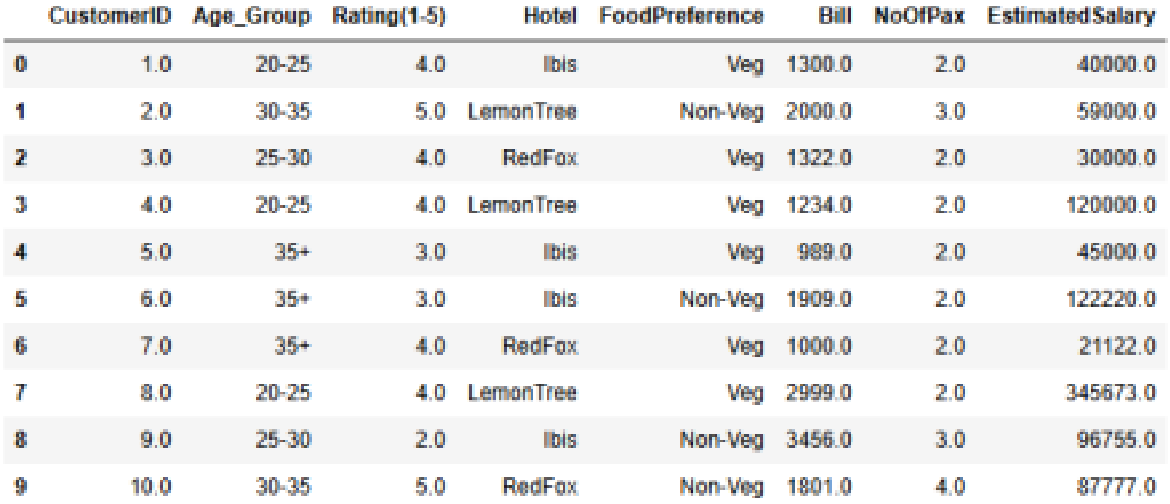
```
df.EstimatedSalary.fillna(round(df.EstimatedSalary.mean()),inplace=True)
```

```
df.NoOfPax.fillna(round(df.NoOfPax.median()),inplace=True)
```

```
df['Rating(1-5)'].fillna(round(df['Rating(1-5)'].median()), inplace=True)
```

```
df.Bill.fillna(round(df.Bill.mean()),inplace=True)
```

```
df
```



	CustomerID	Age_Group	Rating(1-5)	Hotel	FoodPreference	Bill	NoOfPax	EstimatedSalary
0	1.0	20-25	4.0	Ibis	Veg	1300.0	2.0	40000.0
1	2.0	30-35	5.0	LemonTree	Non-Veg	2000.0	3.0	59000.0
2	3.0	25-30	4.0	RedFox	Veg	1322.0	2.0	30000.0
3	4.0	20-25	4.0	LemonTree	Veg	1234.0	2.0	120000.0
4	5.0	35+	3.0	Ibis	Veg	989.0	2.0	45000.0
5	6.0	35+	3.0	Ibis	Non-Veg	1909.0	2.0	122220.0
6	7.0	35+	4.0	RedFox	Veg	1000.0	2.0	21122.0
7	8.0	20-25	4.0	LemonTree	Veg	2999.0	2.0	345673.0
8	9.0	25-30	2.0	Ibis	Non-Veg	3456.0	3.0	96755.0
9	10.0	30-35	5.0	RedFox	Non-Veg	1801.0	4.0	87777.0

NAME:Dayanithi
ROLL NO:230701064
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:03.09.2024

```
import numpy as np
import pandas as pd
df=pd.read_csv('/content/pre-process_datasample.csv')
df
```

```
    Country Age Salary Purchased

0 France 44.0 72000.0 No

1 Spain 27.0 48000.0 Yes

2 Germany 30.0 54000.0 No

3 Spain 38.0 61000.0 No

4 Germany 40.0 NaN Yes

5 France 35.0 58000.0 Yes

6 Spain NaN 52000.0 No

7 France 48.0 79000.0 Yes

8 NaN 50.0 83000.0 No

9 France 37.0 67000.0 Yes
```

Generate code with df View recommended plots

Next steps: df.head() New interactive sheet

```
    Country  Age  Salary  Purchased  0

France  44.0  72000.0  No  1  Spain  27.0

48000.0 Yes 2 Germany 30.0 54000.0 No 3

Spain  38.0  61000.0  No  4  Germany  40  0

NaN Yes
```

New interactive sheet

Next steps:
Generate code with df View recommended plots

```
df.Country.fillna(df.Country.mode()[0],inplace=True)
features=df.iloc[:,:-1].values
```

```
<ipython-input-5-20665a0bbaa1>:1: FutureWarning: A value is trying to be set on a copy of a DataFrame o
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate ob

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inpla


df.Country.fillna(df.Country.mode()[0],inplace=True)
```

```
label=df.iloc[:,-1].values
```

```
Start coding or generate with AI.
```

```
from sklearn.impute import SimpleImputer
```

```
age=SimpleImputer(strategy="mean",missing_values=np.nan)
```

```
Salary=SimpleImputer(strategy="mean",missing_values=np.nan)
```

```
age.fit(features[:,[1]])
```

```
    ▼ SimpleImputer  i ?
   SimpleImputer()
```

```
Salary.fit(features[:,[2]])
```

```
    ▼ SimpleImputer  i ?
   SimpleImputer()
```

```
SimpleImputer()
```

```
    ▼ SimpleImputer  i ?
   SimpleImputer()
```

```
features[:,[1]]=age.transform(features[:,[1]])
```

```
features[:,[2]]=Salary.transform(features[:,[2]])
```

```
features
```

```
array([['France', 44.0, 72000.0],
 ['Spain', 27.0, 48000.0],
 ['Germany', 30.0, 54000.0],
 ['Spain', 38.0, 61000.0],
 ['Germany', 40.0, 63777.77777777778],
 ['France', 35.0, 58000.0],
 ['Spain', 38.77777777777778, 52000.0],
 ['France', 48.0, 79000.0],
 ['France', 50.0, 83000.0],
 ['France', 37.0, 67000.0]], dtype=object)
```

```
from sklearn.preprocessing import OneHotEncoder
```

```
oh = OneHotEncoder(sparse_output=False)
```

```
Country=oh.fit_transform(features[:,[0]])
```

```
Country
```

```
      array([[1., 0., 0.],
       [0., 0., 1.],
       [0., 1., 0.],
       [0., 0., 1.],
       [0., 1., 0.],
       [1., 0., 0.],
       [0., 0., 1.],
       [1., 0., 0.],
```

```
       [1., 0., 0.],
       [1., 0., 0.]])
```

```
final_set=np.concatenate((Country,features[:,[1,2]]),axis=1)
```

```
final_set
```

```
      array([[1.0, 0.0, 0.0, 44.0, 72000.0],
       [0.0, 0.0, 1.0, 27.0, 48000.0],
       [0.0, 1.0, 0.0, 30.0, 54000.0],
       [0.0, 0.0, 1.0, 38.0, 61000.0],
       [0.0, 1.0, 0.0, 40.0, 63777.77777777778],
       [1.0, 0.0, 0.0, 35.0, 58000.0],
       [0.0, 0.0, 1.0, 38.77777777777778, 52000.0],
       [1.0, 0.0, 0.0, 48.0, 79000.0],
       [1.0, 0.0, 0.0, 50.0, 83000.0],
       [1.0, 0.0, 0.0, 37.0, 67000.0]], dtype=object)
```

```
from sklearn.preprocessing import StandardScaler
sc=StandardScaler()
sc.fit(final_set)
feat_standard_scaler=sc.transform(final_set)
```

```
feat_standard_scaler
```

```
      array([[ 1.00000000e+00, -5.00000000e-01, -6.54653671e-01,
       7.58874362e-01, 7.49473254e-01],
       [-1.00000000e+00, -5.00000000e-01, 1.52752523e+00,
       -1.71150388e+00, -1.43817841e+00],
       [-1.00000000e+00, 2.00000000e+00, -6.54653671e-01,
       -1.27555478e+00, -8.91265492e-01],
       [-1.00000000e+00, -5.00000000e-01, 1.52752523e+00,
       -1.13023841e-01, -2.53200424e-01],
       [-1.00000000e+00, 2.00000000e+00, -6.54653671e-01,
       1.77608893e-01, 6.63219199e-16],
       [ 1.00000000e+00, -5.00000000e-01, -6.54653671e-01,
       -5.48972942e-01, -5.26656882e-01],
       [-1.00000000e+00, -5.00000000e-01, 1.52752523e+00,
       0.00000000e+00, -1.07356980e+00],
       [ 1.00000000e+00, -5.00000000e-01, -6.54653671e-01,
       1.34013983e+00, 1.38753832e+00],
       [ 1.00000000e+00, -5.00000000e-01, -6.54653671e-01,
       1.63077256e+00, 1.75214693e+00],
       [ 1.00000000e+00, -5.00000000e-01, -6.54653671e-01,
       -2.58340208e-01, 2.93712492e-01]])
```

```
from sklearn.preprocessing import MinMaxScaler
mms=MinMaxScaler(feature_range=(0,1))
mms.fit(final_set)
feat_minmax_scaler=mms.transform(final_set)
feat_minmax_scaler
```

```
array([[1.        , 0.        , 0.        , 0.73913043, 0.68571429],
       [0.        , 0.        , 1.        , 0.        , 0.        ],
       [0.        , 1.        , 0.        , 0.13043478, 0.17142857],
       [0.        , 0.        , 1.        , 0.47826087, 0.37142857],
       [0.        , 1.        , 0.        , 0.56521739, 0.45079365],
       [1.        , 0.        , 0.        , 0.34782609, 0.28571429],
       [0.        , 0.        , 1.        , 0.51207729, 0.11428571],
       [1.        , 0.        , 0.        , 0.91304348, 0.88571429],
       [1.        , 0.        , 0.        , 1.        , 1.        ],
       [1.        , 0.        , 0.        , 0.43478261, 0.54285714]])
```

```
Start coding or generate with AI.
```

NAME:Dayanithi v
ROLL NO:230701064
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:10.09.2024

```
import numpy as np
import pandas as pd
df=pd.read_csv("/content/pre-process_datasample.csv")
df
```

```
   Country Age Salary Purchased
0 France 44.0 72000.0 No
1 Spain 27.0 48000.0 Yes
2 Germany 30.0 54000.0 No
3 Spain 38.0 61000.0 No
4 Germany 40.0 NaN Yes
5 France 35.0 58000.0 Yes
6 Spain NaN 52000.0 No
7 France 48.0 79000.0 Yes
8 NaN 50.0 83000.0 No
9 France 37.0 67000.0 Yes
```

Double-click (or enter) to edit

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10 entries, 0 to 9
Data columns (total 4 columns):
 # Column Non-Null Count Dtype
--- ------ -------------- -----
 0 Country 9 non-null object
 1 Age 9 non-null float64
 2 Salary 9 non-null float64
 3 Purchased 10 non-null object
dtypes: float64(2), object(2)
memory usage: 448.0+ bytes
```

```
df.Country.mode()
```

```
   Country
0 France
```

```
df.Country.mode()[0]
```

```
type(df.Country.mode())
```

pandas.core.series.Series

```
def __init__(data=None, index=None, dtype: Dtype | None=None, name=None, copy: bool | None=None,
fastpath: bool=False) -> None
```

~~index is not None, the resulting Series is reindexed with the index values.~~

```
dtype : str, numpy.dtype, or ExtensionDtype, optional
 Data type for the output Series. If not specified, this will be
 inferred from `data`.
 See the :ref:`user guide <basics.dtypes>` for more usages.
name : Hashable, default None
    The name to give to the Series
```

```
df.Country.fillna(df.Country.mode()[0],inplace=True)
```

```
df.Age.fillna(df.Age.median(),inplace=True)
```

```
df.Salary.fillna(round(df.Salary.mean()),inplace=True)
```

```
df
```

	Country	Age	Salary	Purchased
0	France	44.0	72000.0	No
1	Spain	27.0	48000.0	Yes
2	Germany	30.0	54000.0	No
3	Spain	38.0	61000.0	No
4	Germany	40.0	63778.0	Yes
5	France	35.0	58000.0	Yes
6	Spain	38.0	52000.0	No
7	France	48.0	79000.0	Yes
8	France	50.0	83000.0	No
9	France	37 0	67000 0	Yes

```
pd.get_dummies(df.Country)
```

	France	Germany	Spain
0	True	False	False
1	False	False	True
2	False	True	False
3	False	False	True
4	False	True	False
5	True	False	False
6	False	False	True
7	True	False	False
8	True	False	False
9	True	False	False

```
updated_dataset=pd.concat([pd.get_dummies(df.Country),df.iloc[:,[1,2,3]]],axis=1)
```

```
updated_dataset
```

	France	Germany	Spain	Age	Salary	Purchased
0	True	False	False	44.0	72000.0	No
1	False	False	True	27.0	48000.0	Yes
2	False	True	False	30.0	54000.0	No
3	False	False	True	38.0	61000.0	No
4	False	True	False	40.0	63778.0	Yes
5	True	False	False	35.0	58000.0	Yes
6	False	False	True	38.0	52000.0	No
7	True	False	False	48.0	79000.0	Yes
8	True	False	False	50.0	83000.0	No
9	True	False	False	37 0	67000 0	Yes

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10 entries, 0 to 9
Data columns (total 4 columns):
 # Column Non-Null Count Dtype
--- ------ -------------- -----
 0 Country 10 non-null object
 1 Age 10 non-null float64
 2 Salary 10 non-null float64
 3 Purchased 10 non-null object
dtypes: float64(2), object(2)
memory usage: 448.0+ bytes
```

```
updated_dataset.Purchased.replace(['No','Yes'],[0,1],inplace=True)
```

```
updated_dataset
```

	France	Germany	Spain	Age	Salary	Purchased
0	True	False	False	44.0	72000.0	0
1	False	False	True	27.0	48000.0	1

```
2 False True False 30.0 54000.0 0
3 False False True 38.0 61000.0 0
4 False True False 40.0 63778.0 1
5 True False False 35.0 58000.0 1
6 False False True 38.0 52000.0 0
7 True False False 48.0 79000.0 1
8 True False False 50.0 83000.0 0
9 True False False 37 0 67000 0 1
```

```
Start coding or generate with AI.
```

NAME:Dayanithi v
ROLL NO:230701064
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:08.10.2024

```
 import seaborn as sns
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

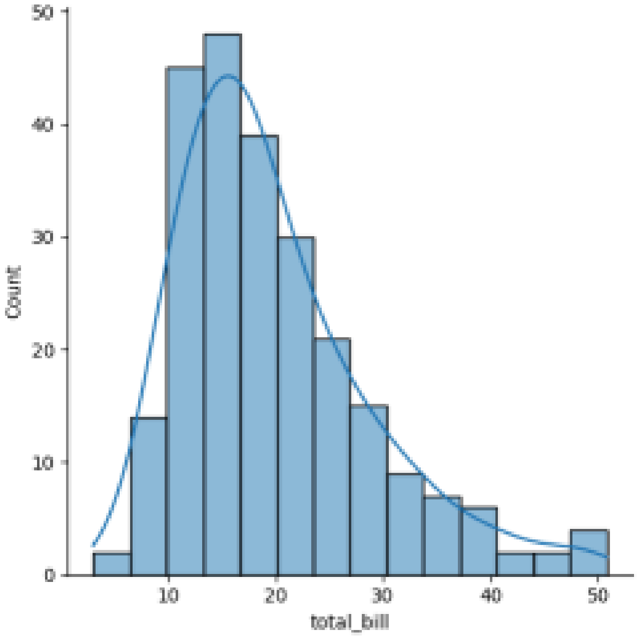
```
tips=sns.load_dataset('tips')
```

```
tips.head()
```

```
       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
```

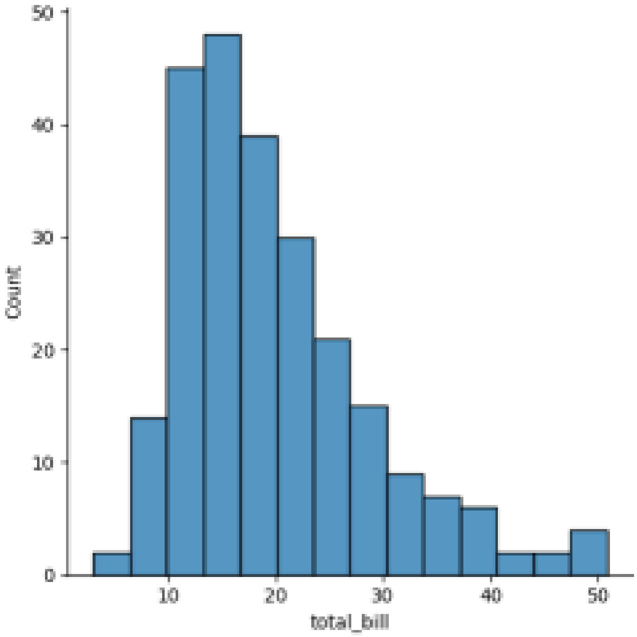
```
sns.displot(tips.total_bill,kde=True)
```

```
<seaborn.axisgrid.FacetGrid at 0x79bb4c7ea680>
```



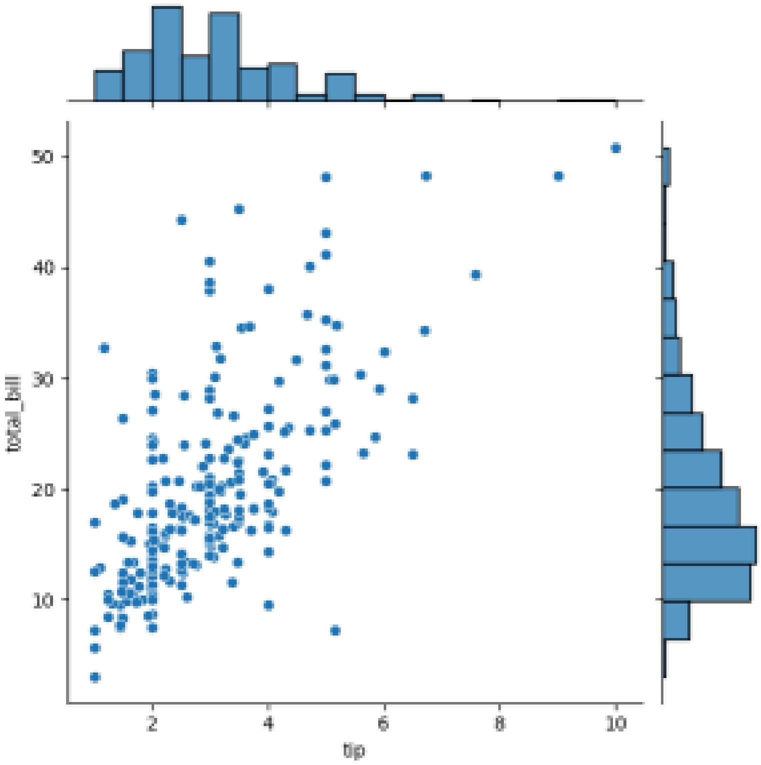
```
sns.displot(tips.total_bill,kde=False)
```

```
<seaborn.axisgrid.FacetGrid at 0x79bb0b0af580>
```



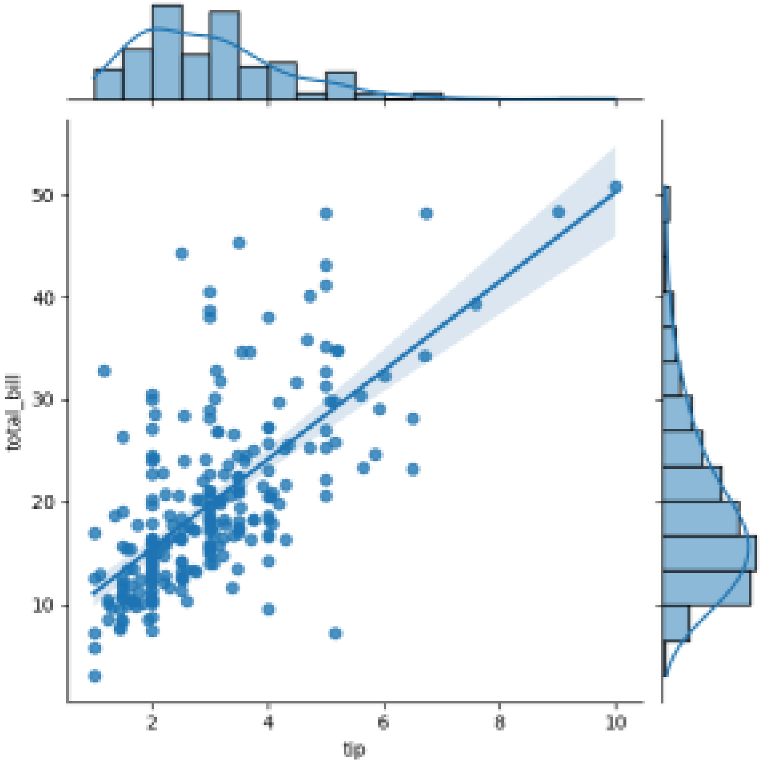
```
sns.jointplot(x=tips.tip,y=tips.total_bill)
```

```
<seaborn.axisgrid.JointGrid at 0x79bb08fc96c0>
```



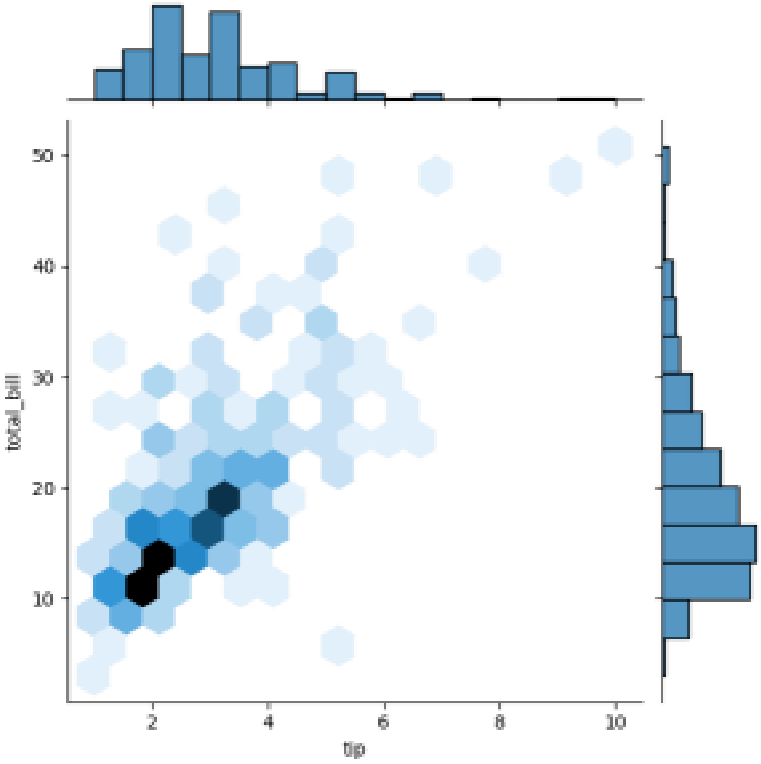
```
sns.jointplot(x=tips.tip,y=tips.total_bill,kind="reg")
```

```
<seaborn.axisgrid.JointGrid at 0x79bb08fc9cf0>
```



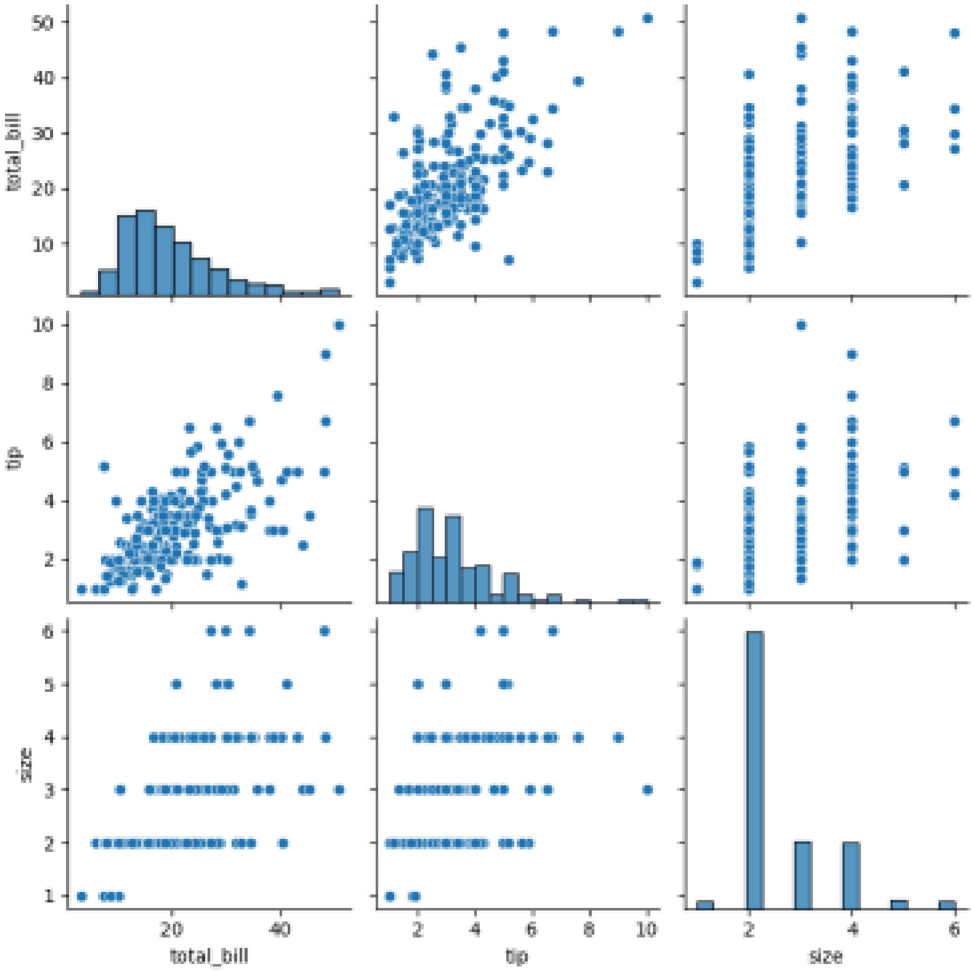
```
sns.jointplot(x=tips.tip,y=tips.total_bill,kind="hex")
```

```
<seaborn.axisgrid.JointGrid at 0x79bb088f4730>
```



```
sns.pairplot(tips)
```

```
<seaborn.axisgrid.PairGrid at 0x79bb06fc3d30>
```



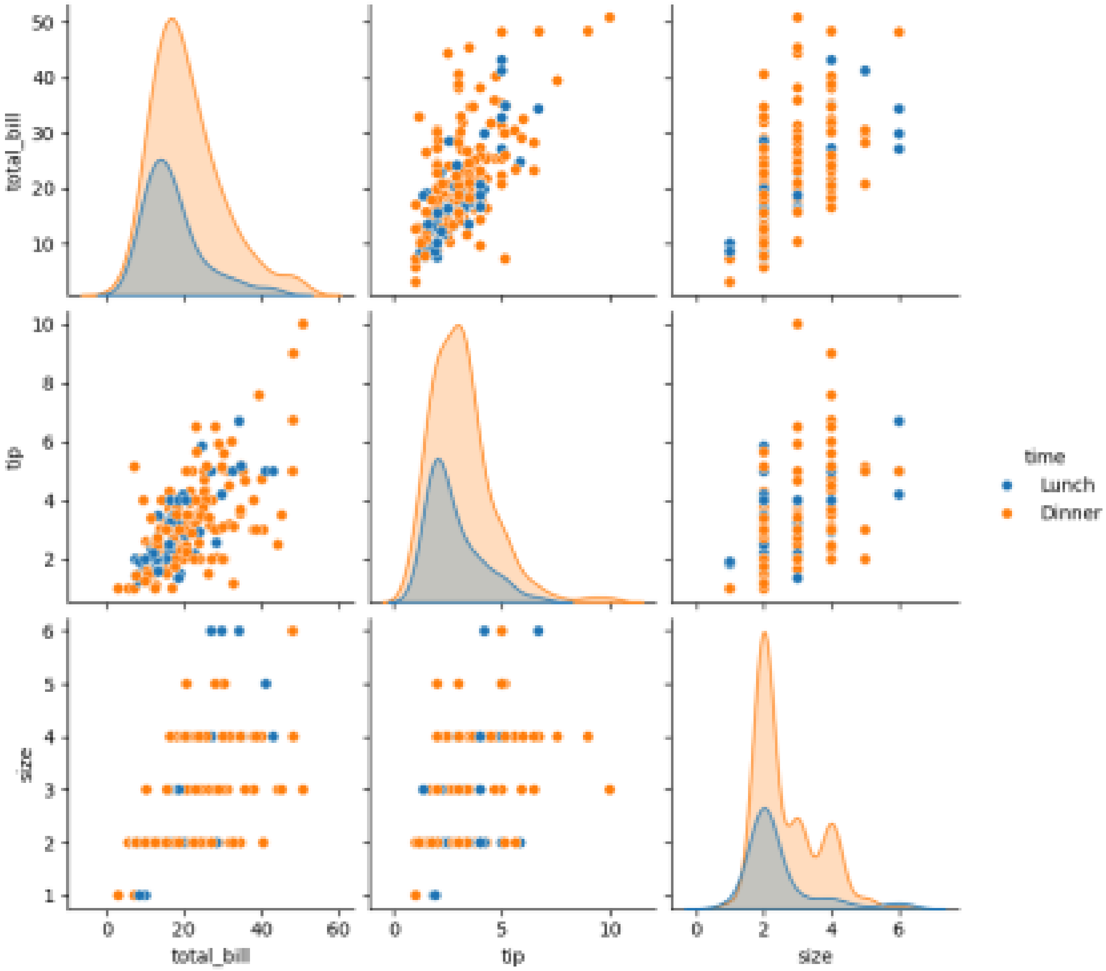
```
tips.time.value_counts()
```

```
              count
        time
      Dinner 176
      Lunch 68

     dtype: int64
```

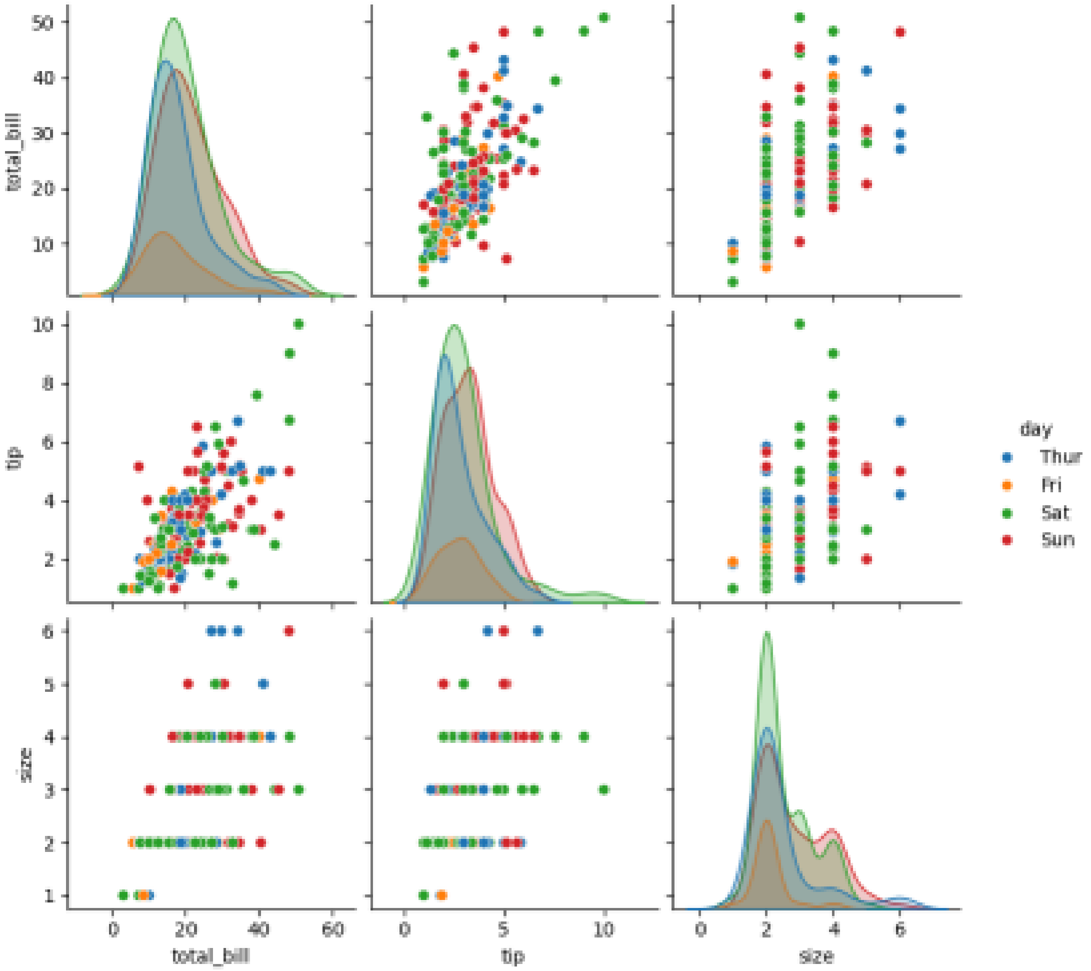
```
sns.pairplot(tips,hue='time')
```

```
<seaborn.axisgrid.PairGrid at 0x79bb088f4670>
```



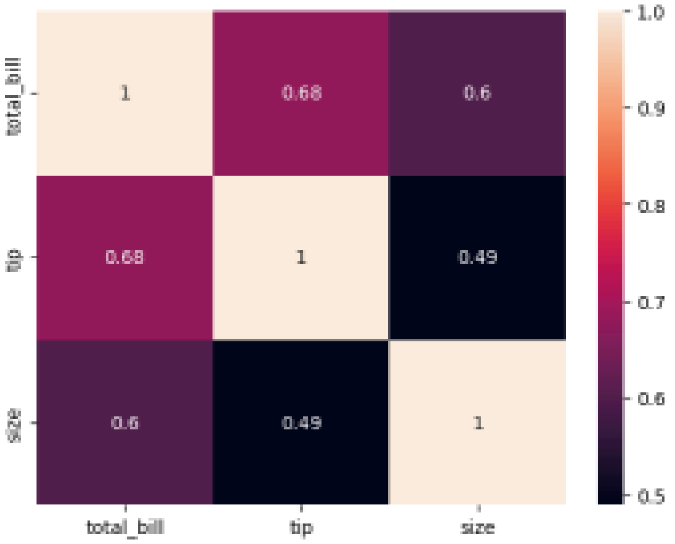
```
sns.pairplot(tips,hue='day')
```

```
<seaborn.axisgrid.PairGrid at 0x79bb08f1f6a0>
```



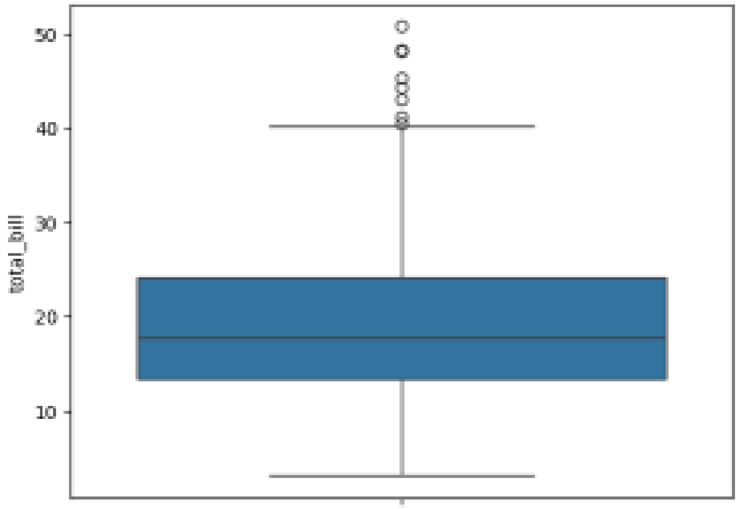
```
sns.heatmap(tips.corr(numeric_only=True),annot=True)
```

```
<Axes: >
```



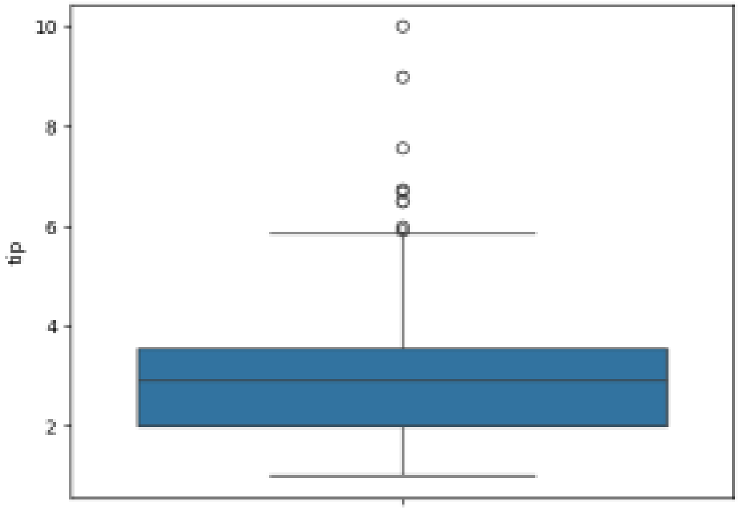
```
sns.boxplot(tips.total_bill)
```

```
<Axes: ylabel='total_bill'>
```



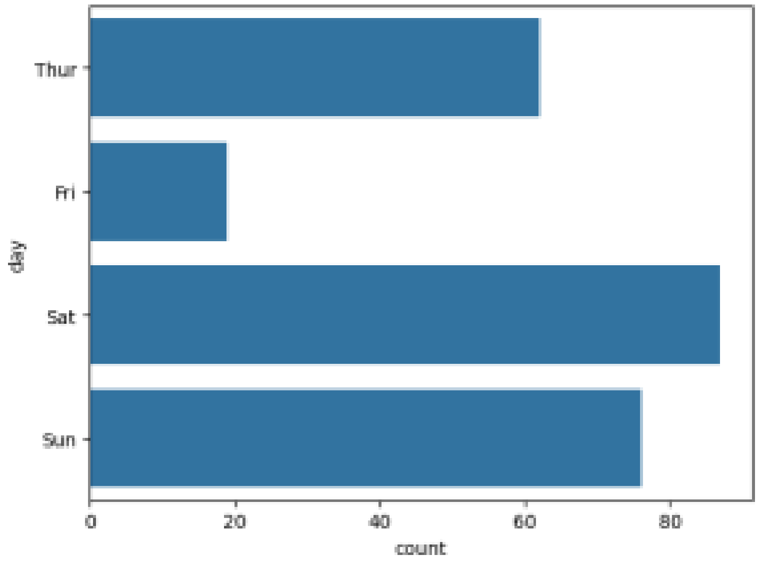
```
sns.boxplot(tips.tip)
```

```
<Axes: ylabel='tip'>
```



```
sns.countplot(tips.day)
```

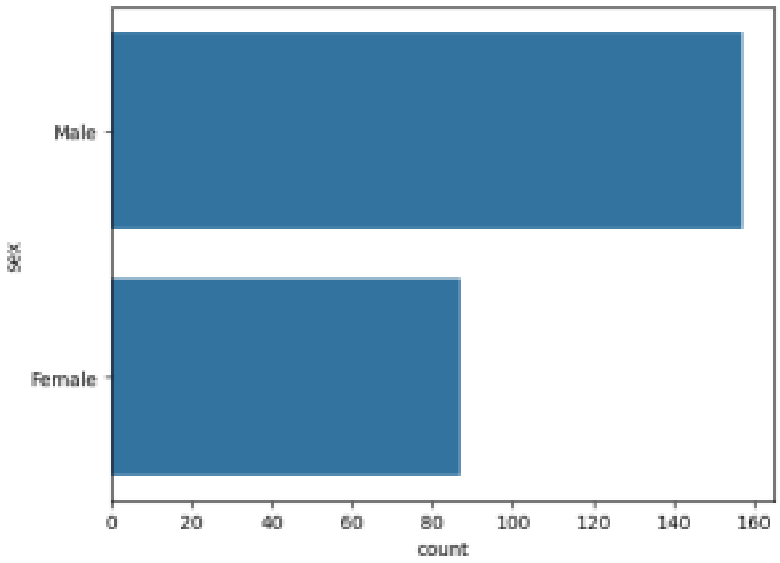
```
<Axes: xlabel='count', ylabel='day'>
```



```
sns.countplot(tips.sex)
```

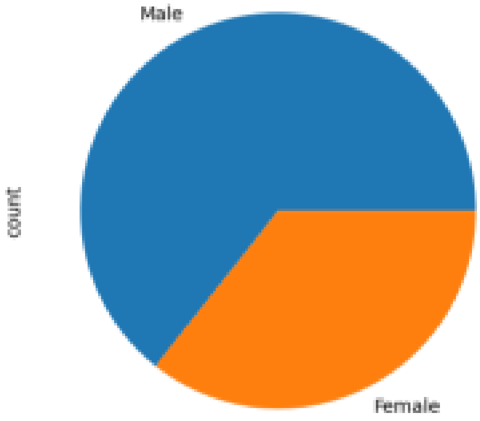
Type your text

```
<Axes: xlabel='count', ylabel='sex'>
```



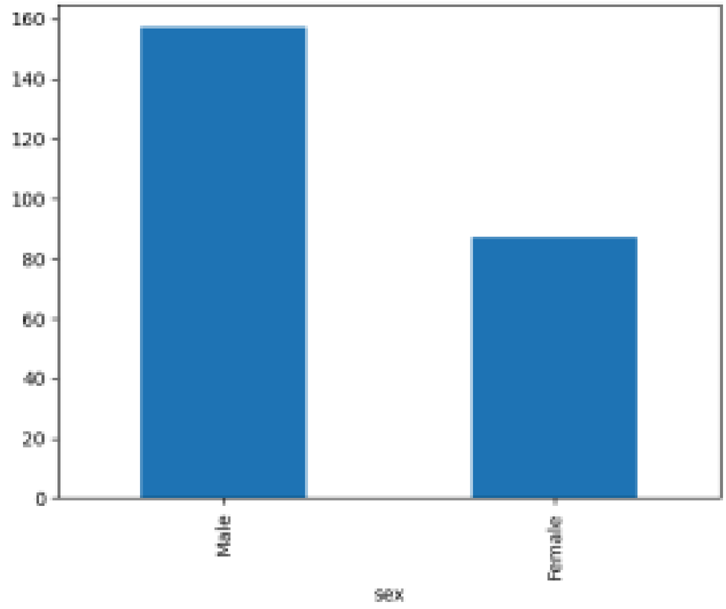
```
tips.sex.value_counts().plot(kind='pie')
```

```
<Axes: ylabel='count'>
```



```
tips.sex.value_counts().plot(kind='bar')
```

```
<Axes: xlabel='sex'>
```



```
sns.countplot(tips[tips.time=='Dinner']['day'])
```

```
<Axes: xlabel='count', ylabel='day'>
```

NAME:Dayanithi v
ROLL NO:230701064
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:08.10.2024

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

```
'pandas.core.frame.DataFram
e'> RangeIndex: 30 entries,
0 to 29
Data columns (total 2
columns):
# Column Non-Null Count
Dtype  --- ------
-------------- -----  0
YearsExperience 30 non-null
float64 1 Salary 30
non-null int64  dtypes:
float64(1), int64(1)
memory usage: 612.0 bytes
```

```
In [3]: In [4]:
```

```
df.dropna(inplace=True)
```

```
df.info()
```

```
<class
'pandas.core.frame.DataFram
e'> RangeIndex: 30 entries,
0 to 29
Data columns (total 2
columns):
# Column Non-Null Count
Dtype  --- ------
-------------- -----  0
YearsExperience 30 non-null
float64 1 Salary 30
non-null int64  dtypes:
float64(1), int64(1)
memory usage: 612.0 bytes
```

```
df.describe()
```

```
In [5]:
import numpy as np
import pandas as pd
df=pd.read_csv('Salary_data
.csv')
df
```

```
df.info()
```

```
<class
```

```
Out[5]: YearsExperience Salary count 30.000000

 30.000000 mean 5.313333 76003.000000 std 2.837888
                                          27414.429785
          min 1.100000 37731.000000
          25% 3.200000 56720.750000
          50% 4.700000 65237.000000
          75% 7.700000 100544.750000
          max 10.500000 122391.000000
```

```
In [6]: In [7]: In [20]:
```

```
features=df.iloc[:,[0]].values
label=df.iloc[:,[1]].values
```

```
from sklearn.model_selection import
```

```
train_test_split
x_train,x_test,y_train,y_test=train_test_split(
features,label,test_size=0.2,random_st
```

```
from sklearn.linear_model import
LinearRegression
model=LinearRegression()
model.fit(x_train,y_train)
```

```
Out[20]: ▾ LinearRegression

          LinearRegression()
```

```
                    model.score(x_trai
In [21]:            n,y_train)

Out[21]: 0.9603182547438908
                   model.score(x_tes
In [23]:           t,y_test)

Out[23]: 0.9184170849214232
          model.coef
In [24]:   _

Out[24]: array([[9281.30847068]])
             model.interc
In [25]:     ept_

Out[25]: array([27166.73682891])

In [26]:                                            yr_of_exp=float(input("Enter Years of
                                                    Experience: "))
                                                    yr_of_exp_NP=np.array([[yr_of_exp]])
In [27]: In [28]:                                   Salary=model.predict(yr_of_exp_NP)

                                                    Enter Years of Experience: 44



In [ ]: In [29]:                                    print("Estimated Salary for {} years of

                                                    experience is {}: " .format(yr_of_exp,Salary)

In [ ]:                                             Estimated Salary for 44.0 years of experience
import pickle
pickle.dump(model,open('SalaryPred.model','wb')) is [[435544.30953887]]:
)

model=pickle.load(open('SalaryPred.model','rb')
)
```

NAME:Dayanithi V
ROLL NO:230701064
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:22.10.2024

```
In [1]: In [2]:
```

```
df.info()
```

```
<class
'pandas.core.frame.DataFr
ame'> RangeIndex: 150
entries, 0 to 149 Data
columns (total 5
columns):
# Column Non-Null Count
Dtype  --- ------
-------------- -----  0
sepal.length 150 non-null
float64 1 sepal.width 150
non-null float64 2
petal.length 150 non-null
float64 3 petal.width 150
non-null float64 4
variety 150 non-null
object  dtypes:
float64(4), object(1)
memory usage: 6.0+ KB
```

```
In [3]:
import numpy as np
import pandas as pd

df=pd.read_csv('Iris.csv'
)
```

```
df.variety.value_counts()
```

```
Out[3]: Setosa 50
         Versicolor 50
         Virginica 50
         Name: variety, dtype: int64
```

```
In [4]:
 df.head(
 )
```

```
Out[4]: sepal.length sepal.width petal.length petal.width variety 0 5.1 3.5
         1.4 0.2 Setosa 1 4.9 3.0 1.4 0.2 Setosa 2 4.7 3.2 1.3 0.2 Setosa 3 4.6
         3.1 1.5 0.2 Setosa 4 5.0 3.6 1.4 0.2 Setosa
```

```
In [5]: In [6]: In [8]:

features=df.iloc[:,:-1].values
label=df.iloc[:,4].values

from sklearn.model_selection import
train_test_split
```

```
from sklearn.neighbors import
KNeighborsClassifier

xtrain,xtest,ytrain,ytest=train_test_split
(features,label,test_size=.2,rando
model_KNN=KNeighborsClassifier(n_neighbors
=5)
model_KNN.fit(xtrain,ytrain)
```

```
Out[8]:
 KNeighborsClassifier()
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.

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In [9]:

```
print(model_KNN.score(xtrain,ytrain))
print(model_KNN.score(xtest,ytest))
```

```
0.9583333333333334
1.0
```

In [10]:

```
from sklearn.metrics import confusion_matrix
confusion_matrix(label,model_KNN.predict(features))
```

Out[10]:

```
array([[50,  0,  0],
       [ 0, 47,  3],
       [ 0,  2, 48]], dtype=int64)
```

In [11]:

```
from sklearn.metrics import classification_report
print(classification_report(label,model_KNN.predict(features)))
```

```
 precision recall f1-score support

 Setosa 1.00 1.00 1.00 50 Versicolor
0.96 0.94 0.95 50  Virginica 0.94
0.96 0.95 50

 accuracy 0.97 150  macro avg 0.97
0.97 0.97 150 weighted avg 0.97 0.97
0.97 150
```

In [ ]:

NAME:Dayanithi V
ROLL NO:230701064
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:29.10.2024

```
                              import pandas as pd
                              df=pd.read_csv('Social_N
In [1]:                       etwork_Ads.csv') df
import numpy as np
```

```
Out[1]:  User ID  Gender  Age  EstimatedSalary  Purchased  0  15624510

           Male  19  19000  0  1  15810944  Male  35  20000  0  2  15668575

           Female 26 43000 0 3 15603246 Female 27 57000 0 4 15804002

           Male 19 76000 0 ... ... ... ... ... ...

         395 15691863 Female 46 41000 1 396 15706071 Male 51 23000

         1  397  15654296  Female  50  20000  1  398  15755018  Male  36

         33000 0 399 15594041 Female 49 36000 1


         400 rows × 5 columns
```

```
          df.head(
In [2]:   )
```

```
Out[2]:  User ID Gender Age EstimatedSalary Purchased

          0 15624510 Male 19 19000 0

          1 15810944 Male 35 20000 0

          2 15668575 Female 26 43000 0

          3 15603246 Female 27 57000 0

          4 15804002 Male 19 76000 0
```

```
                    2,3]].values
In [4]:             label=df.iloc[:,4].v
features=df.iloc[:,[ alues features
```

```
Out[4]: array([[ 19, 19000],  [
          35, 20000],
           [ 26, 43000],
           [ 27, 57000],
           [ 19, 76000],
           [ 27, 58000],
           [ 27, 84000],
           [ 32, 150000],
           [ 25, 33000],
           [ 35, 65000],
           [ 26, 80000],
           [ 26, 52000],
           [ 20, 86000],
           [ 32, 18000],
           [ 18, 82000],
           [ 29, 80000],
           [ 47, 25000],
           [ 45, 26000],
           [ 46, 28000],
                [ 48 29000]
```

```
        label
In
[5]:
```

```
Out[5]: array([0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1,
          1, 1, 1, 1, 1, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,  0,
          0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0,  0, 0,
          0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0,  0, 0, 0,
          0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0,  0, 0, 0, 0,
          0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,  0, 0, 0, 0, 0,
          1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0,  0, 0, 0, 0, 0, 1,
          1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0,  0, 0, 0, 0, 0, 0, 1,
          0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,  0, 0, 0, 0, 1, 0, 1, 0,
          1, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 1,  0, 1, 1, 1, 0, 0, 1, 1, 0,
          1, 1, 0, 1, 1, 0, 1, 0, 0, 0, 1, 1, 0,  1, 1, 0, 1, 0, 1, 0, 1, 0, 0,
          1, 1, 0, 1, 0, 0, 1, 1, 0, 1, 1, 0,  1, 1, 0, 0, 1, 0, 0, 1, 1, 1, 1,
          1, 0, 1, 1, 1, 1, 0, 1, 1, 0, 1,  0, 1, 0, 1, 1, 1, 1, 0, 0, 0, 1, 1,
          0, 1, 1, 1, 1, 1, 0, 0, 0, 1,  1, 0, 0, 1, 0, 1, 0, 1, 1, 0, 1, 0, 1,
          1, 0, 1, 1, 0, 0, 0, 1, 1,  0, 1, 0, 0, 1, 0, 1, 0, 0, 1, 1, 0, 0, 1,
          1, 0, 1, 1, 0, 0, 1, 0,  1, 0, 1, 1, 1, 0, 1, 0, 1, 1, 1, 0, 1, 1, 1,
          1, 0, 1, 1, 1, 0, 1,  0, 1, 0, 0, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 1, 1,
          1, 1, 1, 1, 0, 1,  1, 1, 0, 1], dtype=int64)
```

```
                          import train_test_split from
In [6]:                   sklearn.linear_model import
from sklearn.model_selection  LogisticRegression
```

In [7]: In [8]:

```
plit(features,label,test_size=0.
model=LogisticRegression()
 model.fit(x_train,y_train)
 train_score=model.score(x_train,y_train)
 test_score=model.score(x_test,y_test)
 if test_score>train_score:
 print("Test {} Train{} Random State
{}".format(test_score,train_score,i)
```

```
Test 0.6875 Train0.63125 Random State 3
Test 0.7375 Train0.61875 Random State 4
Test 0.6625 Train0.6375 Random State 5
Test 0.65 Train0.640625 Random State 6
Test 0.675 Train0.634375 Random State 7
Test 0.675 Train0.634375 Random State 8
Test 0.65 Train0.640625 Random State 10
Test 0.6625 Train0.6375 Random State 11
Test 0.7125 Train0.625 Random State 13
Test 0.675 Train0.634375 Random State 16
Test 0.7 Train0.628125 Random State 17
Test 0.7 Train0.628125 Random State 21
Test 0.65 Train0.640625 Random State 24
Test 0.6625 Train0.6375 Random State 25
Test 0.75 Train0.615625 Random State 26
Test 0.675 Train0.634375 Random State 27
Test 0.7 Train0.628125 Random State 28
Test 0.6875 Train0.63125 Random State 29
Test 0.6875 Train0.63125 Random State 31
T t 0 6625 T i 0 6375 R d St t 37
```

```
for i in range(1,401):
x_train,x_test,y_train,y_test=train_test_s
```

```
x_train,x_test,y_train,y_test=train_test_s
plit(features,label,test_size=0.2,
finalModel=LogisticRegression()
finalModel.fit(x_train,y_train)
```

Out[8]:

```
LogisticRegression()
```

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In [9]: In [10]:

```
print(finalModel.score(x_train,y_tra
in))
print(finalModel.score(x_test,y_test
))
```

```
0.834375
0.9125
```

```
from sklearn.metrics import
classification_report
print(classification_report(label,fi
nalModel.predict(features)))
```

```
 precision recall f1-score support

 0 0.85 0.93 0.89 257  1 0.84 0.71
0.77 143

 accuracy 0.85 400  macro avg 0.85
0.82 0.83 400 weighted avg 0.85 0.85
0.85 400
```

In [ ]:

NAME:Dayanithi V
ROLL NO:230701064
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:05.11.2024

```
import seaborn as sns
%matplotlib inline
```

In [1]:

```
df=pd.read_csv('Mall_Customer
s.csv')
```

```
df.info()
```

In [2]: In [3]:

```
<class
'pandas.core.frame.DataFrame'
>
RangeIndex: 200 entries, 0 to
199
Data columns (total 5
columns):
# Column Non-Null Count Dtype
--- ------ --------------
-----  0 CustomerID 200
non-null int64  1 Gender 200
non-null object 2 Age 200
non-null int64  3 Annual
Income (k$) 200 non-null
int64  4 Spending Score
(1-100) 200 non-null int64
dtypes: int64(4), object(1)
memory usage: 7.9+ KB
```

In [4]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as
plt
```

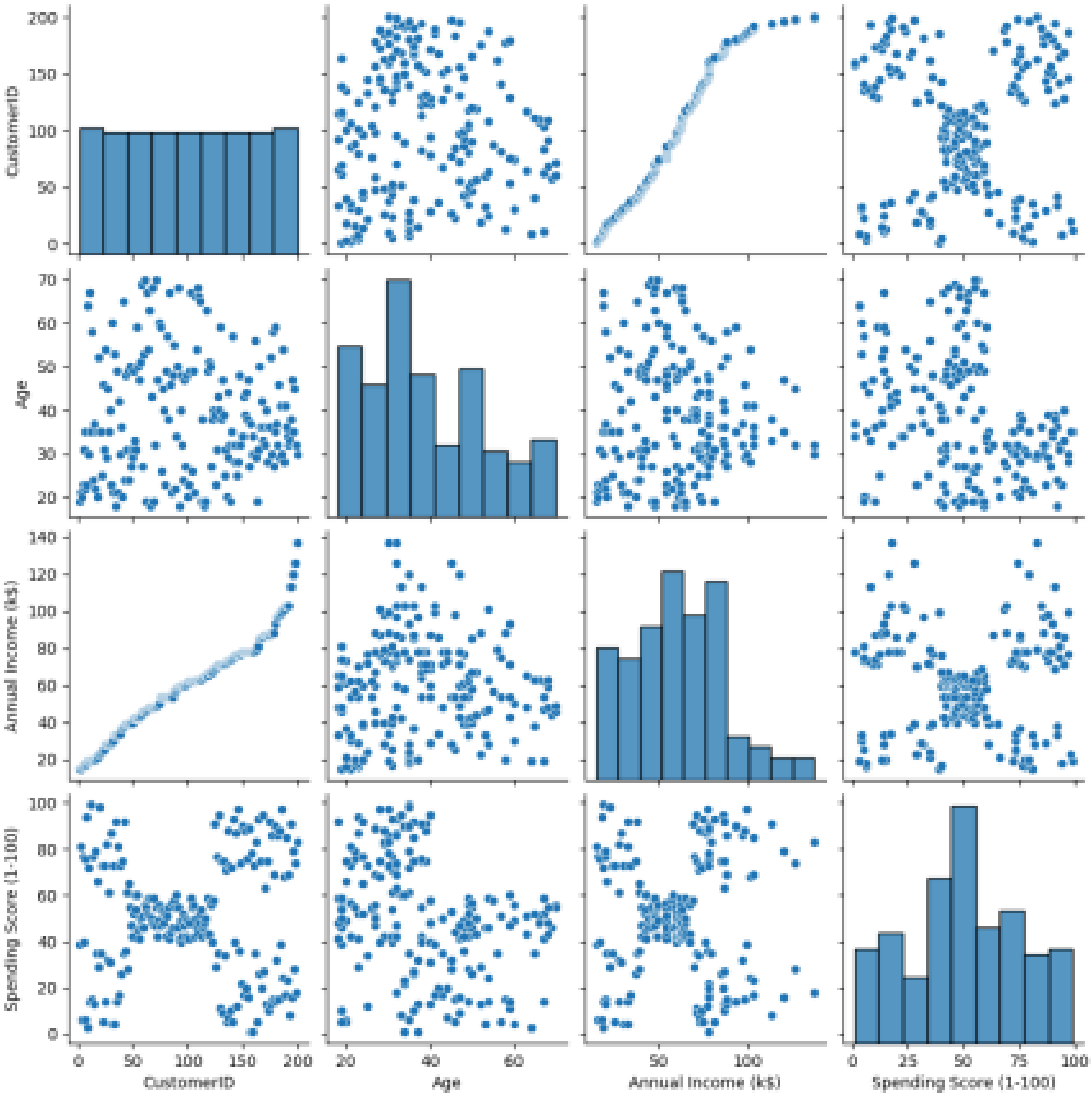
```
df.head()
```

Out[4]:

	CustomerID	Gender	Age	Annual Income (k$)	Spending Score (1-100)
0	1	Male	19	15	39
1	2	Male	21	15	81
2	3	Female	20	16	6
3	4	Female	23	16	77
4	5	Female	31	17	40

```
         sns.pairplot(df)
In [5]:
```

```
Out[5]: <seaborn.axisgrid.PairGrid at 0x170e8e47850>
```



```
features=df.iloc[:,[3,4]].values
```

In [6]:

```
from sklearn.cluster import KMeans
model=KMeans(n_clusters=5)
```

In [7]:

```
model.fit(features)
KMeans(n_clusters=5)
```

```
C:\Users\Ayyadurai\AppData\Local\anaconda
3\Lib\site-packages\sklearn\clust
er\_kmeans.py:870: FutureWarning: The
default value of `n_init` will chang e
from 10 to 'auto' in 1.4. Set the value
of `n_init` explicitly to suppre ss the
warning
warnings.warn(
C:\Users\Ayyadurai\AppData\Local\anaconda
3\Lib\site-packages\sklearn\clust
er\_kmeans.py:1382: UserWarning: KMeans
is known to have a memory leak on Windows
with MKL, when there are less chunks than
available threads. You c an avoid it by
setting the environment variable
OMP_NUM_THREADS=1. warnings.warn(
```

Out[7]:

```
KMeans(n_clusters=5)
```

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On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [8]:

```
Final=df.iloc[:,[3,4]]
Final['label']=model.predict(features)
Final.head()
```

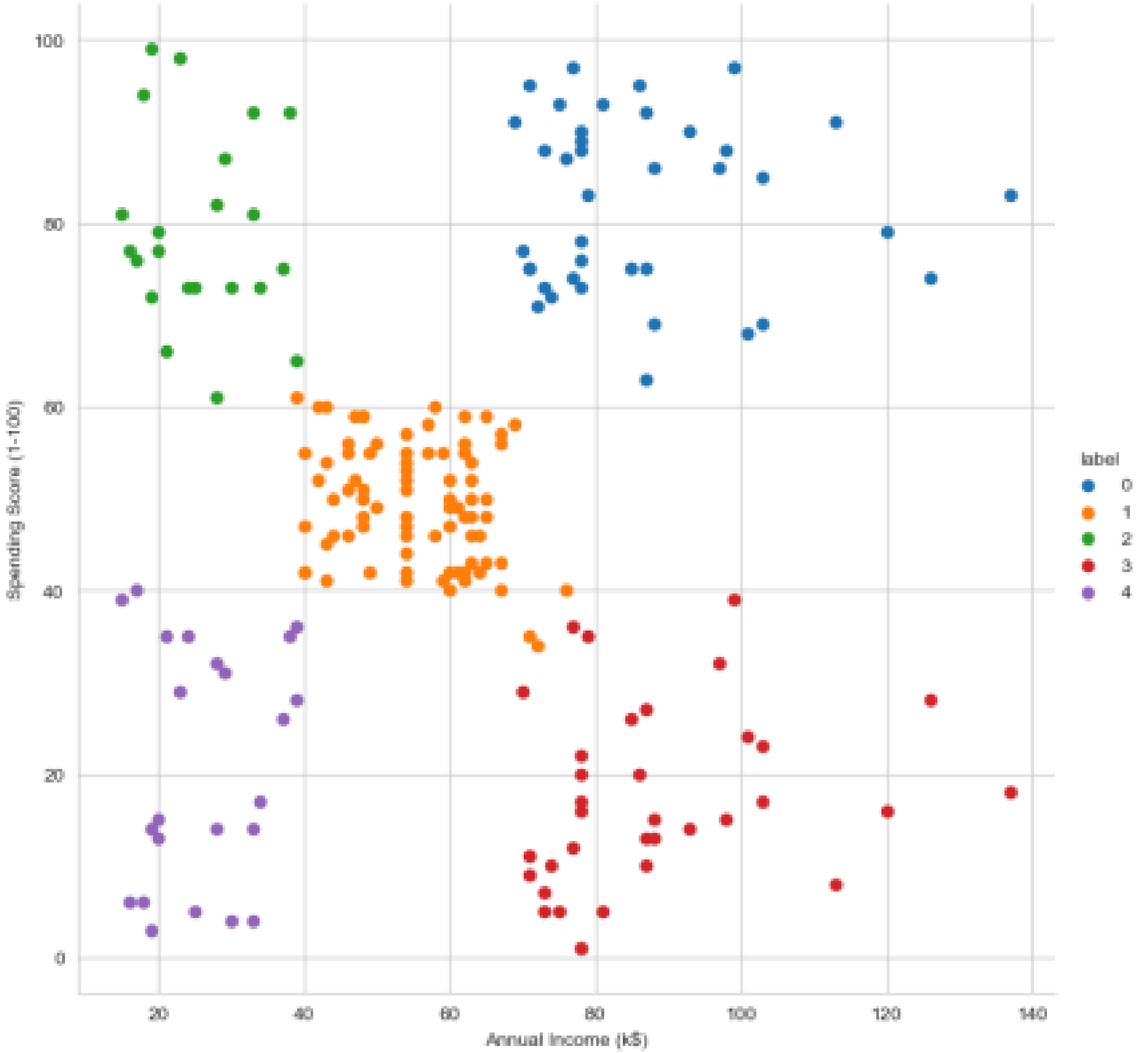
```
C:\Users\Ayyadurai\AppData\Local\Temp\ipy
kernel_8116\470183701.py:2: Setti
ngWithCopyWarning:
A value is trying to be set on a copy of
a slice from a DataFrame. Try using
.loc[row_indexer,col_indexer] = value
instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-doc
s/stable/user_guide/indexing.html#returni
ng-a-view-versus-a-copy (https://
pandas.pydata.org/pandas-docs/stable/user
_guide/indexing.html#returning-a
view-versus-a-copy)
Final['label']=model.predict(features)
```

Out[8]:

	Annual Income (k$)	Spending Score (1-100)	label
0	15	39	4
1	15	81	2
2	16	6	4
3	16	77	2
4	17	40	4

In [9]:

```
sns.set_style("whitegrid")
sns.FacetGrid(Final,hue="label",height=8) \
.map(plt.scatter,"Annual Income (k$)", "Spending Score (1-100)") \
.add_legend();
plt.show()
```



```
In [10]: features_el=df.iloc[:,[2,3,4]].values
         from sklearn.cluster import KMeans
         wcss=[]
         for i in range(1,10):
          model=KMeans(n_clusters=i)
          model.fit(features_el)
          wcss.append(model.inertia_)
         plt.plot(range(1,10),wcss)
```