

NAME:DEEPA S
ROLL NO:230701065
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 x 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
```

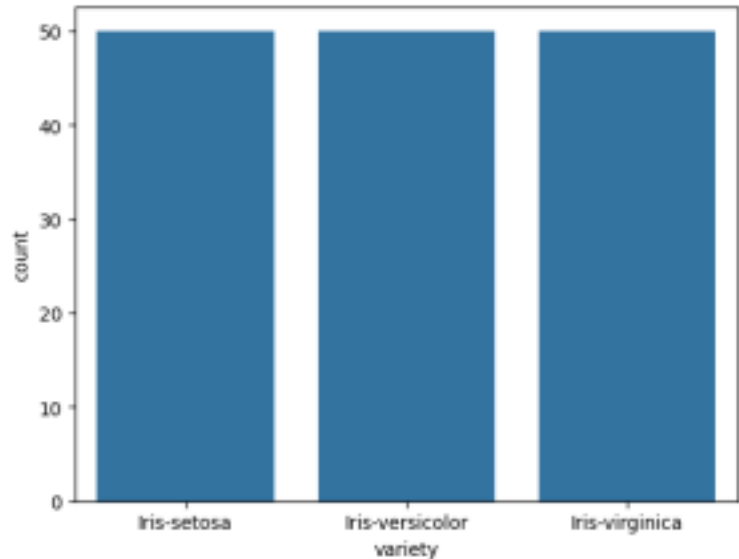
```
data.describe()
```

```
      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)
```

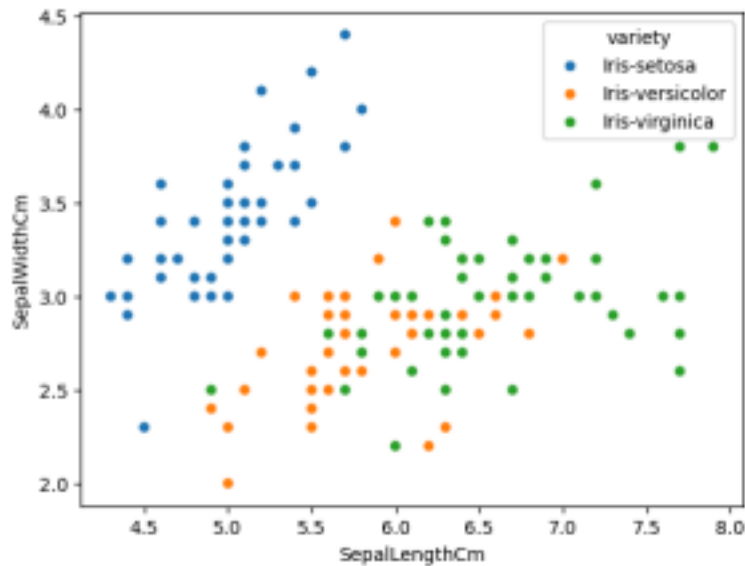
```
FinalDataset.head()
```

```

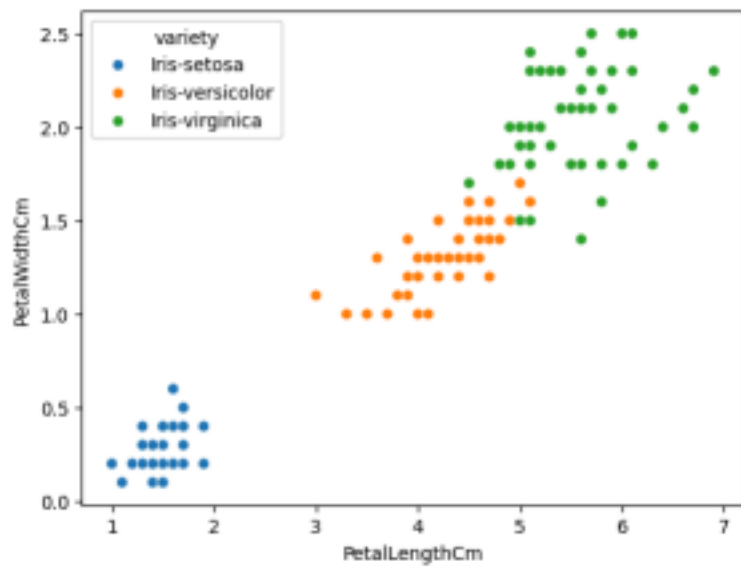
      Iris-setosa  Iris-versicolor  Iris-virginica  Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  0  True
False False 1 5.1 3.5 1.4 1 True False False 2 4.9 3.0 1.4 2 True False False 3 4.7 3.2 1.3 3 True
False False 4 4.6
3.1 1.5 4 True False False 5 5.0 3.6 1.4
```

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

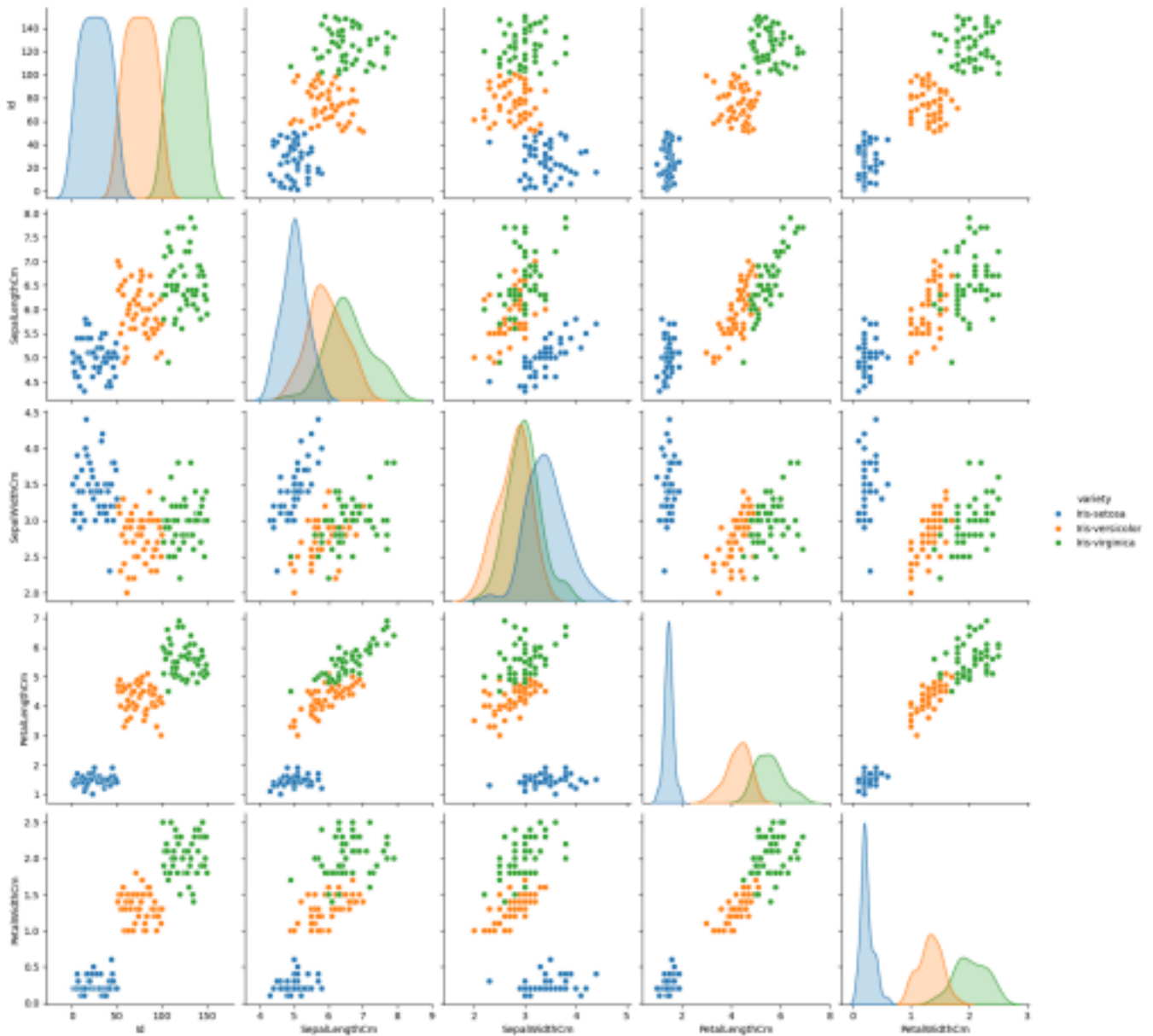
```
<Axes: xlabel='SepalLengthCm', ylabel='SepalWidthCm'>
```



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

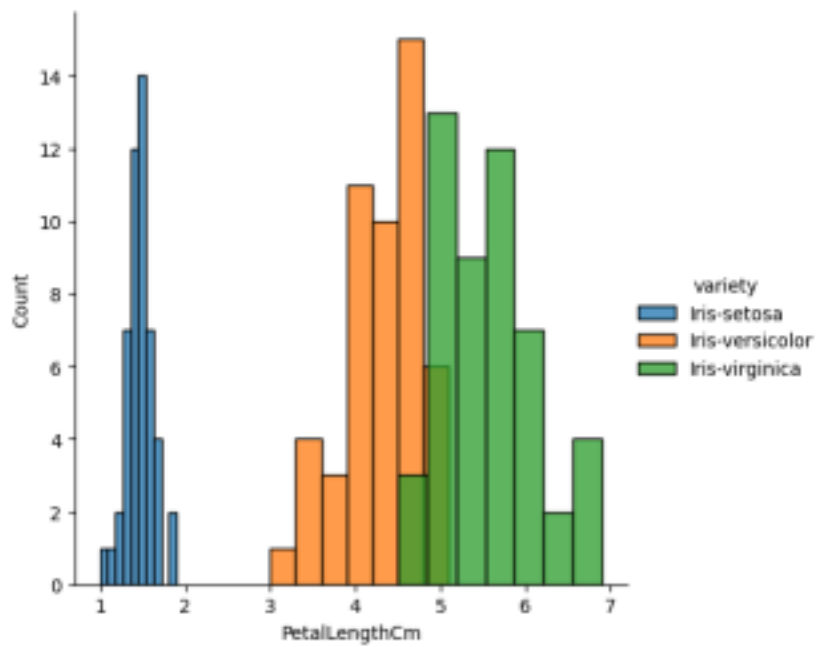


```
sns.pairplot(data,hue='variety',height=3);
```

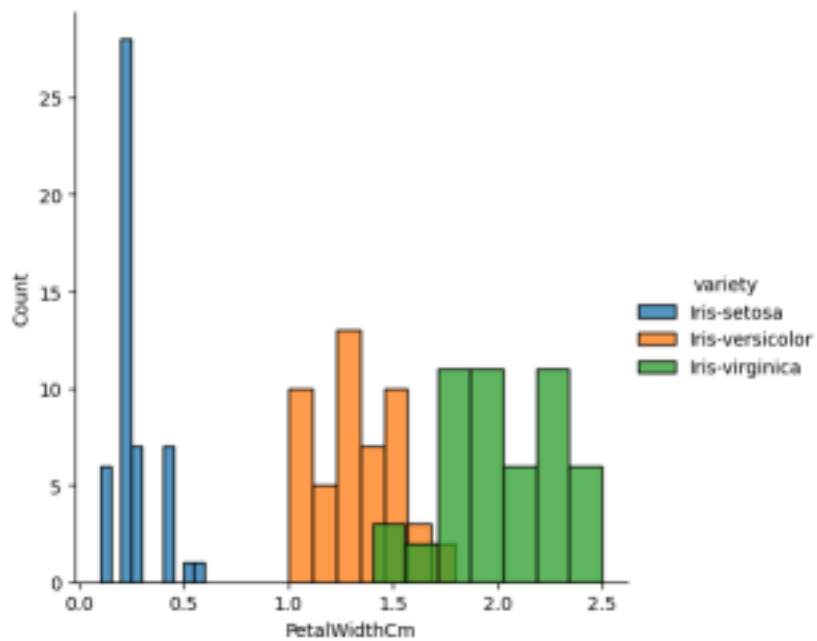


<https://colab.research.google.com/drive/1Tqx5lOXjHro7-CLF16NYNKyRMTEo1INN#printMode=true> 3/5
10/14/24, 12:23 PM irispetalsepal.ipynb - Colab plt.show()

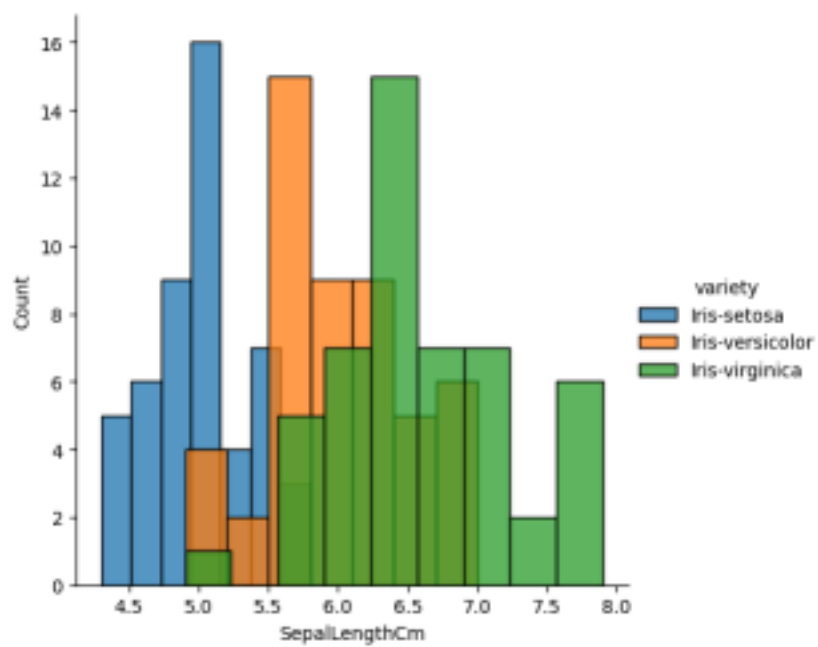
```
sns.FacetGrid(data,hue='variety',height=5).map(sns.histplot,'Petal.LengthCm').add_legend();  
plt.show();
```



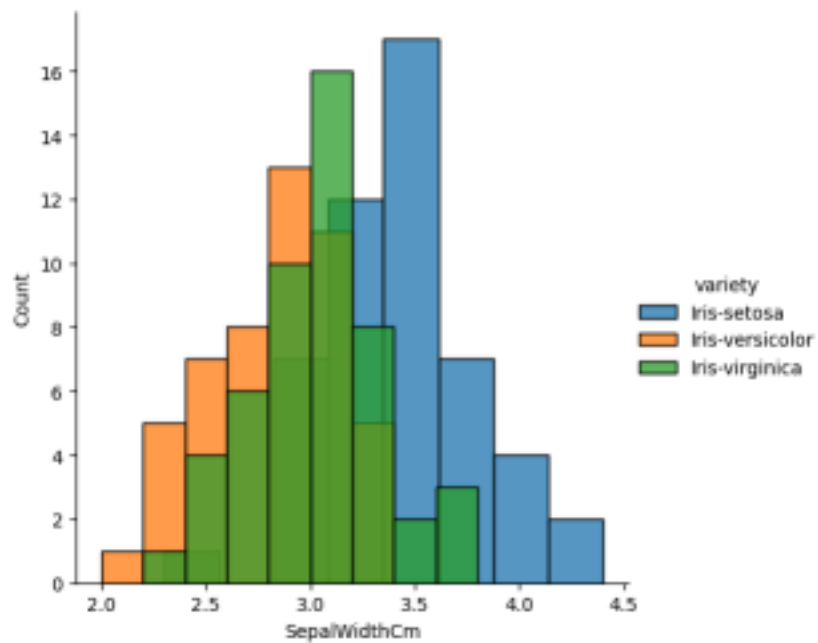
```
sns.FacetGrid(data,hue='variety',height=5).map(sns.histplot,'PetalWidthCm').add_legend();
plt.show();
```



```
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:DEEPA S
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SUBJECT NAME:CS23332-FUNDAMENTALS OF 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]])
```

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10/14/24, 12:45 PM Untitled17.ipynb - Colab

NAME:DEEPA S
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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],
```

https://colab.research.google.com/drive/1TNEzkVEMxSI_3eUDFZrcEeJH-g7BNg2j#scrollTo=IDn_tbKJiBVI&printMode=true 3/4
10/14/24, 12:15 PM pandasclass.ipynb - Colab

```
       [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:DEEPA S
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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
```

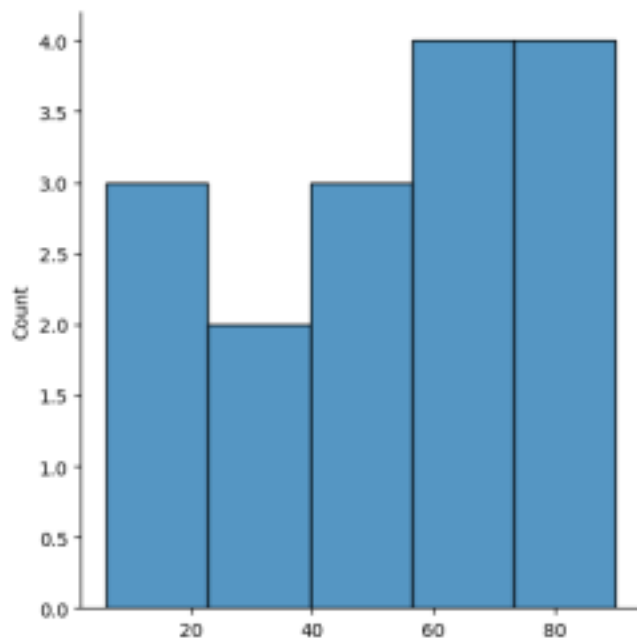
```
lr,ur=outDetection(array)
```

```
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:
```

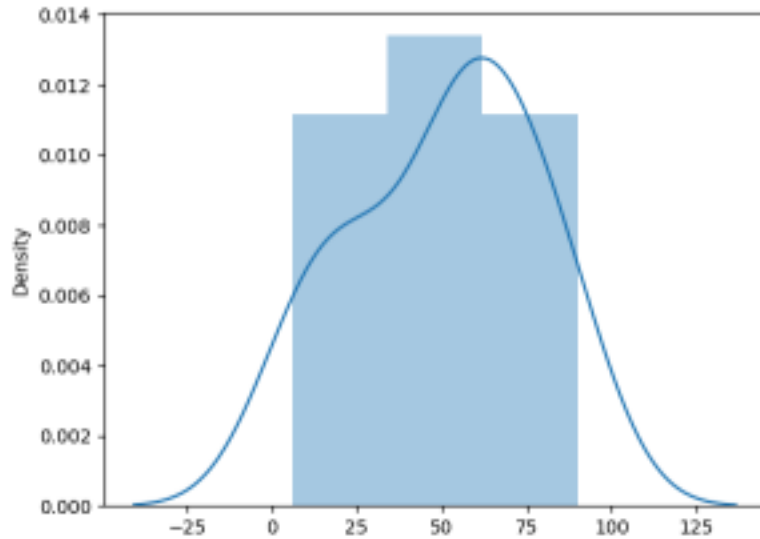
```
`distplot` is a deprecated function and will be removed in seaborn v0.14.0.
```

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'>
```

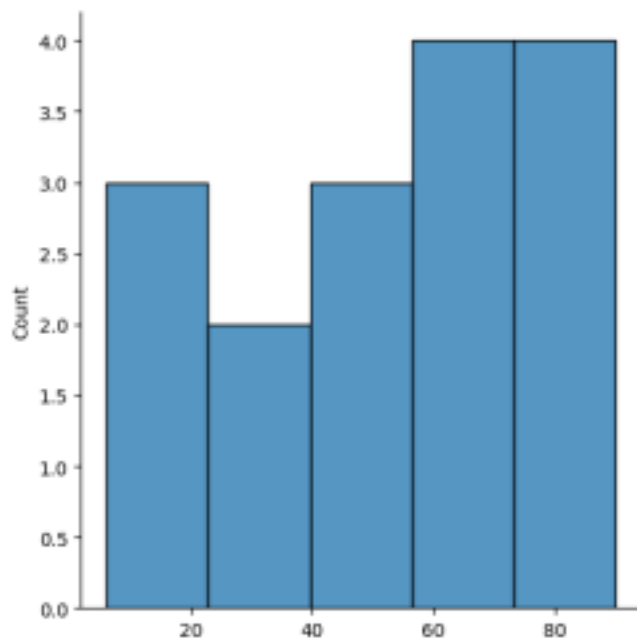


```
new_array=array[(array>lr) & (array<ur)]
new_array
```

```
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.
```

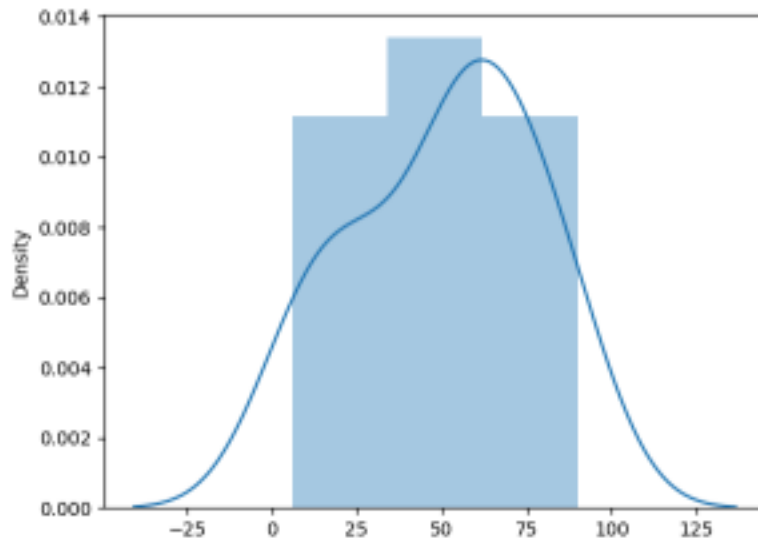
Please adapt your code to use either `displot` (a figure-level function with similar flexibility) or `histplot` (an axes-level function for histograms).

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:DEEPA S
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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)

CustomerID: 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: SettingWithCopyWarning:

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](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: SettingWithCopyWarning:

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: SettingWithCopyWarning:

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:DEEPA S
ROLL NO:230701065
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](#)
[New interactive sheet](#)

Next steps: `df.head()`

	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 or Series. The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object is not a copy.

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

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

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

Start coding or generate with AI.

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10/5/24, 8:09 PM 09.09.2024-sklearn.ipynb - Colab

```
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 ⓘ ?
SimpleImputer()

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

▼ SimpleImputer ⓘ ?
SimpleImputer()

```
SimpleImputer()
```

▼ SimpleImputer ⓘ ?
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.]])
```

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10/5/24, 8:09 PM 09.09.2024-sklearn.ipynb - Colab

```
[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.

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10/5/24, 8:09 PM 09.09.2024-sklearn.ipynb - Colab

NAME:DEEPA S
ROLL NO:230701065
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)
```

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10/5/24, 6:12 PM 10th Day DataPreprocessing.ipynb - Colab

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:DEEPA S
ROLL NO:230701065
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
```

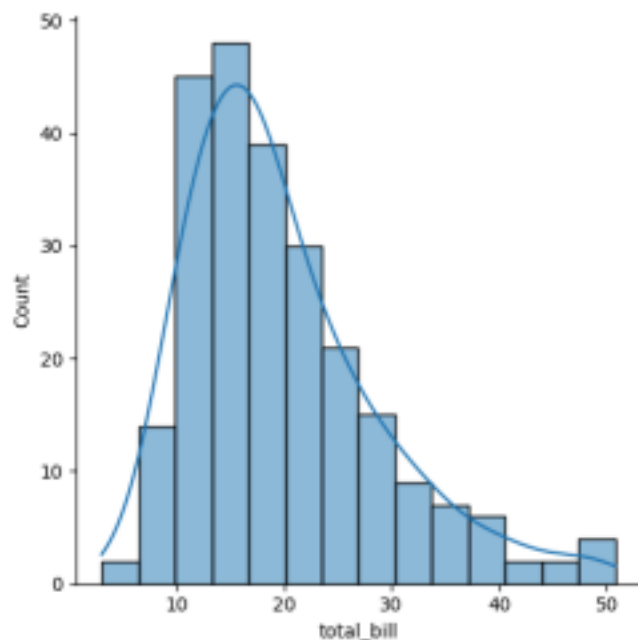
```
tips=sns.load_dataset('tips')
```

```
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)
```

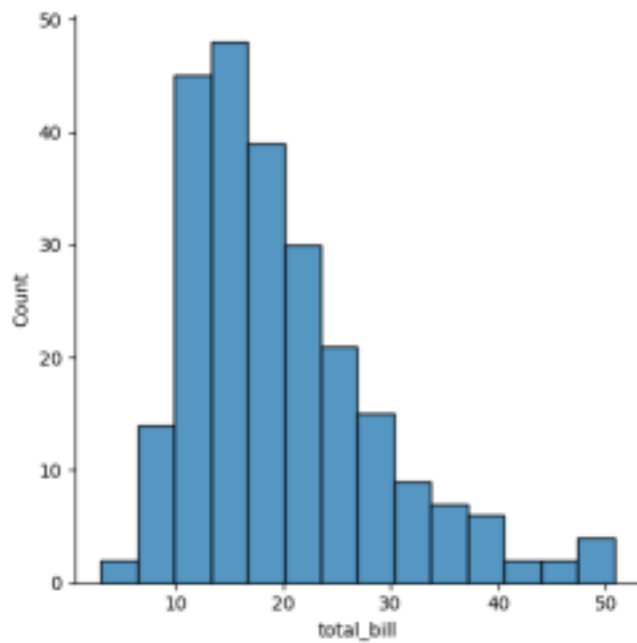
```
<seaborn.axisgrid.FacetGrid at 0x79bb4c7ea680>
```



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

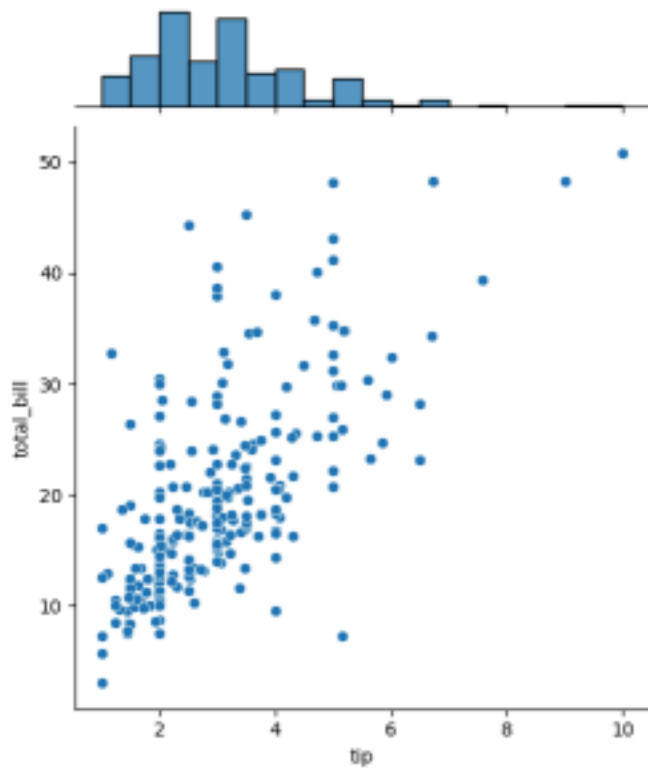
https://colab.research.google.com/drive/1ixdO2LyjKtMYUgtZcoc8jSInDGmeKn4_#scrollTo=J9uBGy0XX3rZ&printMode=true 1/9
10/1/24, 9:52 AM 9.9.2024-Visualization.ipynb - Colab

<seaborn.axisgrid.FacetGrid at 0x79bb0b0af580>

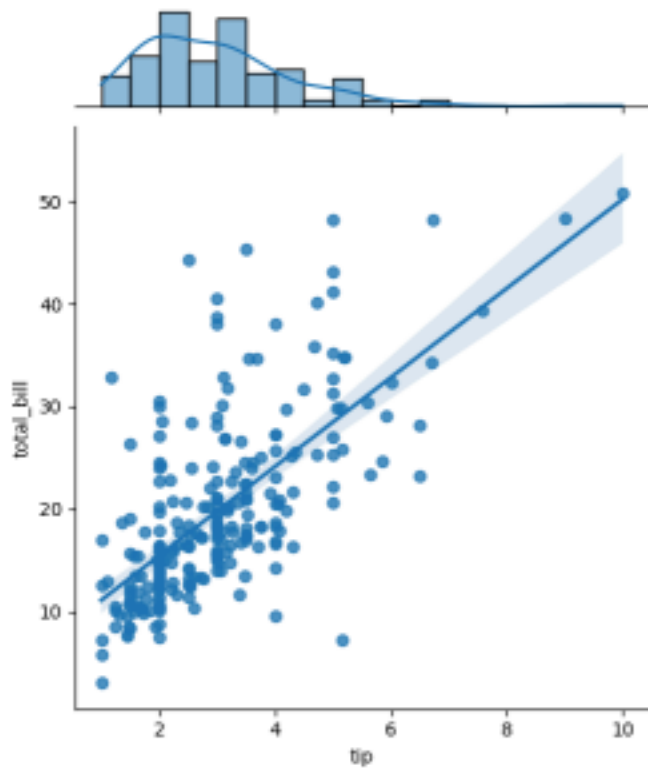


```
sns.jointplot(x=tips.tip,y=tips.total_bill)
```

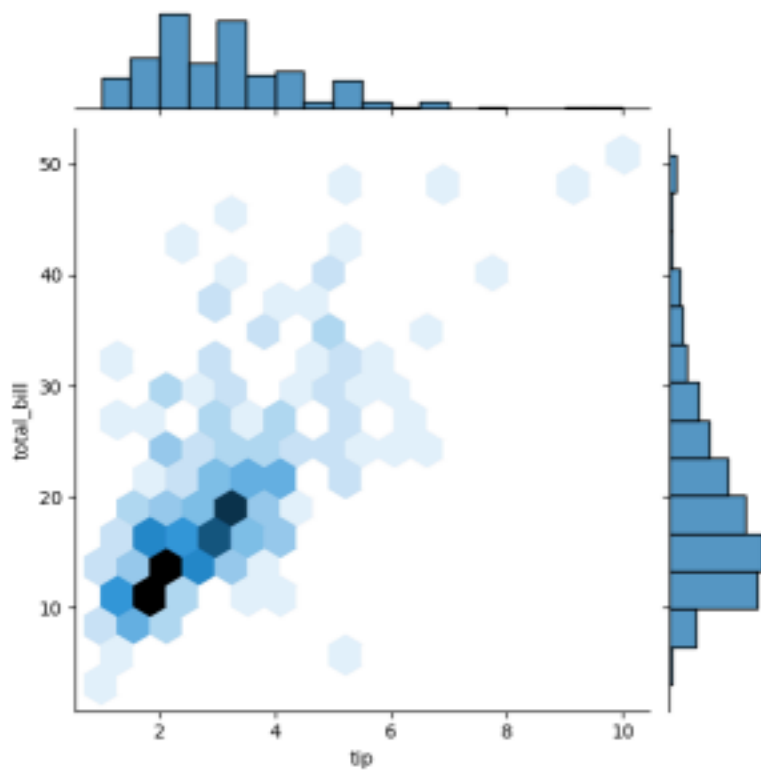
<seaborn.axisgrid.JointGrid at 0x79bb08fc96c0>



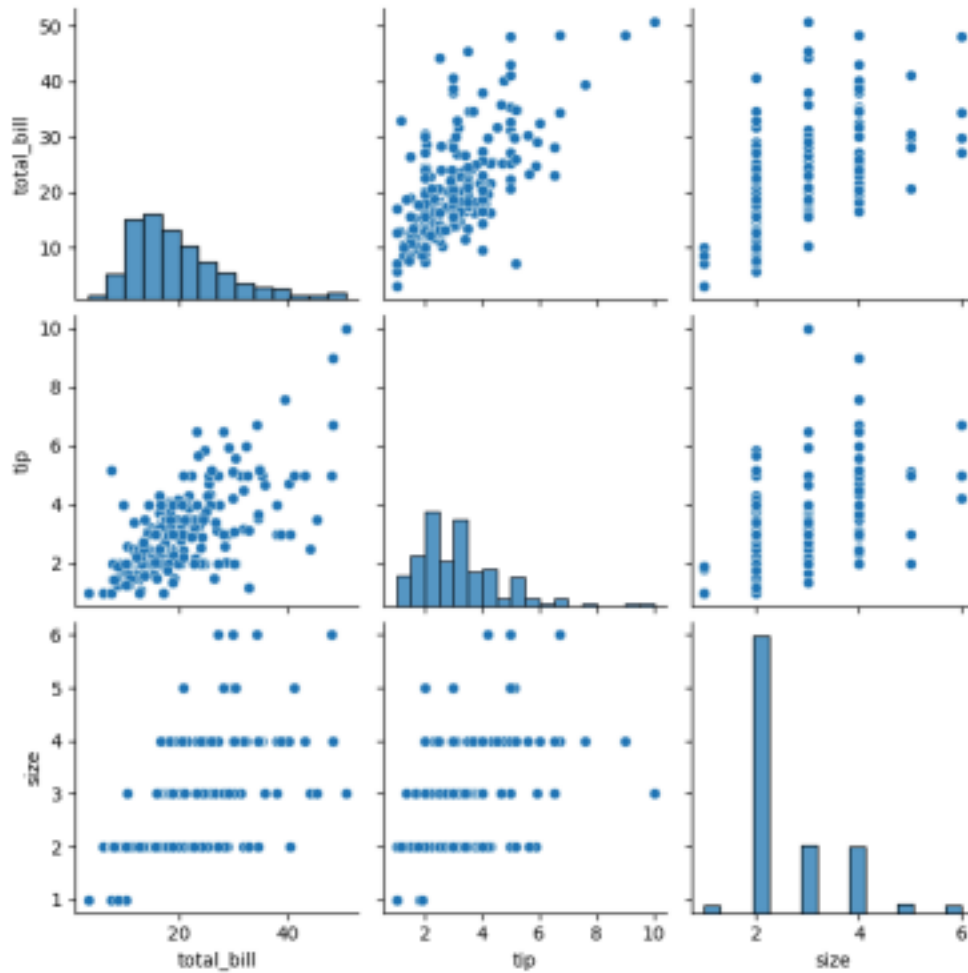
```
sns.jointplot(x=tips.tip,y=tips.total_bill,kind="reg")
```



```
sns.jointplot(x=tips.tip,y=tips.total_bill,kind="hex")
<seaborn.axisgrid.JointGrid at 0x79bb088f4730>
```



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



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

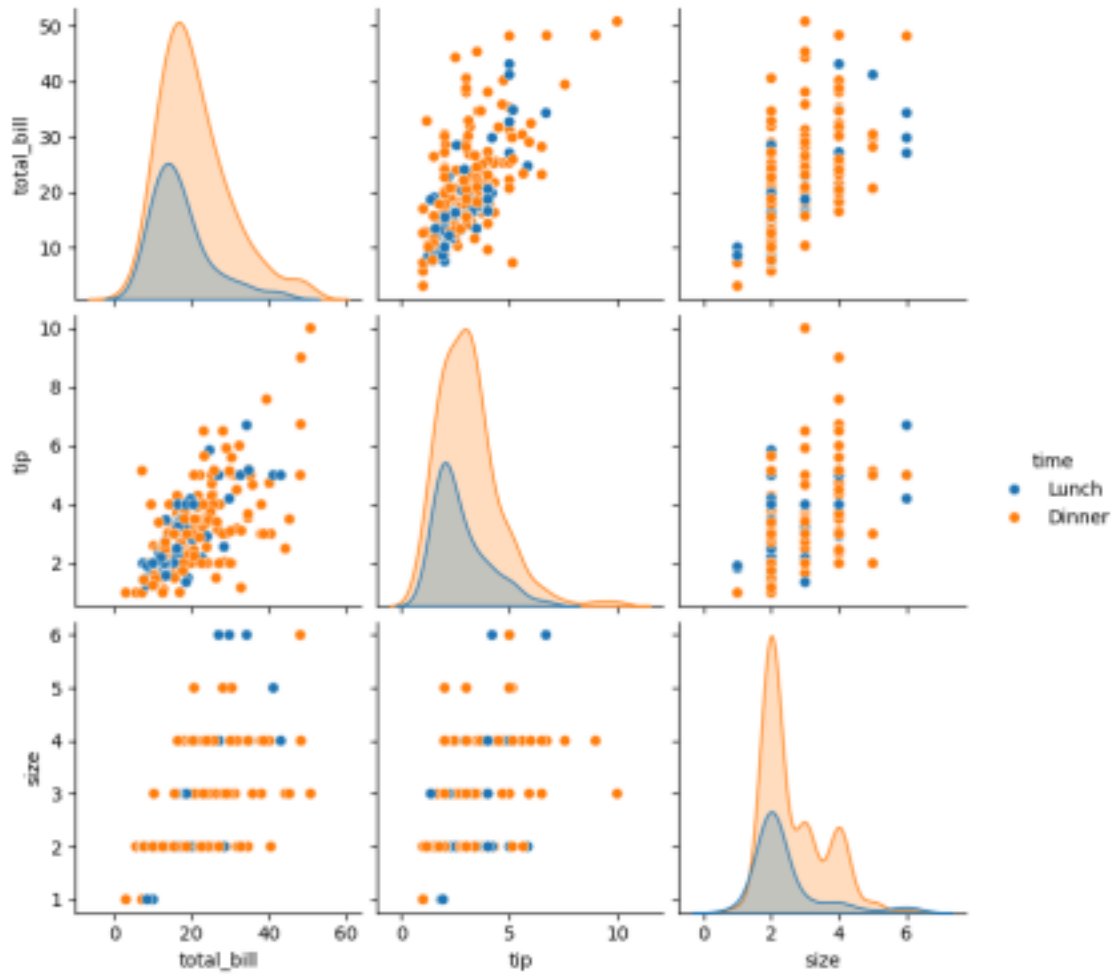
```
time
```

```
Dinner 176
```

```
Lunch 68
```

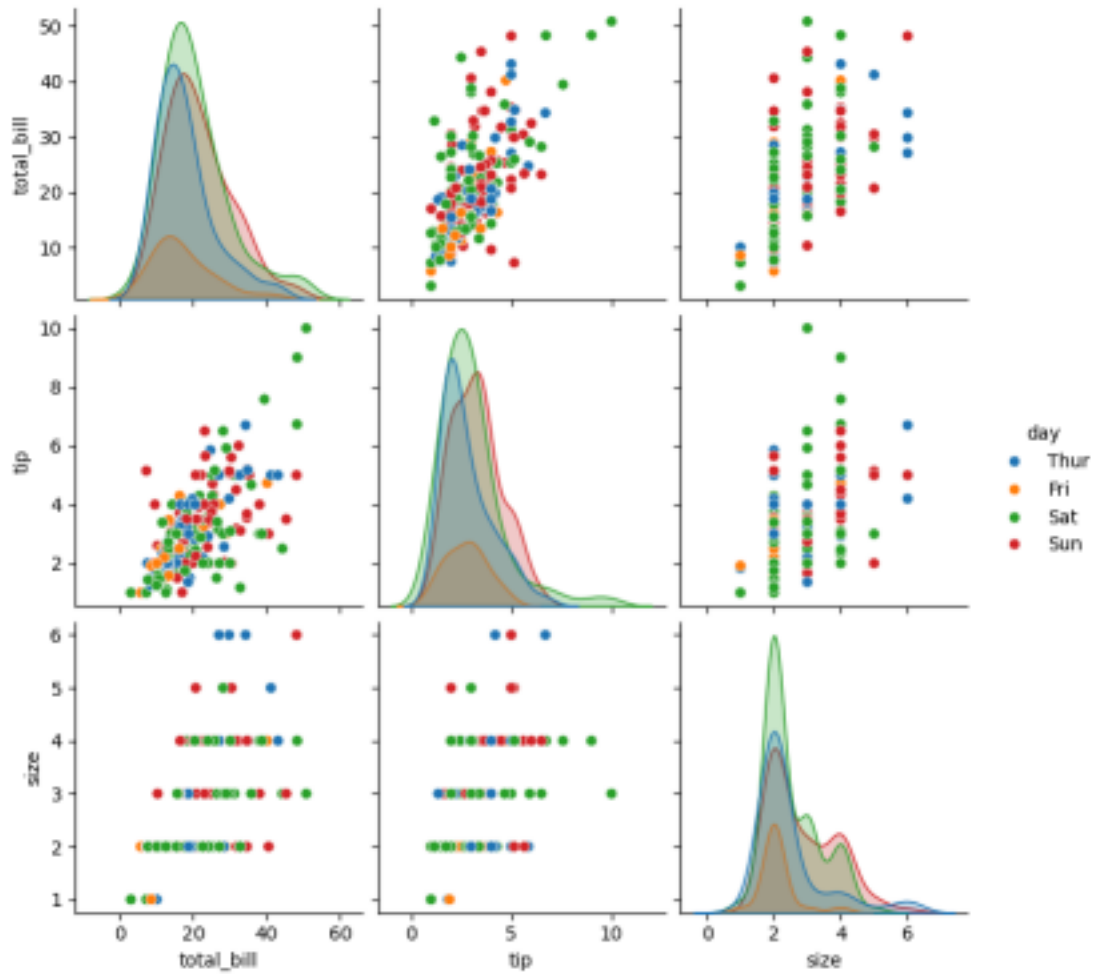
```
dtype: int64
```

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



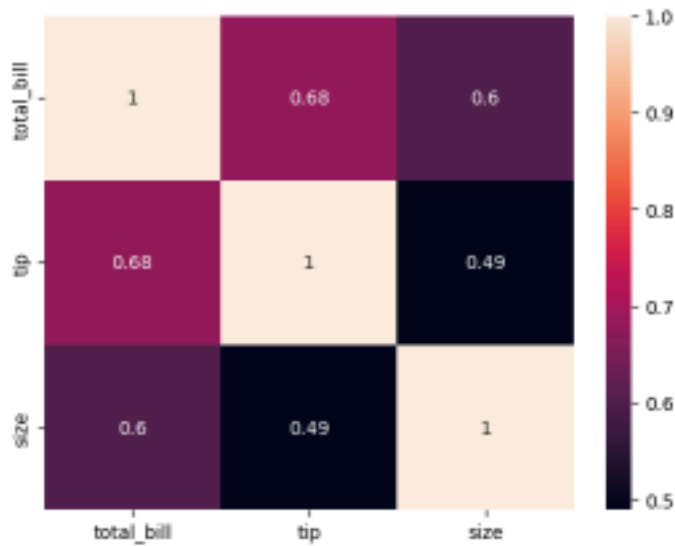
```
sns.pairplot(tips, hue='day')
```

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



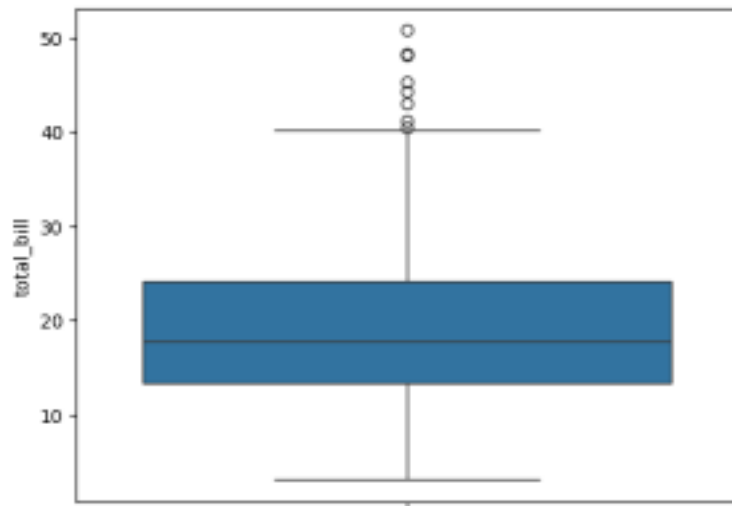
```
sns.heatmap(tips.corr(numeric_only=True),annot=True)
```

```
<Axes: >
```



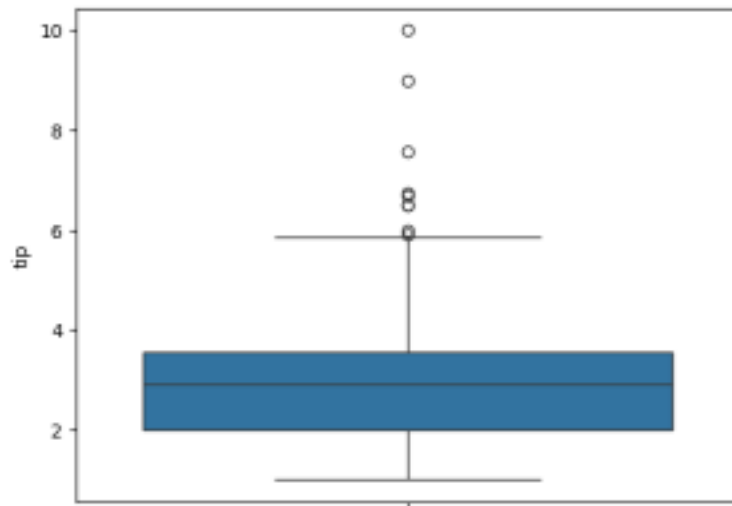
```
sns.boxplot(tips.total_bill)
```

<Axes: ylabel='total_bill'>



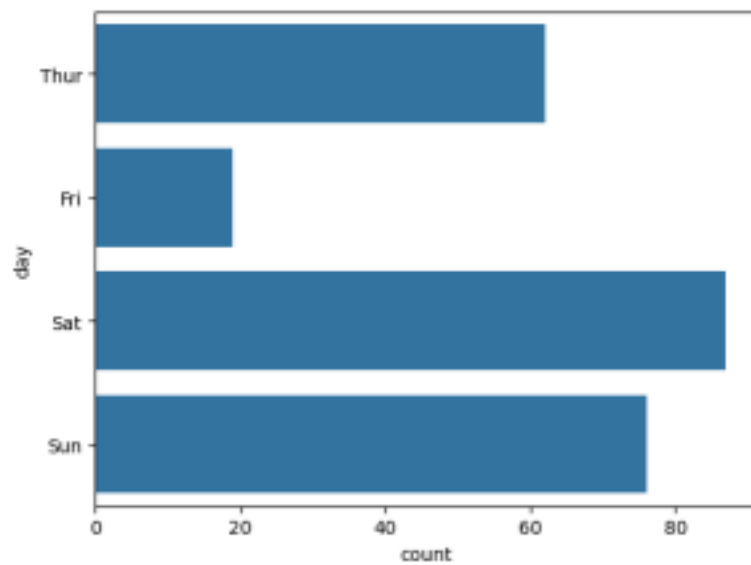
```
sns.boxplot(tips.tip)
```

<Axes: ylabel='tip'>



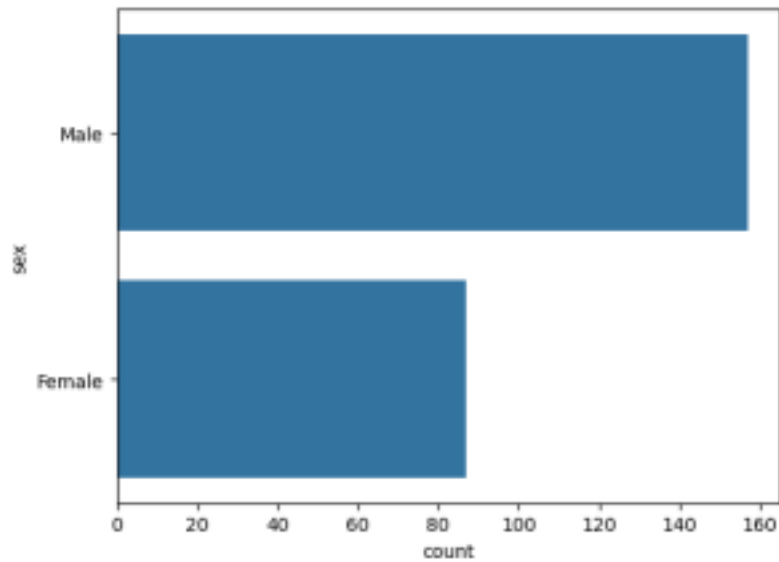
```
sns.countplot(tips.day)
```

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

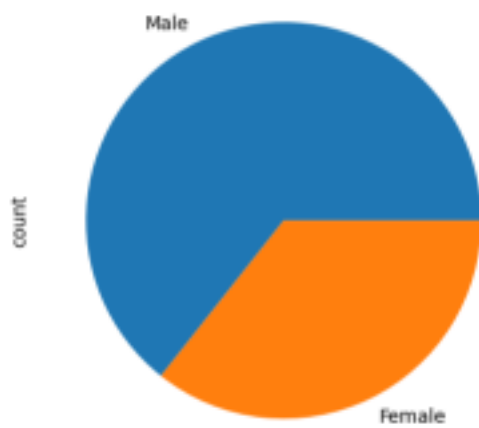


```
sns.countplot(tips.sex)
```

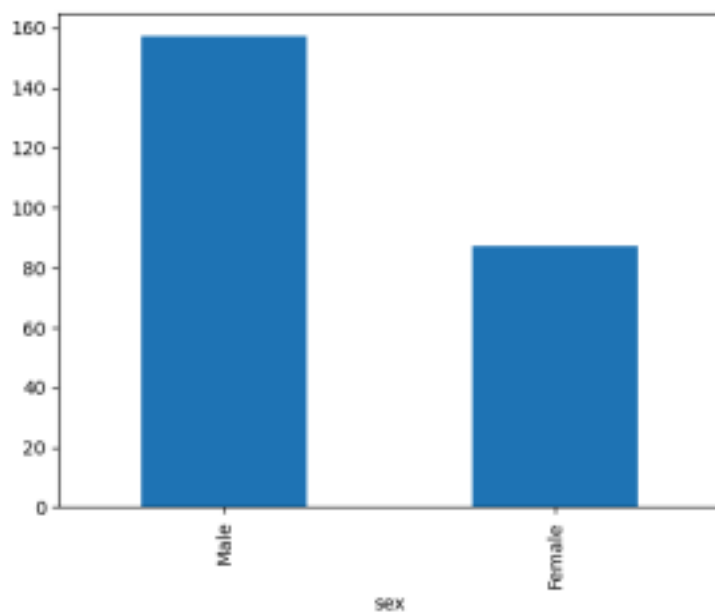
<Axes: xlabel='count', ylabel='sex'>



```
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'])
```




```
In [ ]: In [19]: 'pandas.core.frame.DataFrame'> 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 1 dtypes:
float64(1), int64(1)
memory usage: 612.0 bytes

In [3]: In [4]: df.dropna(inplace=True)

df.info()

<class
'pandas.core.frame.DataFrame'> 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 1 dtypes:
float64(1), int64(1)
memory usage: 612.0 bytes

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

df.info()

df.describe()

<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

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

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

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

from sklearn.model_selection import
```

```
Out[20]: ▼ LinearRegression
          LinearRegression()
```

localhost:8888/notebooks/Regresion.ipynb# 1/2

9/16/24, 3:49 AM Regresion - Jupyter Notebook

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

```
Out[21]: 0.9603182547438908
          model.score(x_test, y_test)
```

```
In [23]:          model.coef
Out[23]: 0.9184170849214232
```

```
In [24]:          -
Out[24]: array([[9281.30847068]])
          model.intercept_
```

```
In [25]:          ept_
Out[25]: array([27166.73682891])
```

```
In [26]:          yr_of_exp=float(input("Enter Years of Experience: "))
```

```
In [27]: In [28]:          yr_of_exp_NP=np.array([[yr_of_exp]])
          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'))
```

localhost:8888/notebooks/Regresion.ipynb# 2/2

```
df.info()

In [1]: In [2]: <class
                 'pandas.core.frame.DataFrame'> 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]: df.variety.value_counts()

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

Out[3]: Setosa 50
        Versicolor 50
        Virginica 50
        Name: variety, dtype: int64
        df.head(
In [4]: )

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]: from sklearn.neighbors import
                           KNeighborsClassifier

                           xtrain,xtest,ytrain,ytest=train_test_split
                           (features,label,test_size=.2,random
                           state=42)
                           model_KNN=KNeighborsClassifier(n_neighbors
                           =5)
                           model_KNN.fit(xtrain,ytrain)

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

from sklearn.model_selection import
train_test_split

Out[8]: KNeighborsClassifier()
```

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

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9/16/24, 3:51 AM KNN - Jupyter Notebook

```

est))

In [9]: In [10]:
0.9583333333333334
1.0

from sklearn.metrics import
confusion_matrix
print(model_KNN.score(xtrain,y confusion_matrix(label,model_K
train))
NN.predict(features))
print(model_KNN.score(xtest,yt

Out[10]: array([[50, 0, 0],
               [ 0, 47, 3],
               [ 0, 2, 48]], dtype=int64)

from sklearn.metrics import
classification_report
print(classification_report(label,mo
del_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

```



```
import pandas as pd
df=pd.read_csv('Social_Network_Ads.csv') df

In [1]:
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]

```

```

In         label
[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, 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, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 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,
              1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 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, 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, 0,
              1, 1, 0, 1, 0, 0, 1, 1, 0, 1, 1, 0, 1, 1, 0, 0, 1, 1, 1, 1,
              1, 0, 1, 1, 1, 1, 0, 1, 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,
              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, 0, 1, 1, 1, 0, 1, 0, 1, 0, 0, 1, 1, 0, 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
sklearn.linear_model import
In [6]: LogisticRegression
from sklearn.model_selection

```


In [7]: In [8]:

```
plt(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
plt(features,label,test_size=0.2,
finalModel=LogisticRegression()
```

```
x_train,x_test,y_train,y_test=train_test_s finalModel.fit(x_train,y_train)
```

Out[8]: LogisticRegression()

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

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In [9]: In [10]:

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

```
precision recall f1-score support
```

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

```
0.834375
0.9125
```

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

In []:

NAME:DEEPA S
ROLL NO:230701065
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:05.11.2024

```
In [1]: import seaborn as sns
        %matplotlib inline

        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()
```

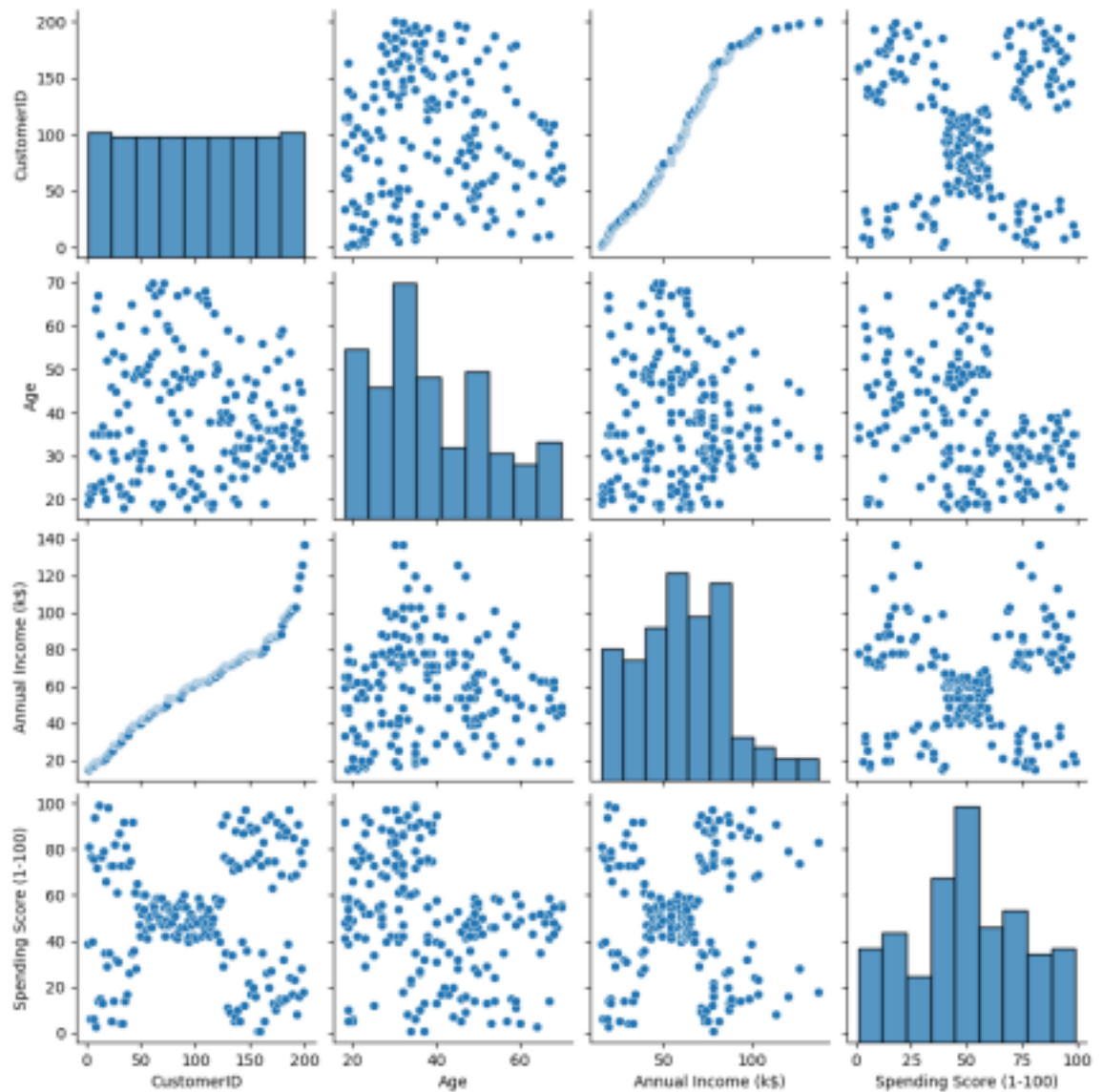
Out[4]: CustomerID Gender Age Annual Income (k\$) Spending Score (1-100)

```
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]:

In [7]:

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

```

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

C:\Users\Ayyadurai\AppData\Local\anaconda3\Lib\site-packages\sklearn\cluster\_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 can avoid it by setting the environment variable OMP_NUM_THREADS=1. warnings.warn(

```

Out[7]: KMeans(n_clusters=5)

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```

In [8]:
Final=df.iloc[:,[3,4]]
Final['label']=model.predict(features)
Final.head()

C:\Users\Ayyadurai\AppData\Local\Temp\ipykernel_8116\470183701.py:2: SettingWithCopyWarning:
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-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

```

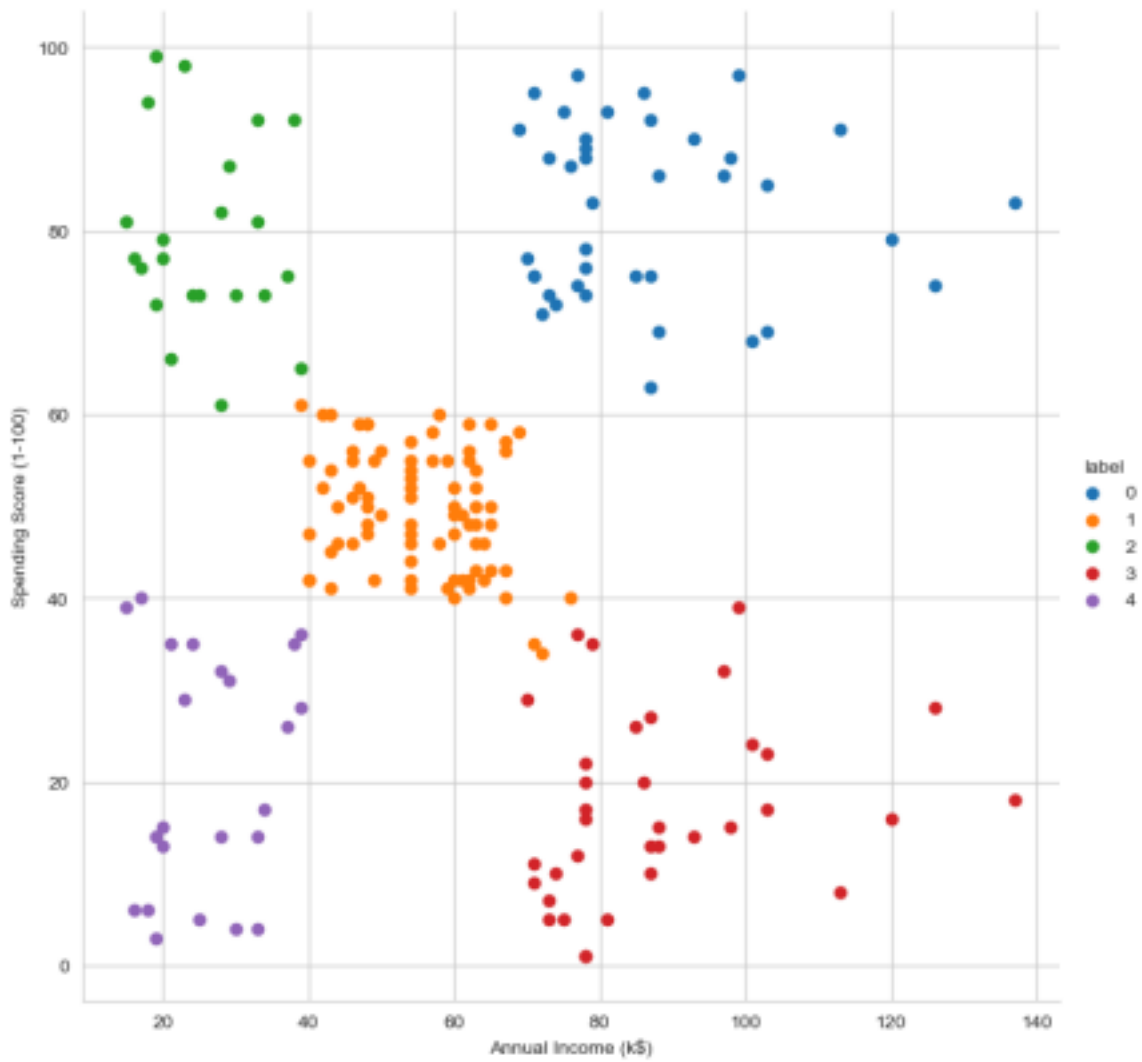
0 15 39 4
1 15 81 2
2 16 6 4
3 16 77 2
4 17 40 4

```

```

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()

```



localhost:8888/notebooks/K-Means Clustering.ipynb 4/8

9/16/24, 3:50 AM K-Means Clustering - Jupyter Notebook

```
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)
```

```
C:\Users\Ayyadurai\AppData\Local\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\Ayyadurai\AppData\Local\anaconda3\Lib\site-packages\sklearn\cluster\_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 can avoid it by setting the environment variable `OMP_NUM_THREADS=1`.

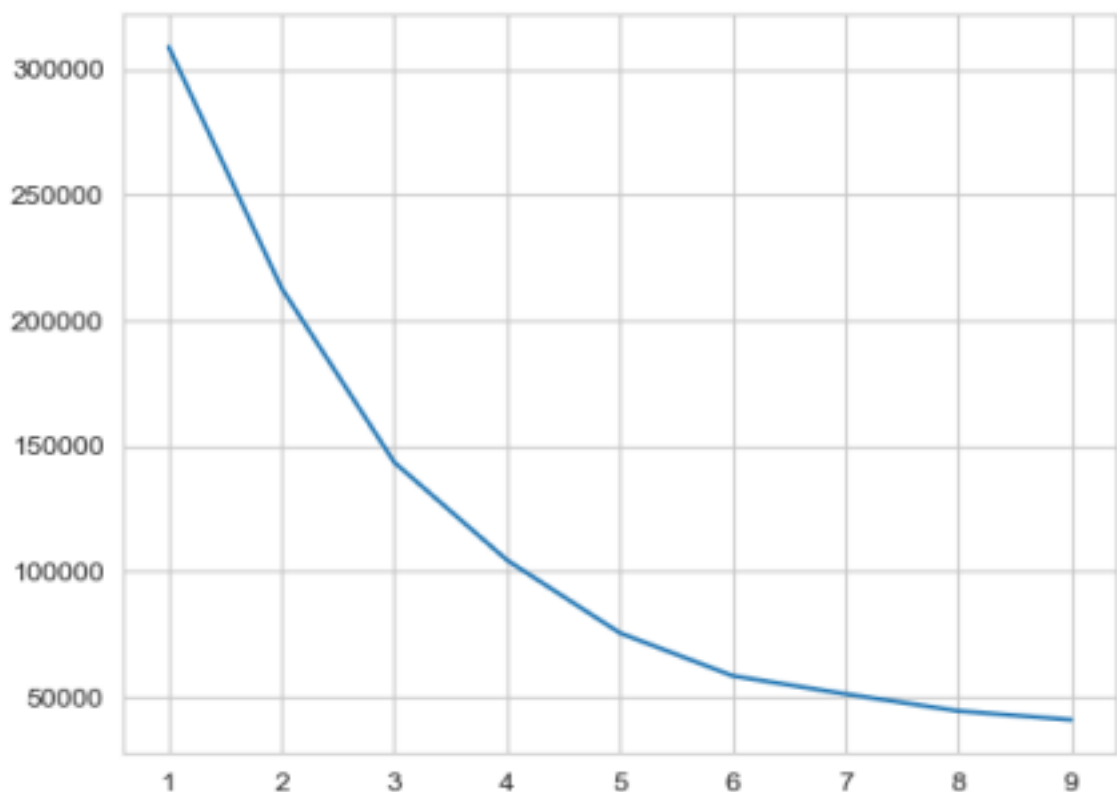
```
er\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
    warnings.warn(
C:\Users\Ayyadurai\AppData\Local\anaconda3\Lib\site-packages\sklearn\clust
```

```

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(
C:\Users\Ayyadurai\AppData\Local\anaconda3\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\anaconda3\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(
C:\Users\Ayyadurai\AppData\Local\anaconda3\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\anaconda3\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[10]: [<matplotlib.lines.Line2D at 0x170e99f3550>]



In []:

