

NAME: Sanjay Kumar
S

ROLL NO :230701290
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
```

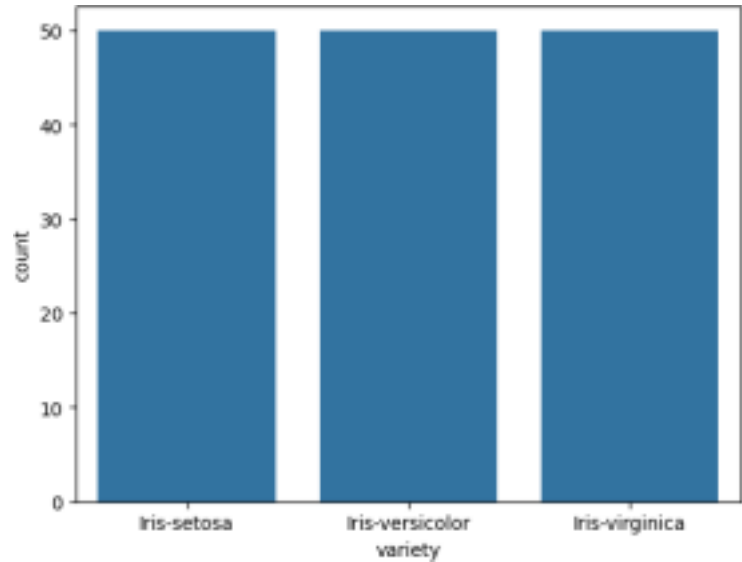
```
data.describe()
```

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
count	150	150	150	150	150
mean	75.5	5.843333	3.054000	3.758667	1.198667
std	43.445368	0.828066	0.433594	1.764420	0.763161
min	1	4.3	2.0	1.0	0.1
25%	38.25	5.1	2.8	1.6	0.3
50%	75.5	5.8	3.0	4.35	1.3
75%	112.75	6.4	3.3	5.1	1.8
max	150	7	4	6.9	2.5

```
data.value_counts('variety')

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

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



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

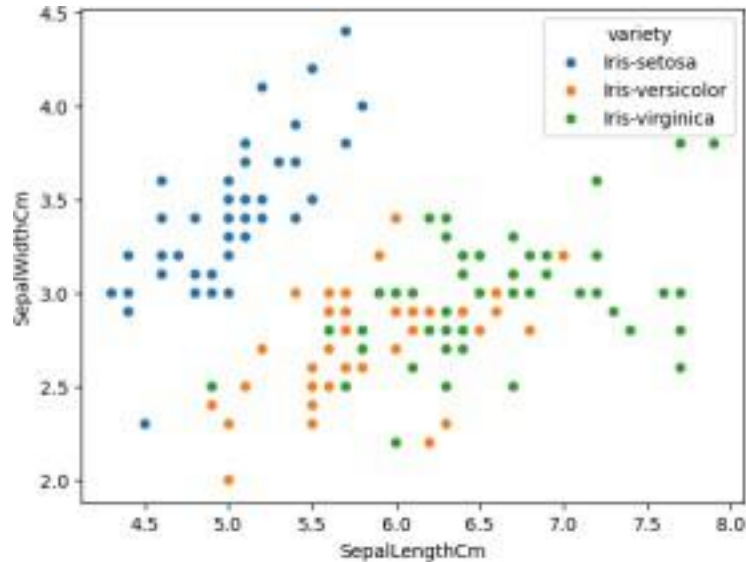
```
FinalDataset=pd.concat([pd.get_dummies(data.variety),data.iloc[:,[0,1,2,3]]],axis=1)
```

```
FinalDataset.head()
```

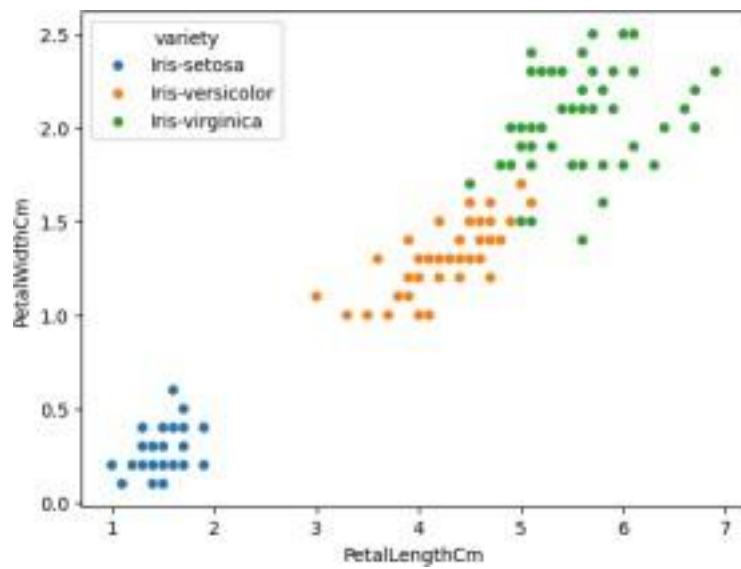
	Iris-setosa	Iris-versicolor	Iris-virginica	Id	SepallLengthCm	SepalWidthCm	PetalLengthCm	0	True
False	False	1	5.1	3.5	1.4	1	True	False	2
4.9	3.0	1.4	2	True	False	False	3	4.7	3.2
1.3	3	True	False	False	4	4.6	3.1	1.5	4
True	False	False	5	5	0	3	6	1	4

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

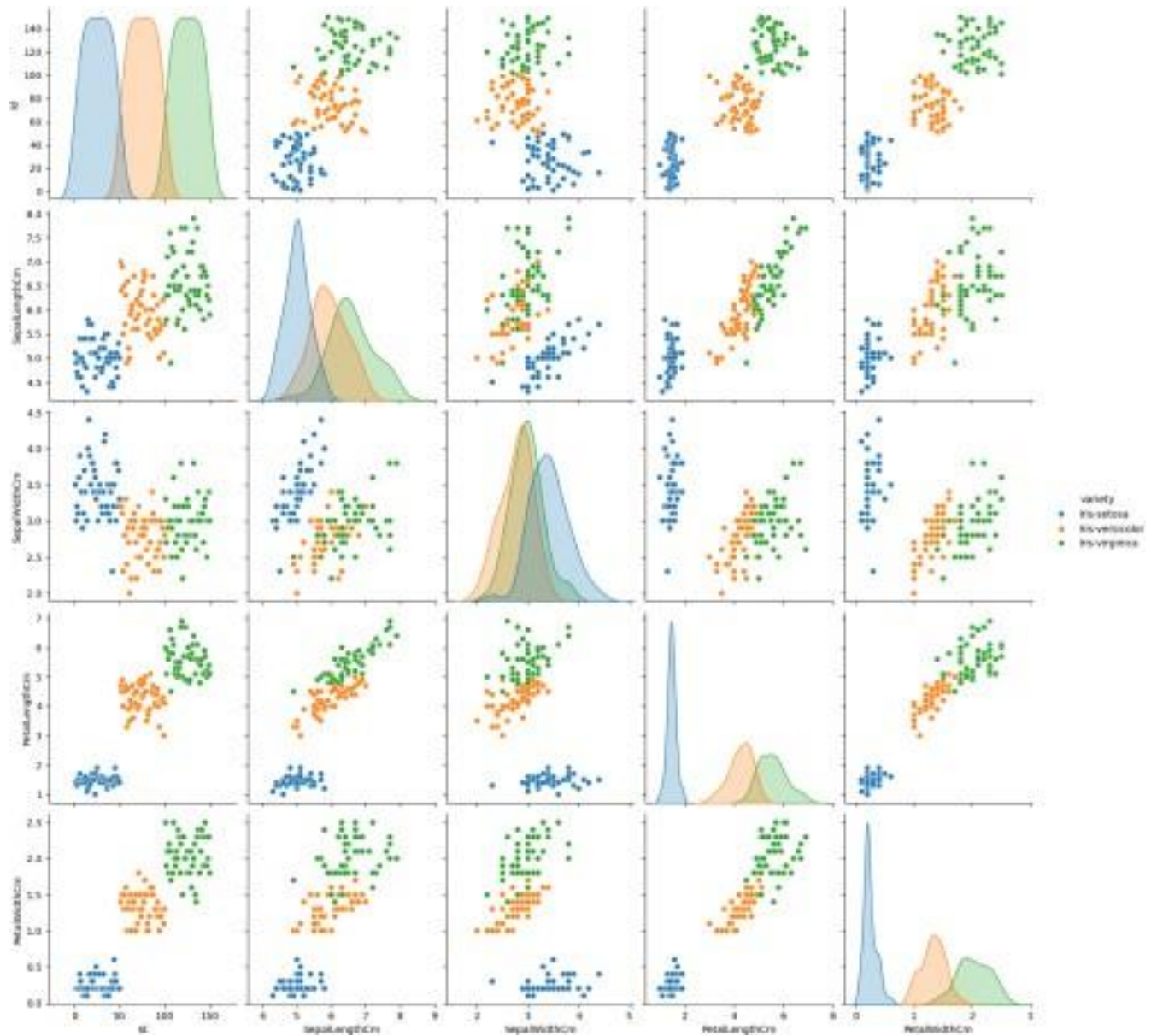
<Axes: xlabel='SepallLengthCm', ylabel='SepalWidthCm'>



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

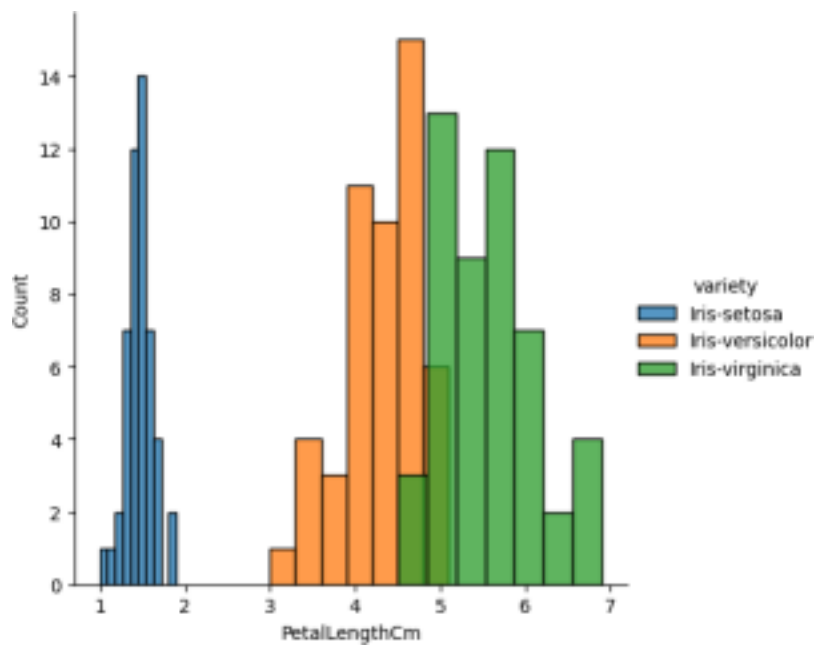


```
sns.pairplot(data,hue='variety',height=3);
```

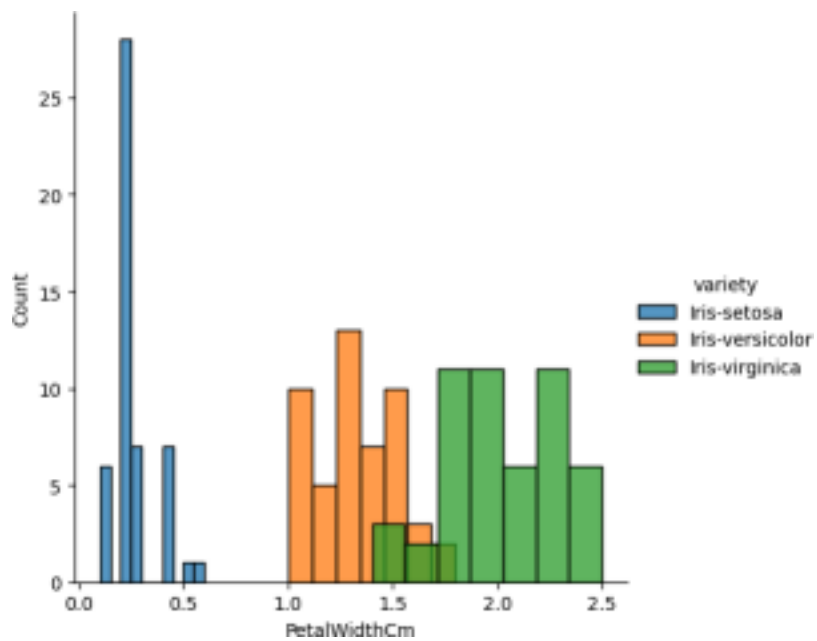


<https://colab.research.google.com/drive/1Tqx5IOXjHro7-CLF16NYNKyRMTEo1INN#printMode=true> 3/5
10/14/24, 12:23 PM irispetalsepal.ipynb - Colab plt.show()

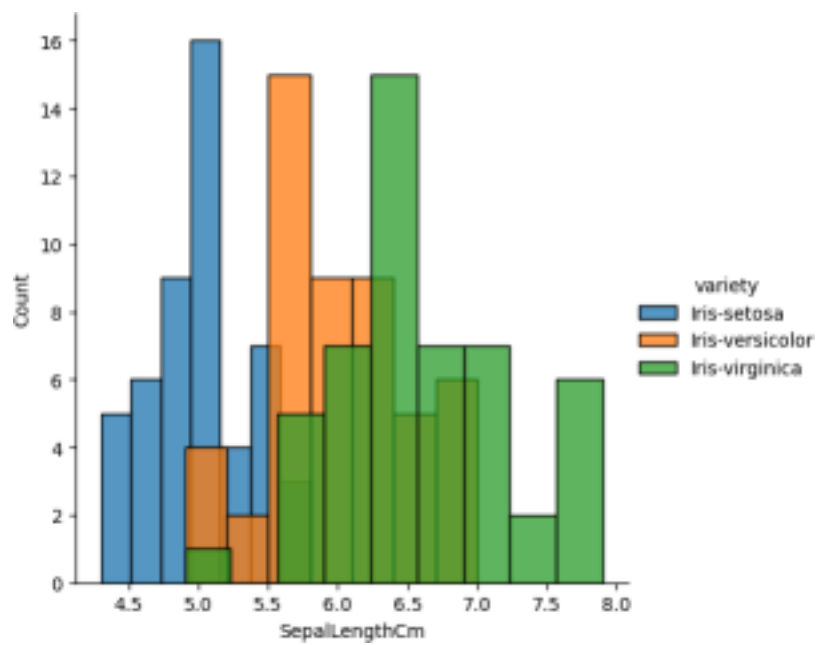
```
sns.FacetGrid(data,hue='variety',height=5).map(sns.histplot,'PetalLengthCm').add_legend(); plt.show();
```



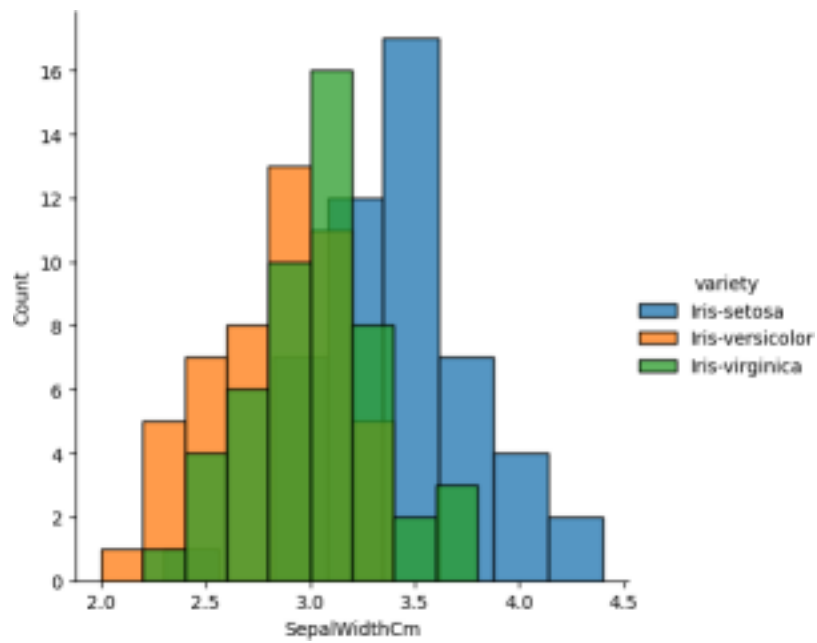
```
sns.FacetGrid(data,hue='variety',height=5).map(sns.histplot,'PetalWidthCm').add_legend(); plt.show();
```



```
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: SANJAY
KUMAR S**

ROLL NO:230701290

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]])
```

BHISHEK S

ROLL NO:230701290

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 id d t t t i l l d
```

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

5714.285714285715


```
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 2 SREEMATHI B 6000

1 3 SREYA G 7000

2 4 SREYASKARI MULLAPUDI 5000

3 5 SRI AKASH U G 8000

4 6 SRI HARSHAVARDHANAN R 3000

5 7 SRI HARSHAVARDHANAN R 6000

NAME:SANJAY
KUMAR S

ROLL NO:230701290

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
```

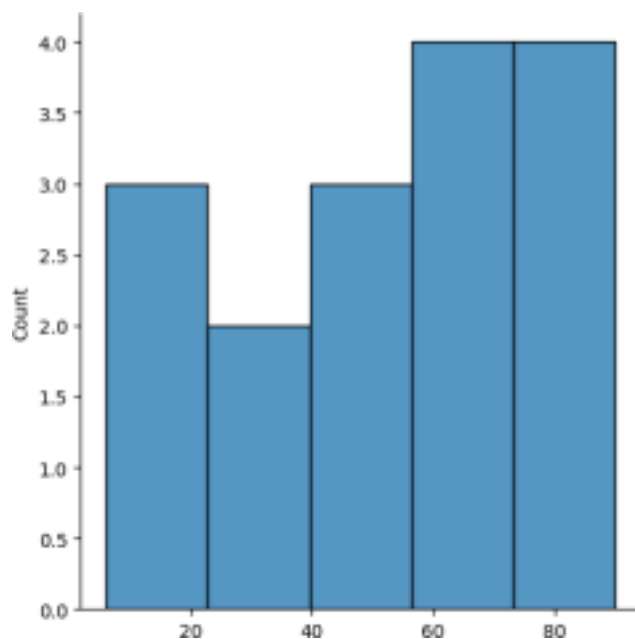
```
(-38.5, 133.5)
```

```
import seaborn as sns
```

```
%matplotlib inline
```

```
sns.displot(array)
```

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



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

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

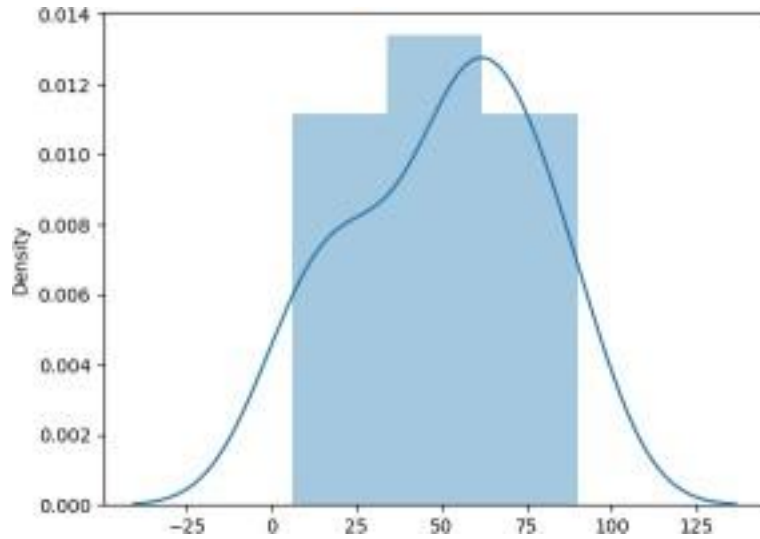
'distplot' is a deprecated function and will be removed in seaborn v0.14.0.

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'>
```

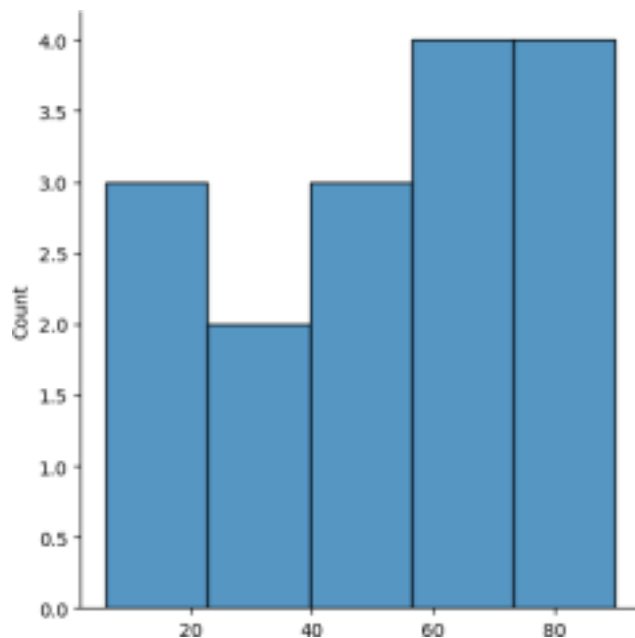


```
new_array=array[(array>lr) & (array<ur)] new_array
```

```
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:
```

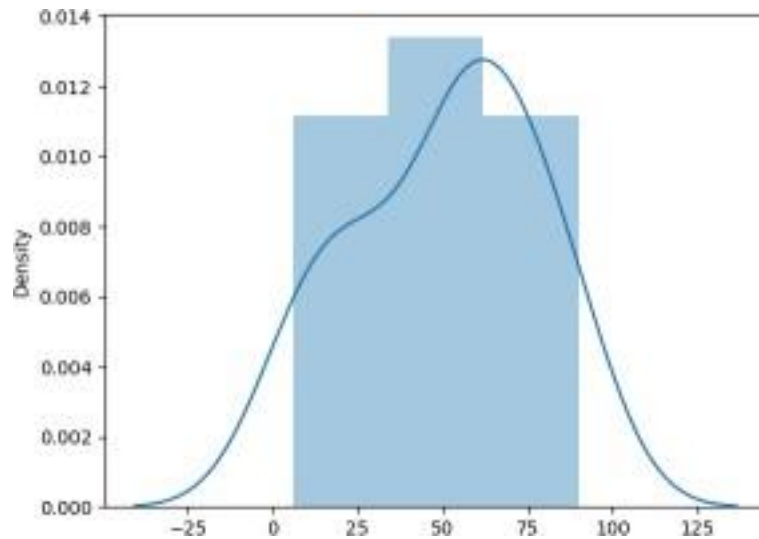
```
`distplot` is a deprecated function and will be removed in seaborn v0.14.0.
```

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:SANJAY
KUMAR S
ROLL NO:230701290
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\SANJAYKUMAR\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\SANJAYKUMAR\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\SANJAYKUMAR\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'],'Tbis',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: SANJAY
KUMAR S
ROLL NO:230701290
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 using 'loc'. This inplace method will never work because the intermediate object is 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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```
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.]])
```

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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)
```



```
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]])
```

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

```
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 False True False 30.0 54000.0 0
1 False False True 38.0 61000.0 0
2 False True False 40.0 63778.0 1
3 True False False 35.0 58000.0 1
4 False False True 38.0 52000.0 0
5 True False False 48.0 79000.0 1
6 True False False 50.0 83000.0 0
7 True False False 37.0 67000.0 1

Start coding or generate with AI.

NAME: SANJAY
KUMAR S
ROLL NO:230701043
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')
```

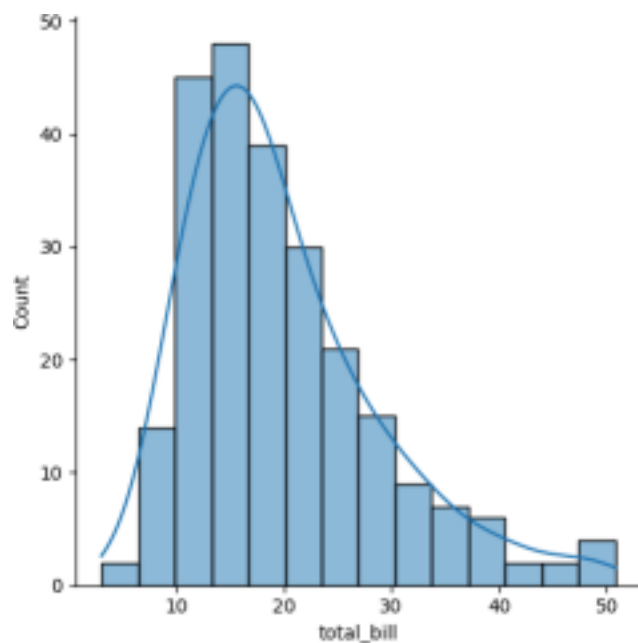
```
tips.head()
```

```
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)
```

[Code](#) [Text](#)

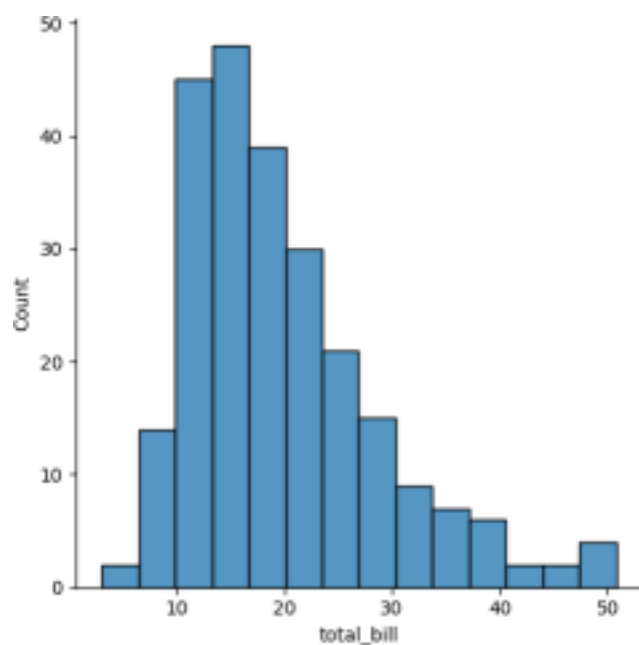
<seaborn.axisgrid.FacetGrid at 0x79bb4c7ea680>



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

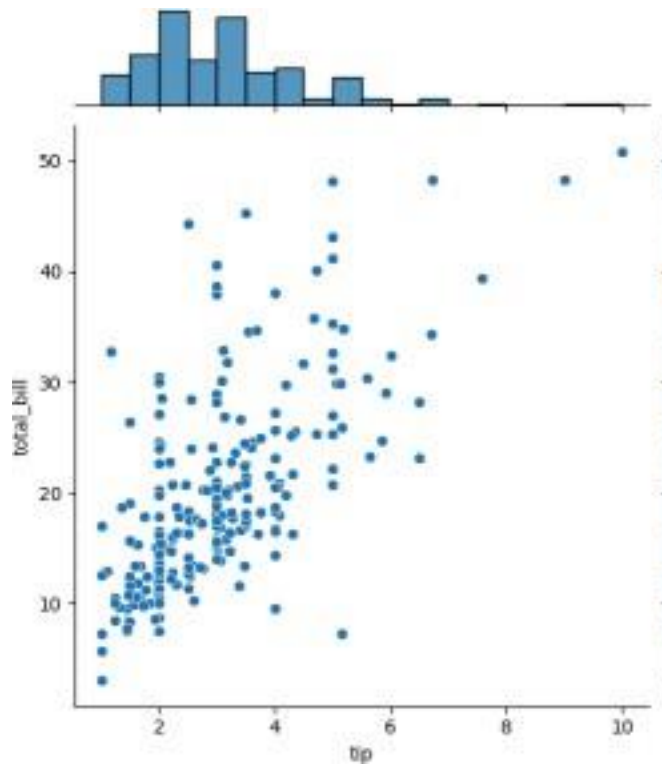
https://colab.research.google.com/drive/1ixdO2LjYjKtMYUgtZcoc8jSlnDGmeKn4_#scrollTo=J9uBGy0XX3rZ&printMode=true 1/9
10/1/24, 9:52 AM 9.9.2024-Visualization.ipynb - Colab

<seaborn.axisgrid.FacetGrid at 0x79bb0b0af580>



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

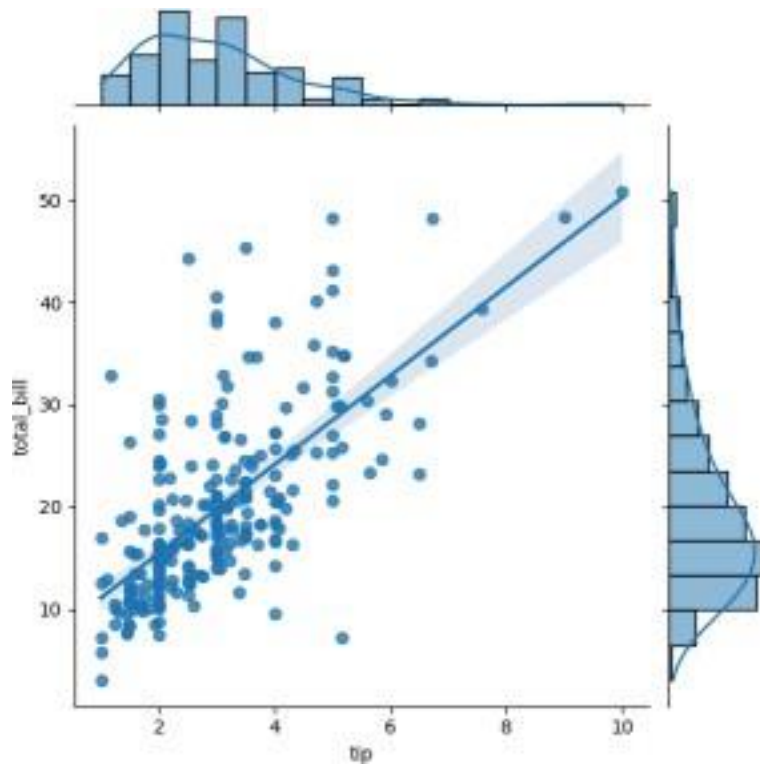
<seaborn.axisgrid.JointGrid at 0x79bb08fc96c0>



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

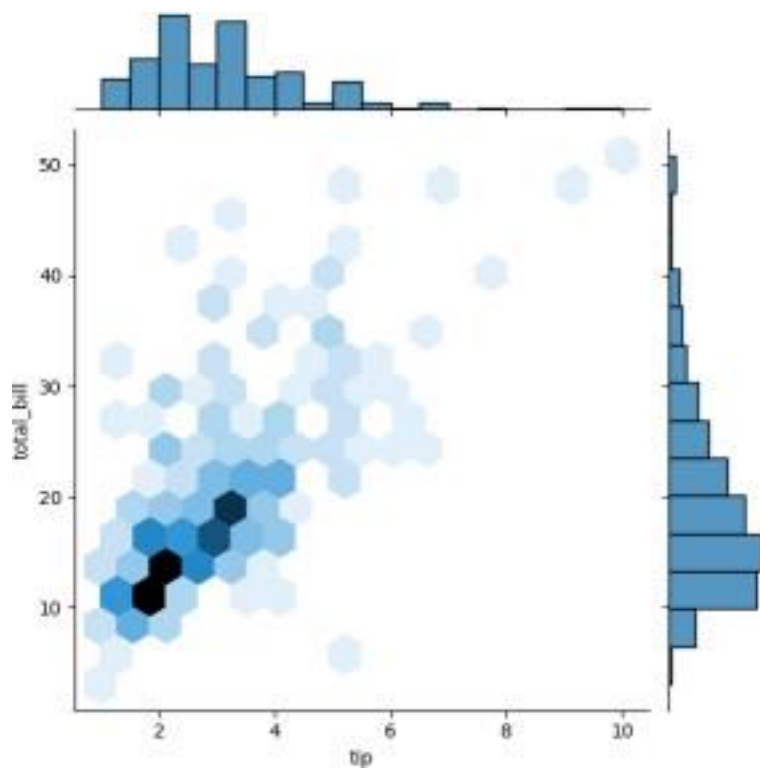
https://colab.research.google.com/drive/1ixdO2LyjKtMYUgtZcoc8jSInDGmeKn4_#scrollTo=J9uBGy0XX3rZ&printMode=true 2/9
10/1/24, 9:52 AM 9.9.2024-Visualization.ipynb - Colab

<seaborn.axisgrid.JointGrid at 0x79bb08fc9cf0>

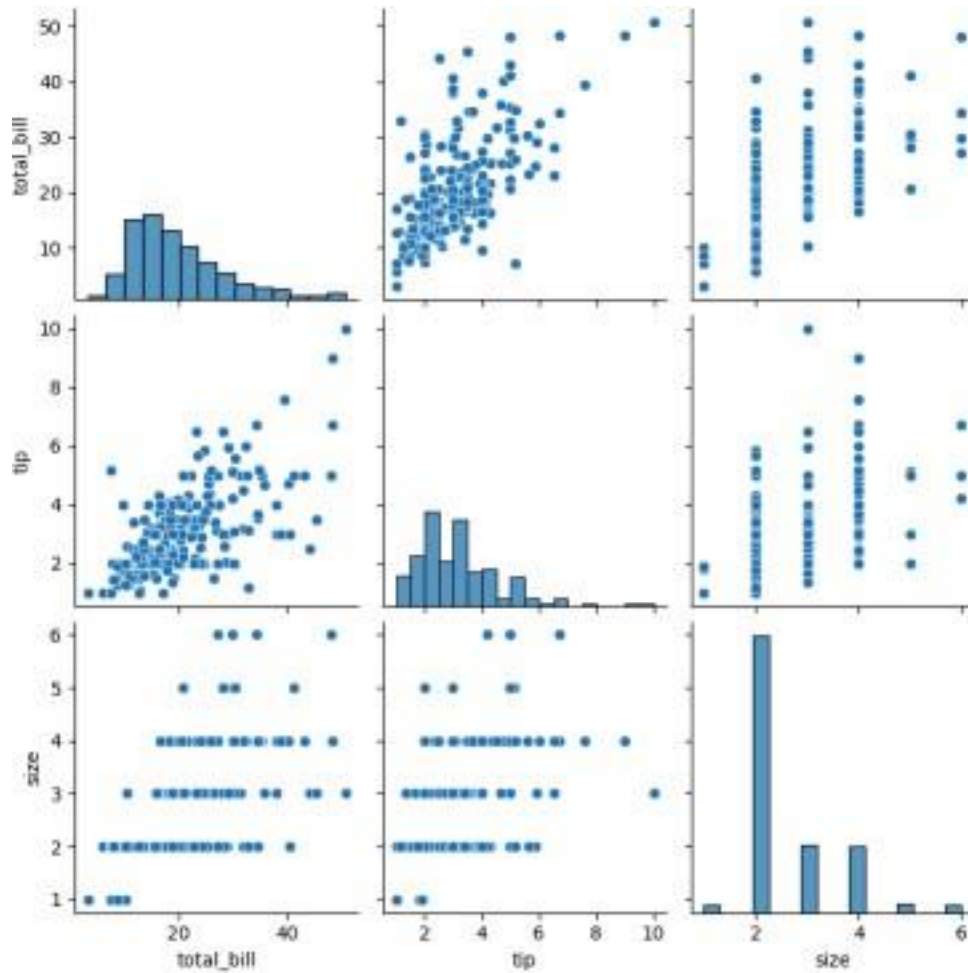


```
sns.jointplot(x=tips.tip,y=tips.total_bill,kind="hex")
```

<seaborn.axisgrid.JointGrid at 0x79bb088f4730>

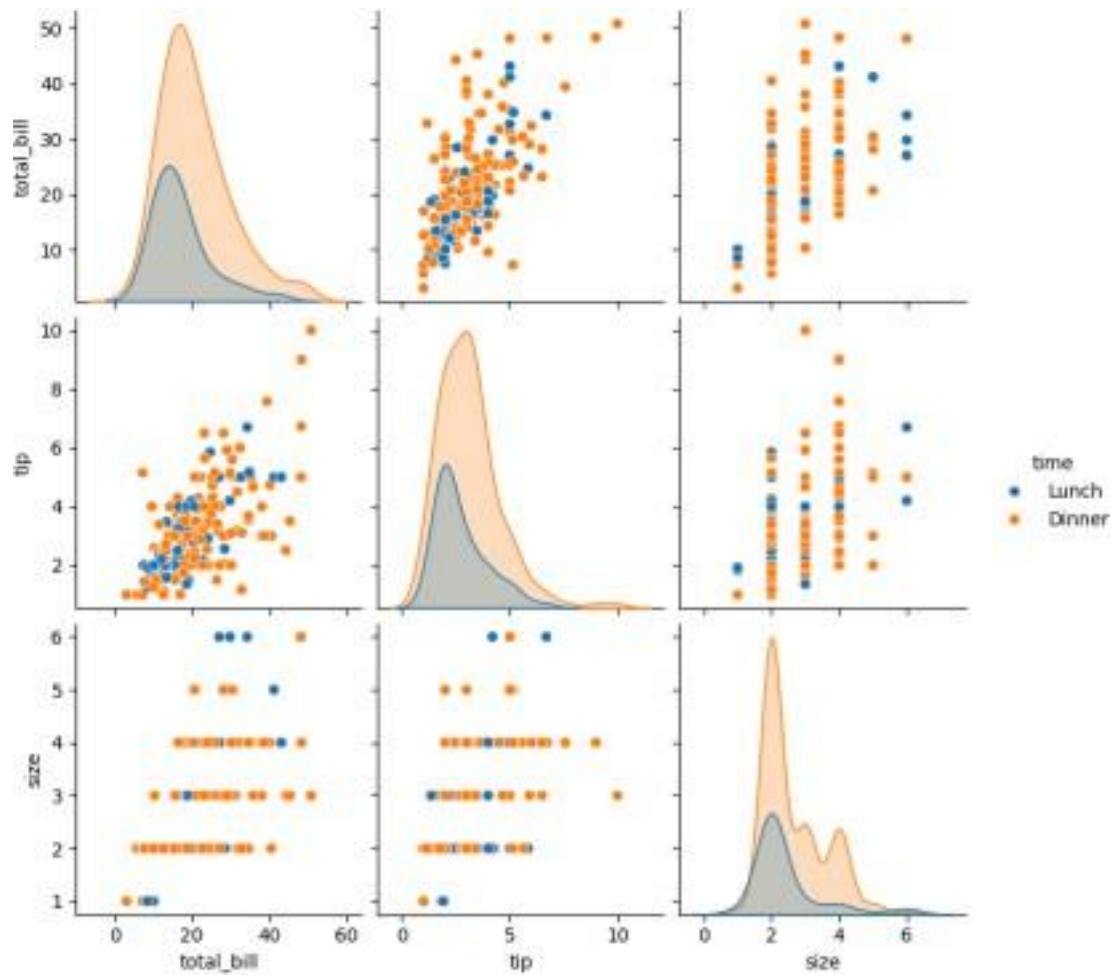


```
sns.pairplot(tips)
```



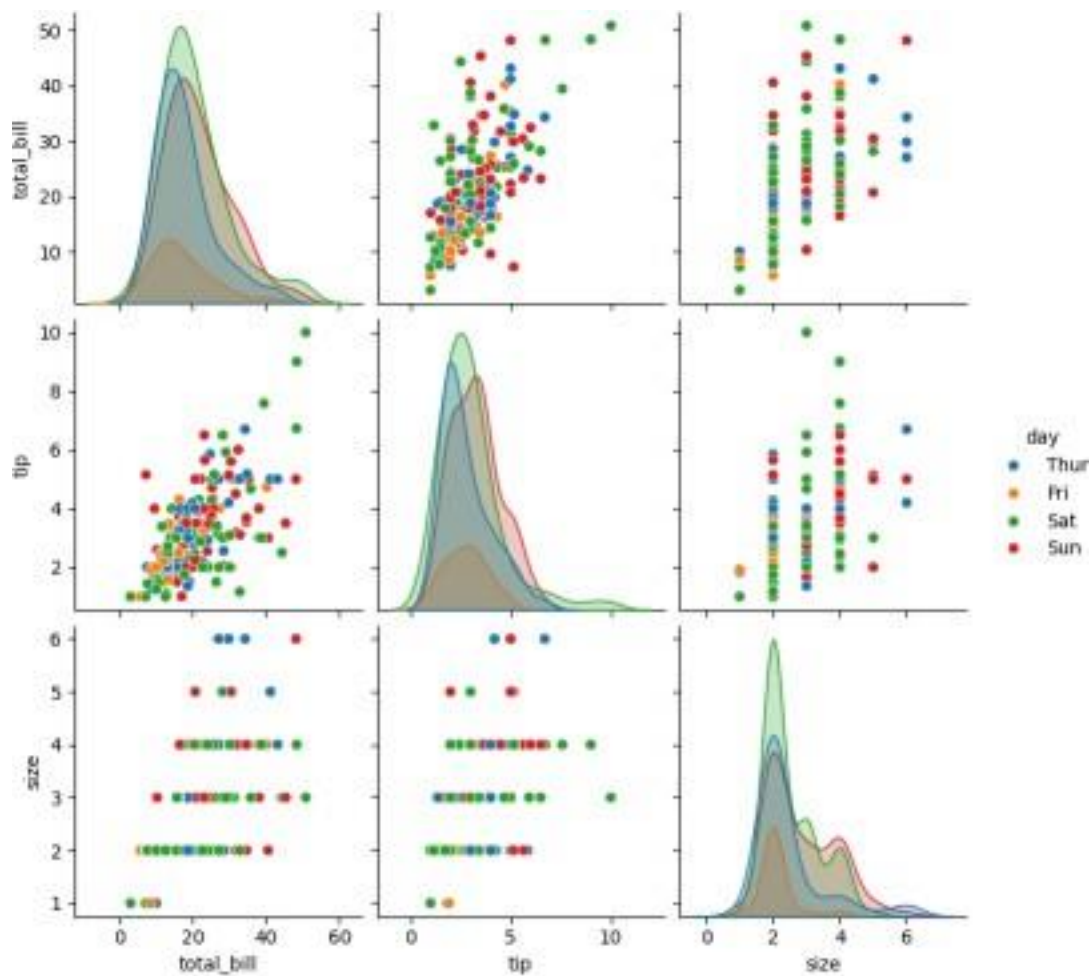
```
tips.time.value_counts()
count
time
Dinner 176
Lunch 68
dtype: int64
```

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



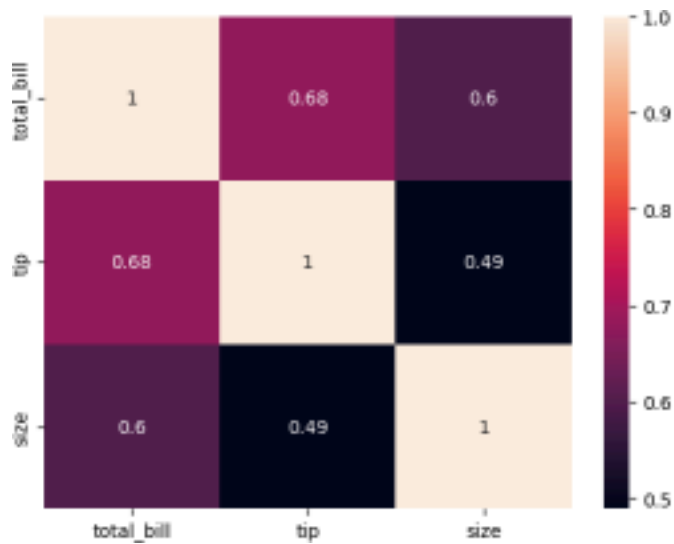
`sns.pairplot(tips,hue='day')`

<seaborn.axisgrid.PairGrid at 0x79bb08f1f6a0>



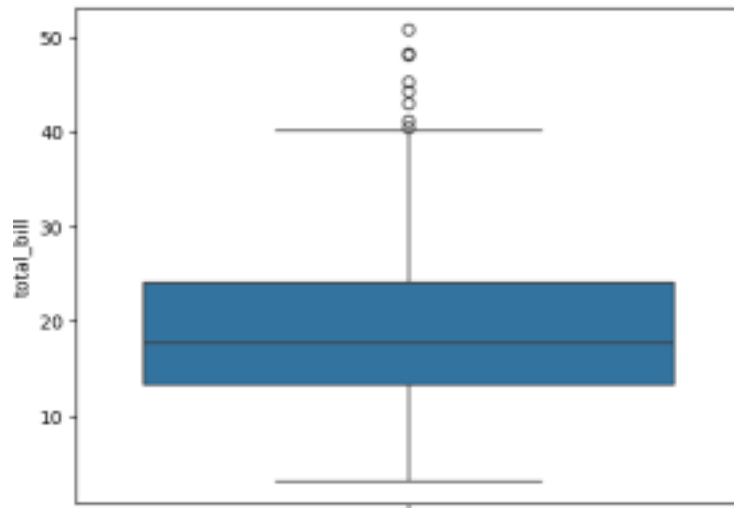
sns.heatmap(tips.corr(numeric_only=True),annot=True)

<Axes: >



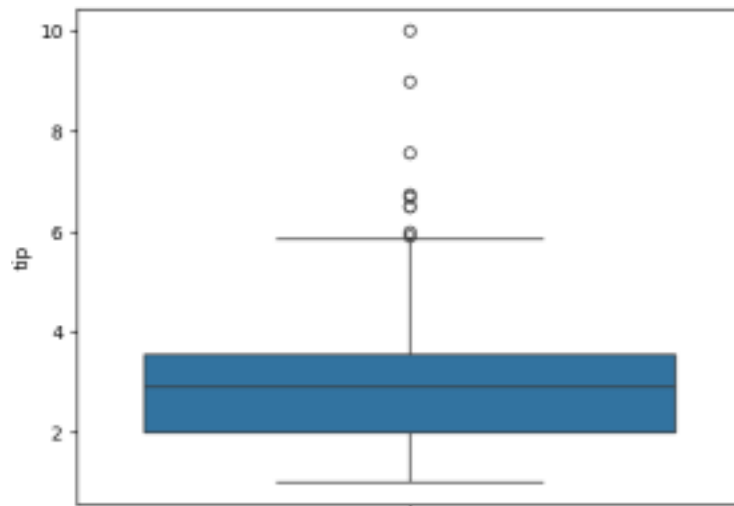
sns.boxplot(tips.total_bill)

<Axes: ylabel='total_bill'>



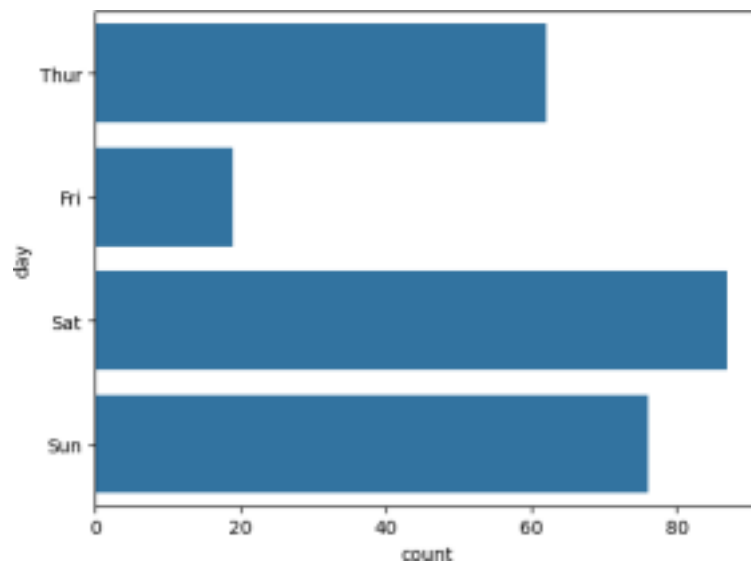
sns.boxplot(tips.tip)

<Axes: ylabel='tip'>



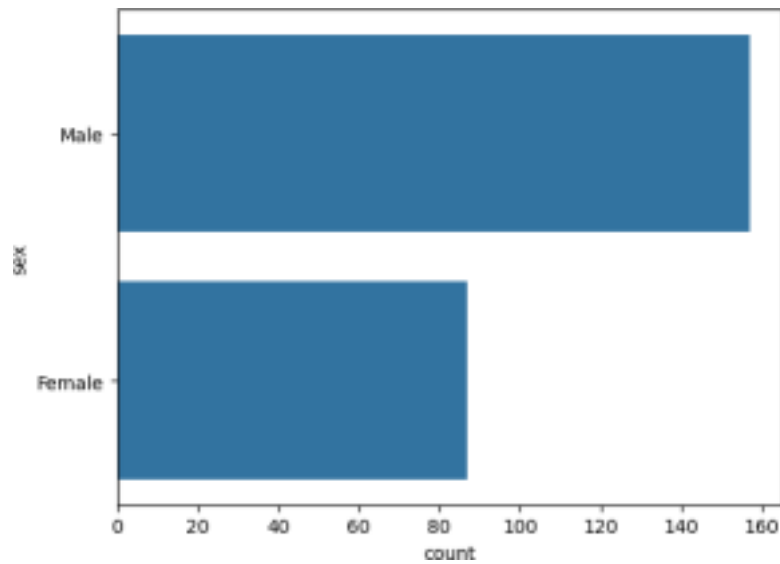
sns.countplot(tips.day)

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



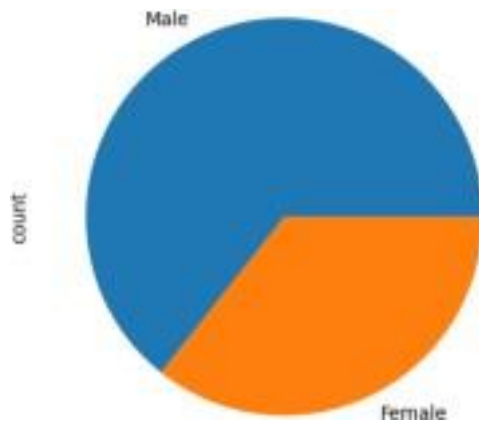
sns.countplot(tips.sex)

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



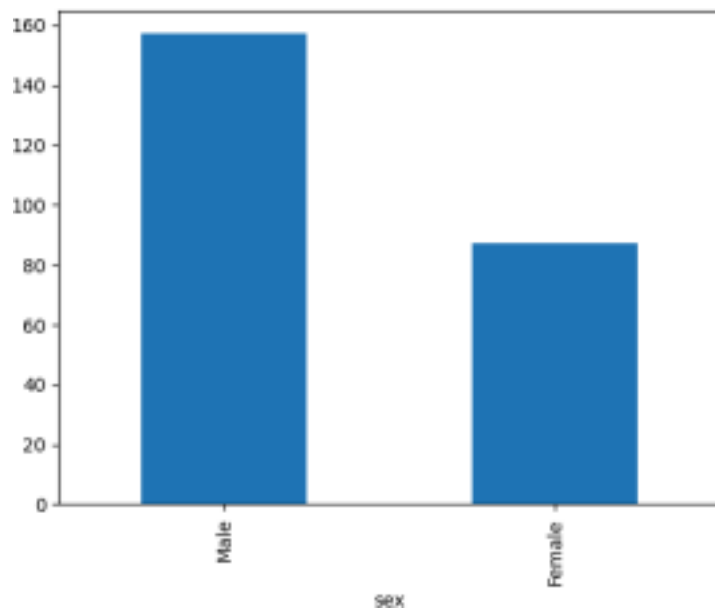
```
tips.sex.value_counts().plot(kind='pie')
```

<Axes: ylabel='count'>



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

<Axes: xlabel='sex'>



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

BHISHEK S

ROLL NO:230701290

SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE

DATE:08.10.2024

```
In [ ]: In [19]: 'pandas.core.frame.DataFrame e'>
RangeIndex: 30 entries,
0 to 29
Data columns (total 2 columns):
# Column Non-Null Count Dtype
-----
YearsExperience 30 non-null float64
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.DataFrame e'> RangeIndex: 30 entries,
0 to 29
Data columns (total 2 columns):
# Column Non-Null Count Dtype
-----
YearsExperience 30 non-null float64
Salary 30 non-null int64
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

In [6]: In [7]: In [20]: 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)

from sklearn.model_selection import
```

Out[20]: ▾ LinearRegression

LinearRegression()

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

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

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

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

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

In [24]: -

Out[24]: array([[9281.30847068]])
model.intercept

In [25]:

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]])
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: SANJAY
KUMAR S
ROLL NO:230701290
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:22.10.2024

```
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
-----
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.variety.value_counts()

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

from sklearn.neighbors import
KNeighborsClassifier

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

xtrain,xtest,ytrain,ytest=train_test_split
(features,label,test_size=.2,random
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()
```

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

```

est))

0.9583333333333334
1.0

from sklearn.metrics import
confusion_matrix
print(model_KNN.score(xtrain,yconfusion_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)

In [11]: In [ ]:

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

```

```
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 x 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
```

```
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]:
```

[illegible]

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

```
from sklearn.model_selection
```

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
```

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

```
for i in range(1,401):
```

```
x_train,x_test,y_train,y_test=train_test_sfinalModel.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
```

```
0 0.85 0.93 0.89 257 1 0.84 0.71  
0.77 143
```

```
print(finalModel.score(x_train,y_train))  
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
```

NAME: SANJAY
KUMAR S
ROLL NO:230701290
SUBJECT NAME:CS23332-FUNDAMENTALS OF DATA SCIENCE
DATE:05.11.2024

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

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

df.info()

<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 [2]: In [3]:

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)

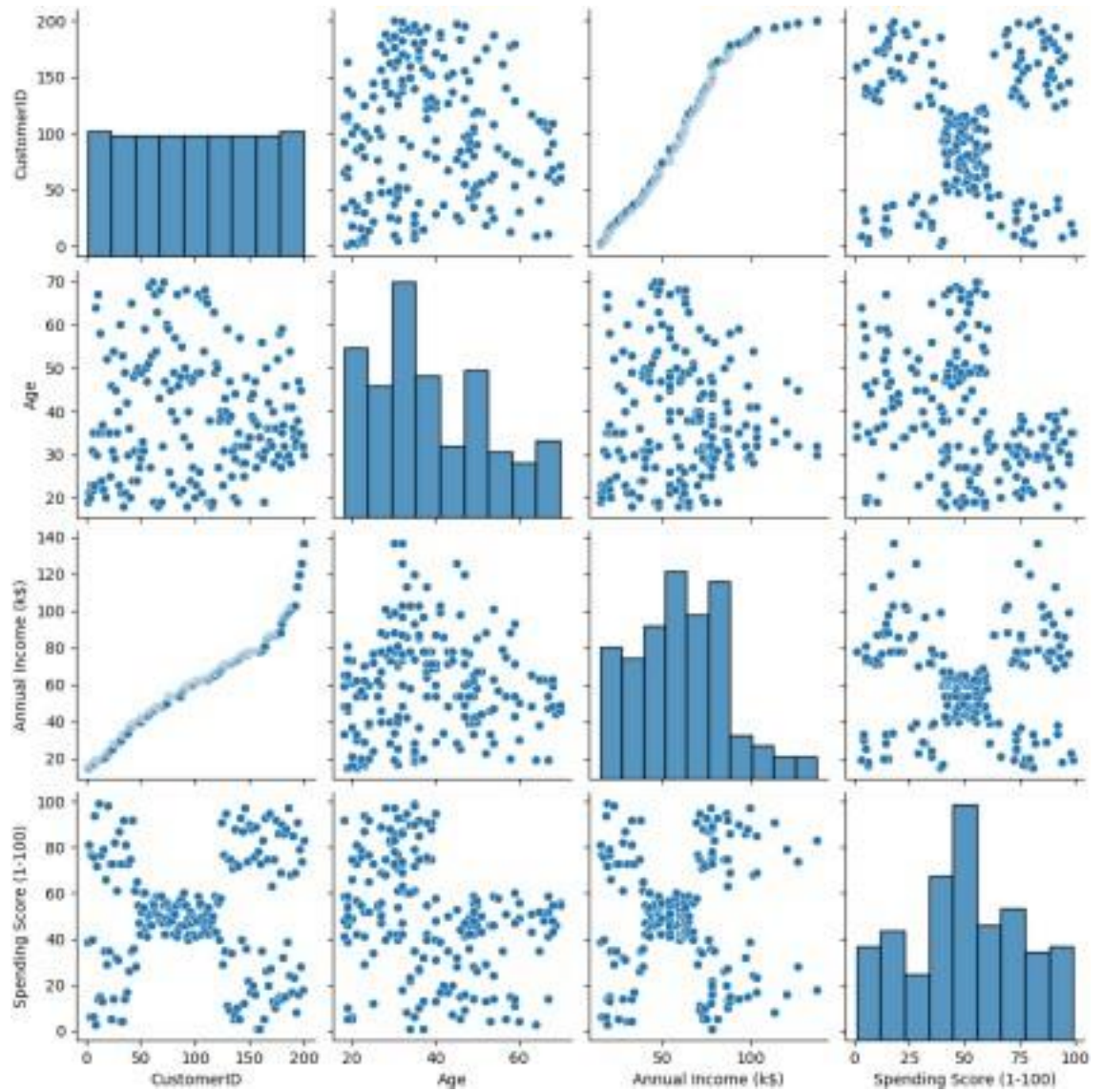
```
0 1 Male 19 15 39
1 2 Male 21 15 81
2 3 Female 20 16 6
3 4 Female 23 16 77
4 5 Female 31 17 40
```



```
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\SANJAYKUMAR\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(
```

```
warnings.warn(
C:\Users\SANJAYKUMAR\AppData\Local\anaconda
3\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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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\SANJAYKUMAR\AppData\Local\Temp\ipykernel_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:

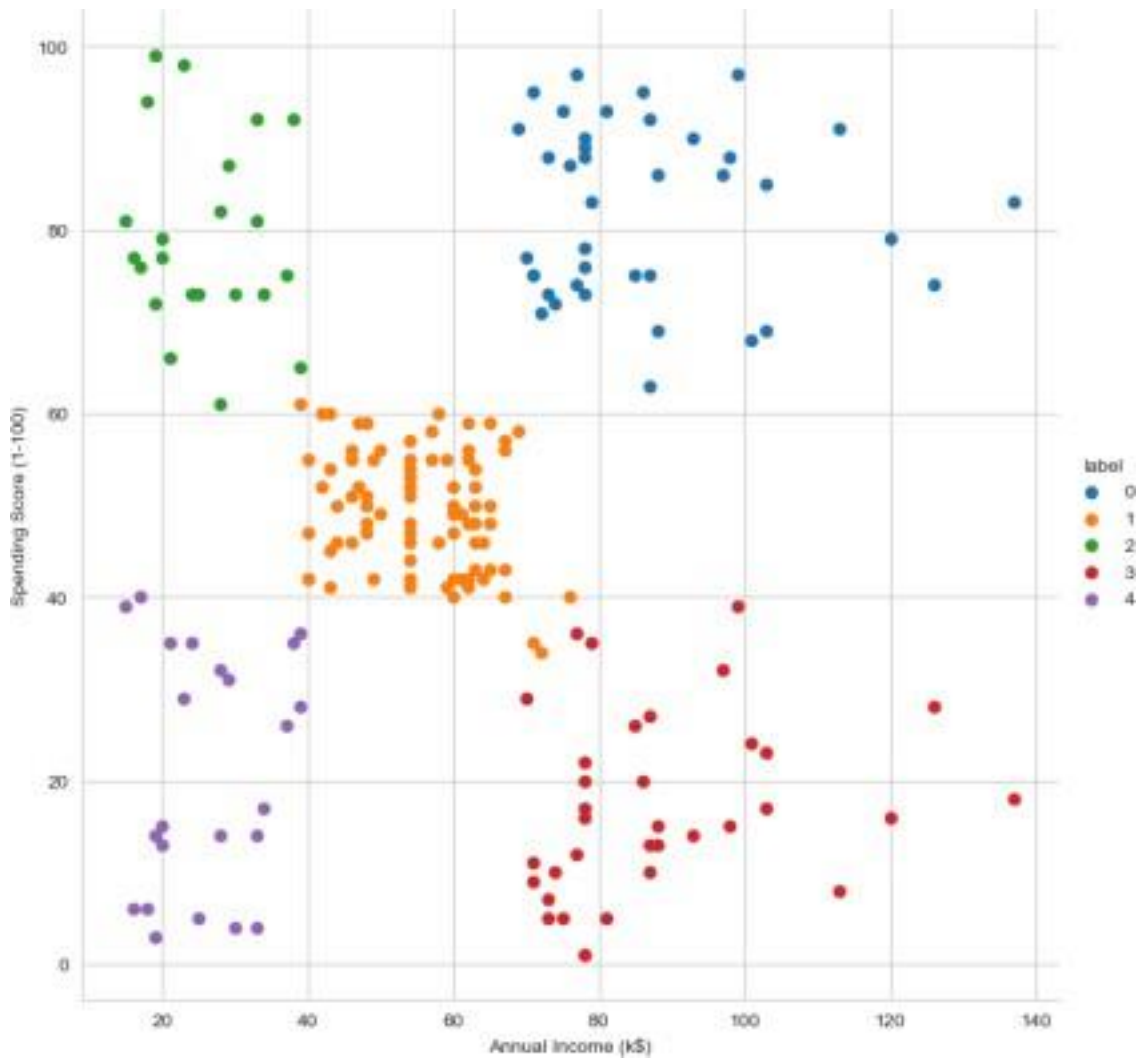
[https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy) (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a view-versus-a-copy)

```
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)
```


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\SANJAYKUMAR\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(  
C:\Users\SANJAYKUMAR\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\SANJAYKUMAR\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(  
C:\Users\SANJAYKUMAR\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\SANJAYKUMAR\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(  
C:\Users\SANJAYKUMAR\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\SANJAYKUMAR\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(  
C:\Users\SANJAYKUMAR\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\SANJAYKUMAR\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(  
C:\Users\SANJAYKUMAR\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\SANJAYKUMAR\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(  
C:\Users\SANJAYKUMAR\AppData\Local\anaconda3\Lib\site-packages\sklearn\cluster
```

localhost:8888/notebooks/K-Means Clustering.ipynb 6/8

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

```
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\SANJAYKUMAR\AppData\Local\anaconda3\Lib\site-packages\sklearn\cluster
```



```
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 can avoid it by setting the environment
variable OMP_NUM_THREADS=1.
```

```
warnings.warn(
```

```
C:\Users\SANJAYKUMAR\AppData\Local\anaconda3\Lib\site-packages\sklearn\clust
```

```
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\SANJAYKUMAR\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 can avoid it by setting the environment
variable OMP_NUM_THREADS=1.
```

```
warnings.warn(
```

```
C:\Users\SANJAYKUMAR\AppData\Local\anaconda3\Lib\site-packages\sklearn\clust
```

```
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
```

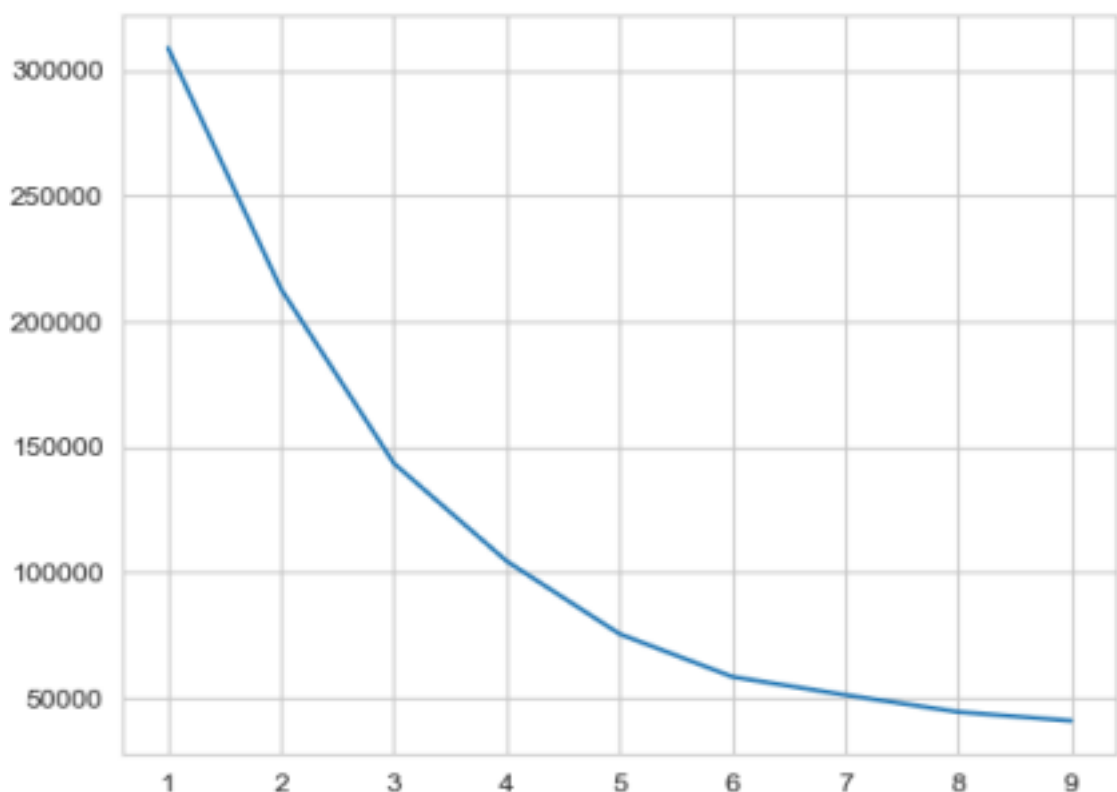
```
warnings.warn(
```

```
C:\Users\SANJAYKUMAR\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 can avoid it by setting the environment
variable OMP_NUM_THREADS=1.
```

```
warnings.warn(
```

Out[10]: [<matplotlib.lines.Line2D at 0x170e99f3550>]



In []:

