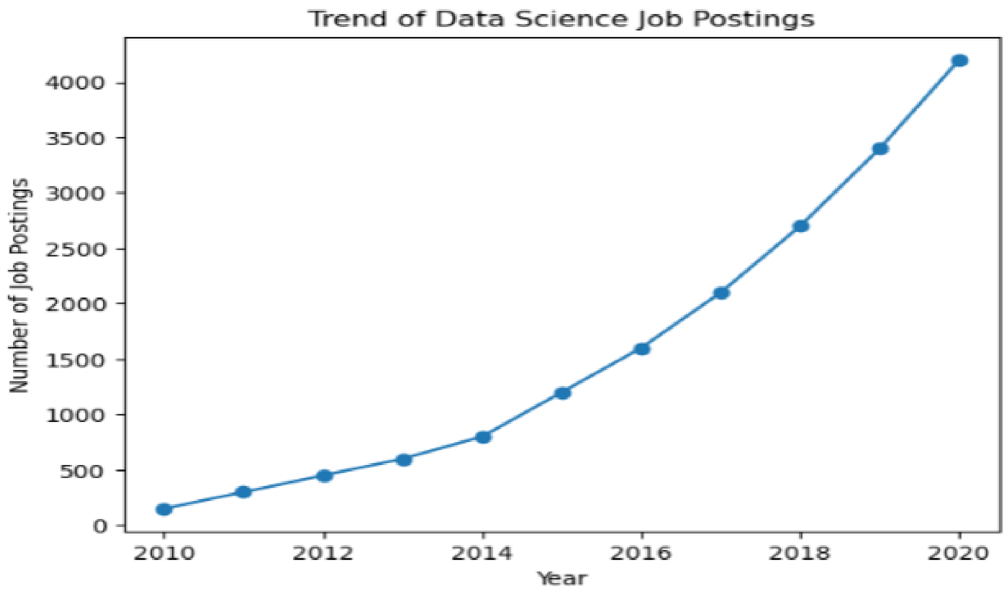
```
#1.A) BASIC PRACTICE EXPERIMENTS 1-4
#230701004
#ABHINAYA LAKSHMI.S
#30/07/24
import pandas as pd
import matplotlib.pyplot as plt
data = {'Year': list(range(2010, 2021)),
'Job Postings': [150, 300, 450, 600, 800, 1200, 1600, 2100, 2700, 3400, 4200]}

df = pd.DataFrame(data)
plt.plot(df['Year'], df['job Postings rob Postings'], marker='o')
plt.title('Trend of Data Science Job Postings')
plt.xlabel('Year')
plt.ylabel('Number of Job Postings')
plt.show()
```

Output:



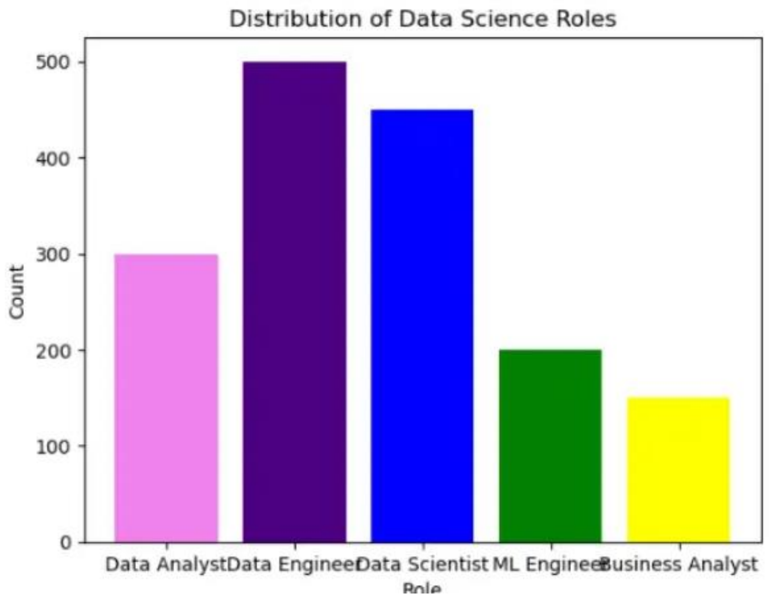
```
In [2]: import pandas
        x=[1,7,2]
        y=pandas.DataFrame(x,index=["a","b","c"])
        print(y)
```

```
   0
a  1
b  7
c  2
```

```
In [3]: import pandas
        x={'Subjects':["Math","Physics","English"] ,'Marks': [89,92,96]}
        print(pandas.DataFrame(x))
```

```
  Subjects  Marks
0     Math     89
1  Physics     92
2  English     96
```

```
In [19]: import matplotlib.pyplot as plt
         roles=['Data Analyst','Data Engineer','Data Scientist','ML Engineer','Business Analyst']
         counts=[300,500,450,200,150]
         color=['violet','indigo','blue','green','yellow']
         plt.bar(roles,counts,color=color)
         plt.title('Distribution of Data Science Roles')
         plt.xlabel('Role')
         plt.ylabel('Count')
         plt.show()
```



#1.B) PANDAS BUIT IN FUNCTION; NUMPY BUIT IN FUCTION- ARRAY SLICING, RAVEL,RESHAPE,NDIM

#230701004

#ABHINAYA LAKSHMI.S

#06.08.2024

#NUMPY FUNCTIONS

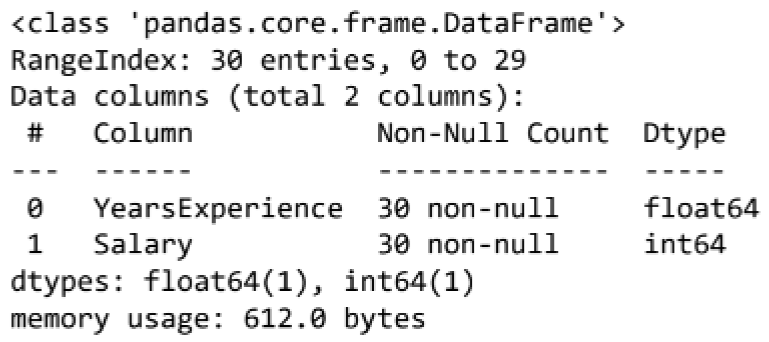
import numpy as np

import pandas as pd

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

df

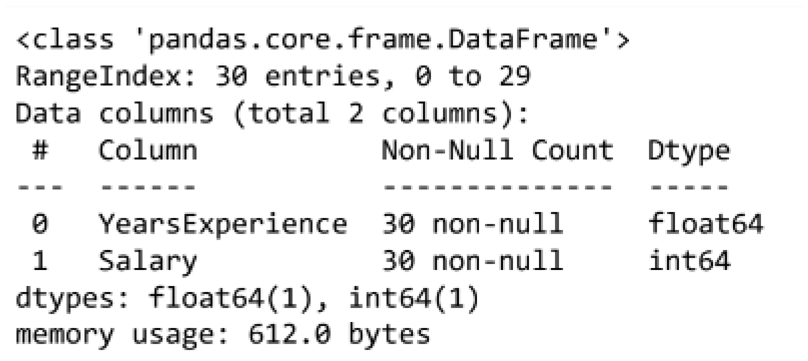
df.info()



```
<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
dtypes: float64(1), int64(1)
memory usage: 612.0 bytes
```

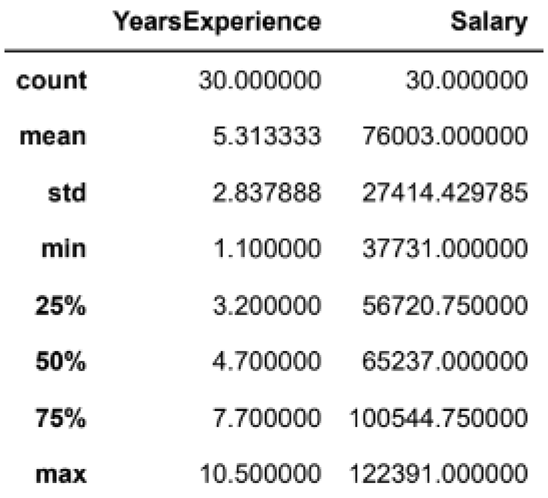
df.dropna(inplace=True)

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
dtypes: float64(1), int64(1)
memory usage: 612.0 bytes
```

df.describe()



	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

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

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

from sklearn.model_selection import train_test_split

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

from sklearn.linear_model import LinearRegression

model=LinearRegression()

model.fit(x_train,y_train)

```
▾ LinearRegression
LinearRegression()
```

model.score(x_train,y_train)

```
0.9603182547438908
```

model.score(x_test,y_test)

```
0.9184170849214232
```

model.coef_

```
array([[9281.30847068]])
```

model.intercept_

```
array([27166.73682891])
```

import pickle

pickle.dump(model,open('SalaryPred.model','wb'))

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

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
```

print("Estimated Salary for {} years of experience is {}: " .format(yr_of_exp,Salary)

```
Estimated Salary for 44.0 years of experience is [[435544.30953887]]:
```

#PANDAS FUNCTIONS

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']

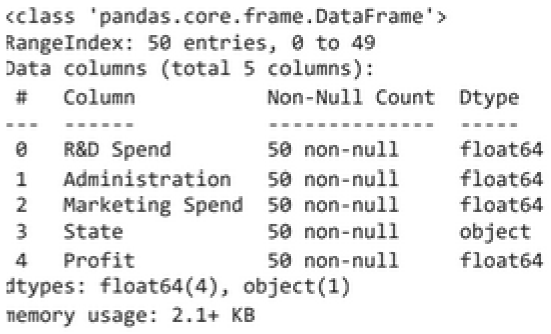
df

	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)
nemory usage: 2.1+ KB
```

df.head()

df.tail()

import numpy as np

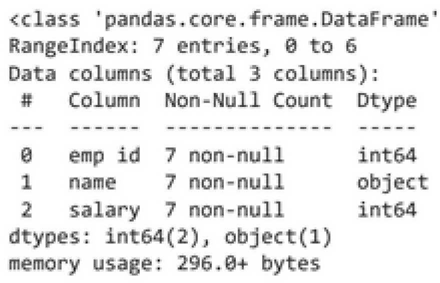
import pandas as pd

df = pd.read_csv("/content/employee.csv")

df.head()

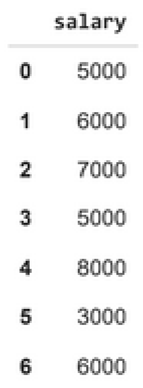
df.tail()

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
```

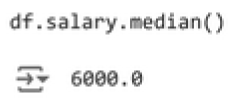
df.salary()



	salary
0	5000
1	6000
2	7000
3	5000
4	8000
5	3000
6	6000

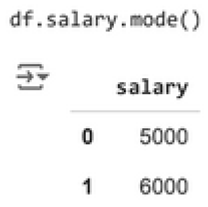
type(df.salary)

df.salary.mean()



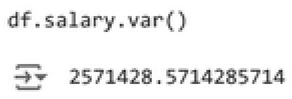
```
df.salary.median()
```

```
6000.0
```



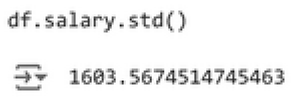
```
df.salary.mode()
```

	salary
0	5000
1	6000



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

```
2571428.5714285714
```

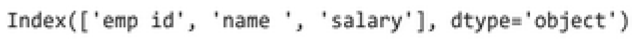


```
df.salary.std()
```

```
1603.5674514745463
```

empCol=df.columns

empCol

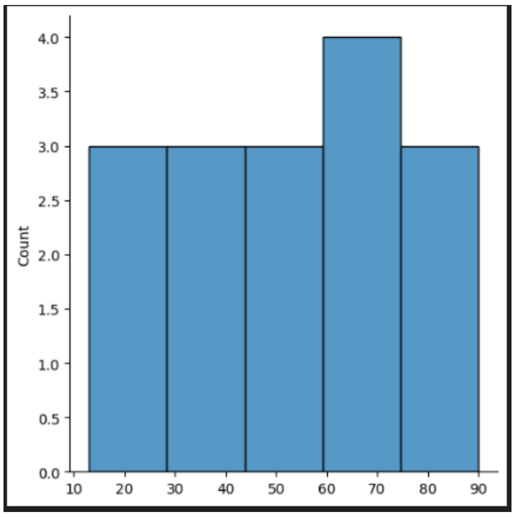


```
Index(['emp id', 'name ', 'salary'], dtype='object')
```

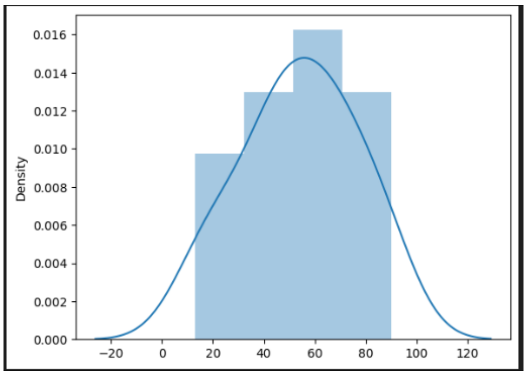
emparray=df.values

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

```
#OUTLIER DETECTION

#230701004

#ABHINAYA LAKSHMI.S

#13.08.2024

#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([21, 72, 69, 45, 61, 43, 43, 59, 62, 42, 90, 25, 54, 86, 80, 13], dtype=int32)

array.mean()

np.percentile(array,25)

np.percentile(array,50)

np.percentile(array,75)

np.percentile(array,100)

#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

import seaborn as sns

%matplotlib inline

sns.displot(array)
```



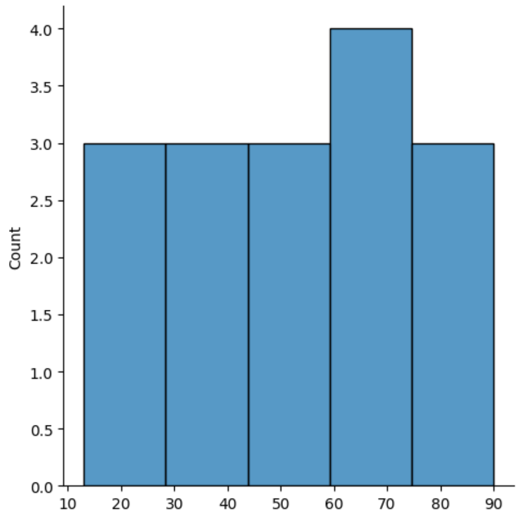
sns.distplot(array)



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

new_array

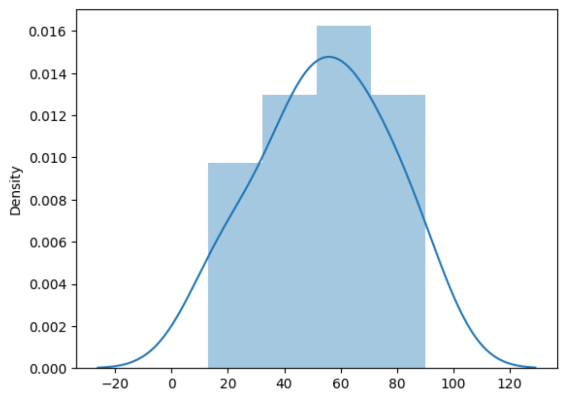
sns.displot(new_array)



lr1,ur1=outDetection(new_array)

lr1,ur1

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

final_array

sns.distplot(final_array)
```



#3) Missing and inappropriate data

#230701004

#ABHINAYA LAKSHMI.S

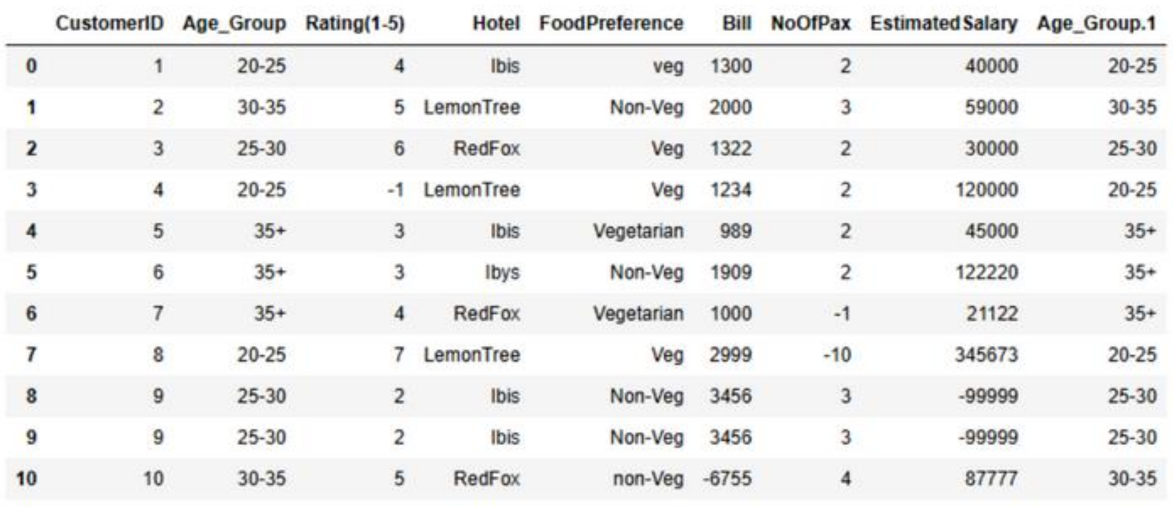
#20.08.2024

import numpy as np

import pandas as pd

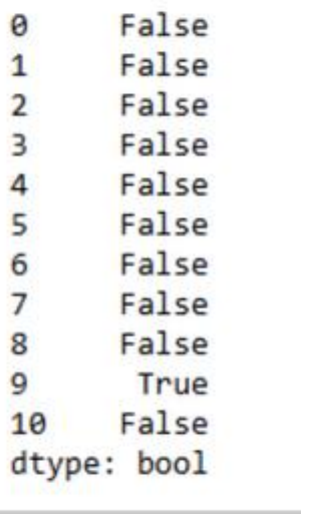
df=pd.read_csv("Hotel_Dataset.csv")

df



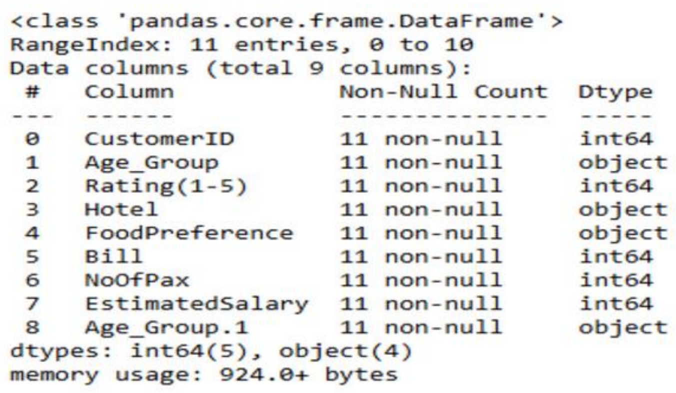
	CustomerID	Age_Group	Rating(1-5)	Hotel	FoodPreference	Bill	NoOfPax	EstimatedSalary	Age_Group.1
0	1	20-25	4	Ibis	veg	1300	2	40000	20-25
1	2	30-35	5	LemonTree	Non-Veg	2000	3	59000	30-35
2	3	25-30	6	RedFox	Veg	1322	2	30000	25-30
3	4	20-25	-1	LemonTree	Veg	1234	2	120000	20-25
4	5	35+	3	Ibis	Vegetarian	989	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

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
```

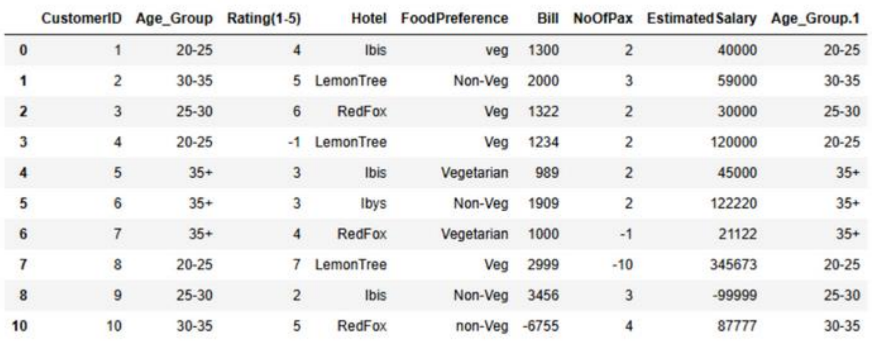
df.info()



```
<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
```

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

len(df)

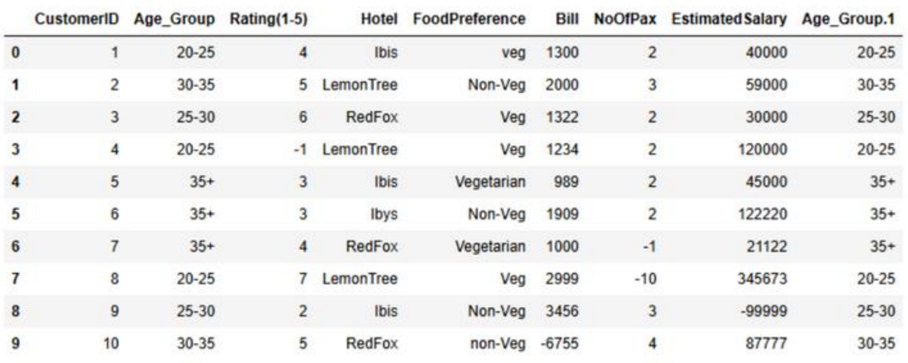
index=np.array(list(range(0,len(df))))

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

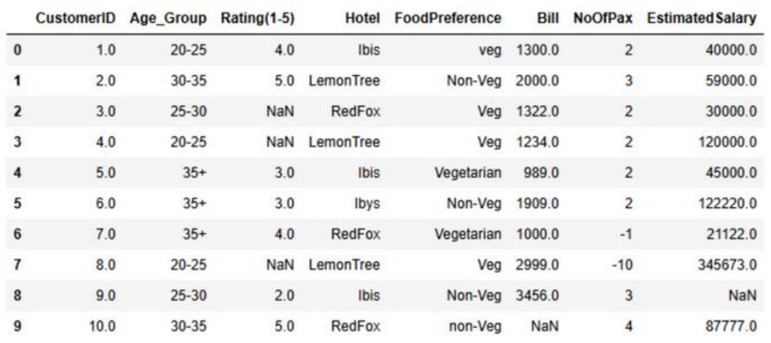
df.drop(['Age_Group.1'],axis=1,inplace=True)

df

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

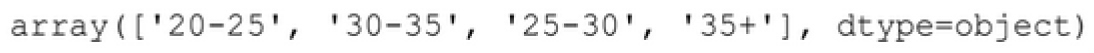


	CustomerID	Age_Group	Rating(1-5)	Hotel	FoodPreference	Bill	NoOfPax	EstimatedSalary
0	1.0	20-25	4.0	Ibis	veg	1300.0	2	40000.0
1	2.0	30-35	5.0	LemonTree	Non-Veg	2000.0	3	59000.0
2	3.0	25-30	NaN	RedFox	Veg	1322.0	2	30000.0
3	4.0	20-25	NaN	LemonTree	Veg	1234.0	2	120000.0
4	5.0	35+	3.0	Ibis	Vegetarian	989.0	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

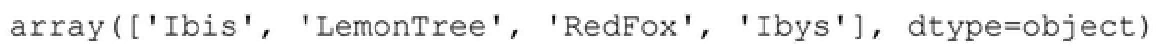
df

df.Age_Group.unique()



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

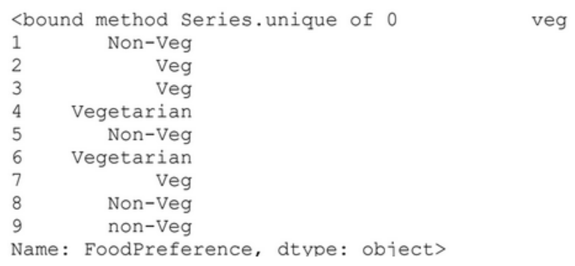
df.Hotel.unique()



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

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)

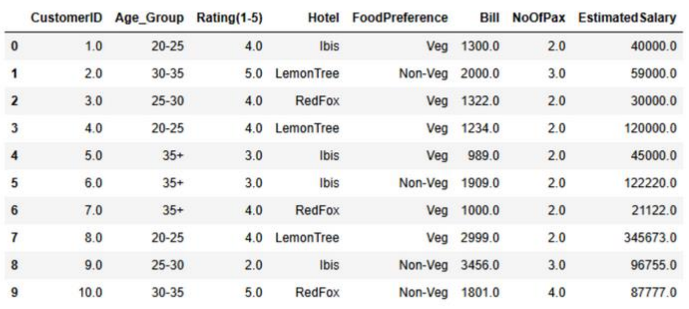
df.EstimatedSalary.fillna(round(df.EstimatedSalary.mean()),inplace=True)

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

#4)Data Preprocessing

#230701004

#ABHINAYA LAKSHMI.S

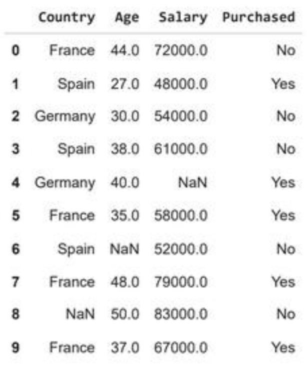
#27.08.2024

import numpy as np

import pandas as pd

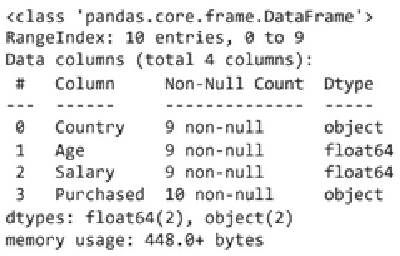
df=pd.read_csv("/content/pre-process_datasample.csv")

df



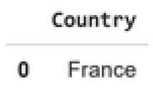
	Country	Age	Salary	Purchased
0	France	44.0	72000.0	No
1	Spain	27.0	48000.0	Yes
2	Germany	30.0	54000.0	No
3	Spain	38.0	61000.0	No
4	Germany	40.0	NaN	Yes
5	France	35.0	58000.0	Yes
6	Spain	NaN	52000.0	No
7	France	48.0	79000.0	Yes
8	NaN	50.0	83000.0	No
9	France	37.0	67000.0	Yes

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]

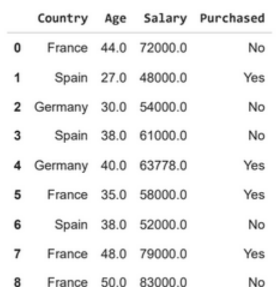
type(df.Country.mode())

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



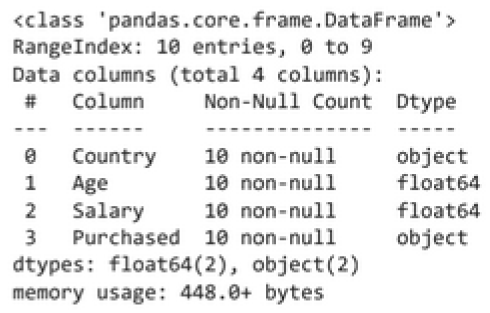
	Country	Age	Salary	Purchased
0	France	44.0	72000.0	No
1	Spain	27.0	48000.0	Yes
2	Germany	30.0	54000.0	No
3	Spain	38.0	61000.0	No
4	Germany	40.0	63778.0	Yes
5	France	35.0	58000.0	Yes
6	Spain	38.0	52000.0	No
7	France	48.0	79000.0	Yes
8	France	50.0	83000.0	No

pd.get_dummies(df.Country)

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

```
France Germany Spain Age Salary Purchased

0 True False False 44.0 72000.0 No

1 False False True 27.0 48000.0 Yes

2 False True False 30.0 54000.0 No

3 False False True 38.0 61000.0 No

4 False True False 40.0 63778.0 Yes

5 True False False 35.0 58000.0 Yes

6 False False True 38.0 52000.0 No

7 True False False 48.0 79000.0 Yes

8 True False False 50.0 83000.0 No

9 True False False 37 0 67000 0 Yes
```

df.info()



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

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

updated_dataset
```

```
        France    Germany   Spain    Age      Salary    Purchased

0       True      False     False    44.0     72000.0   0

1       False     False     True     27.0     48000.0   1

2       False     True      False    30.0     54000.0   0

3       False     False     True     38.0     61000.0   0

4       False     True      False    40.0     63778.0   1

5       True      False     False    35.0     58000.0   1

6       False     False     True     38.0     52000.0   0

7       True      False     False    48.0     79000.0   1

8       True      False     False    50.0     83000.0   0

9       True      False     False    37.0     67000.0   1
```

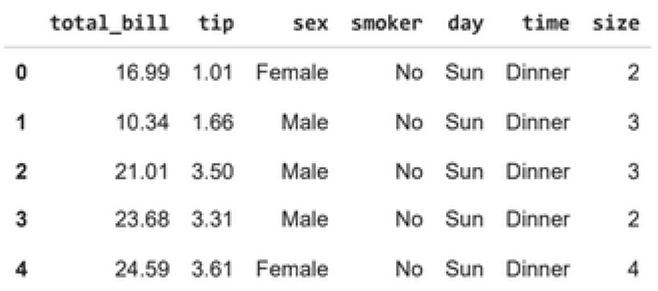
# EDA-Quantitative and Qualitative plots - Experiments 1

#230701004

#ABHINAYA LAKSHMI.S

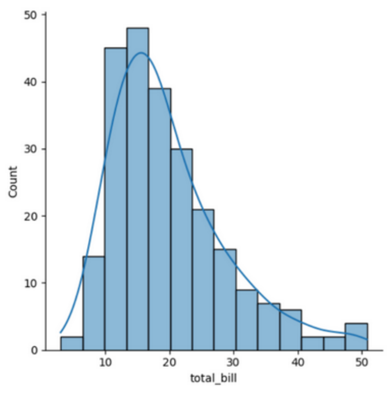
# 03.09.2024

```
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()
```

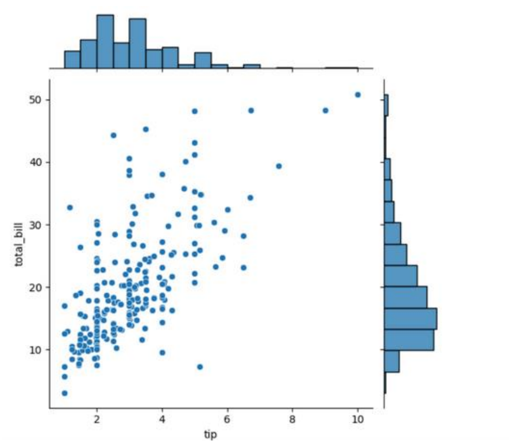


```
   total_bill   tip     sex  smoker  day    time  size
0       16.99  1.01  Female      No  Sun  Dinner     2
1       10.34  1.66    Male      No  Sun  Dinner     3
2       21.01  3.50    Male      No  Sun  Dinner     3
3       23.68  3.31    Male      No  Sun  Dinner     2
4       24.59  3.61  Female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

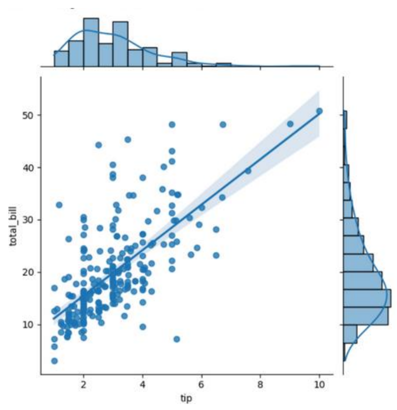
```
sns.displot(tips.total_bill,kde=True)
```



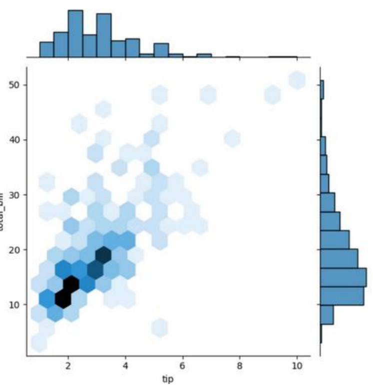
```
sns.jointplot(x=tips.tip,y=tips.total_bill)
```



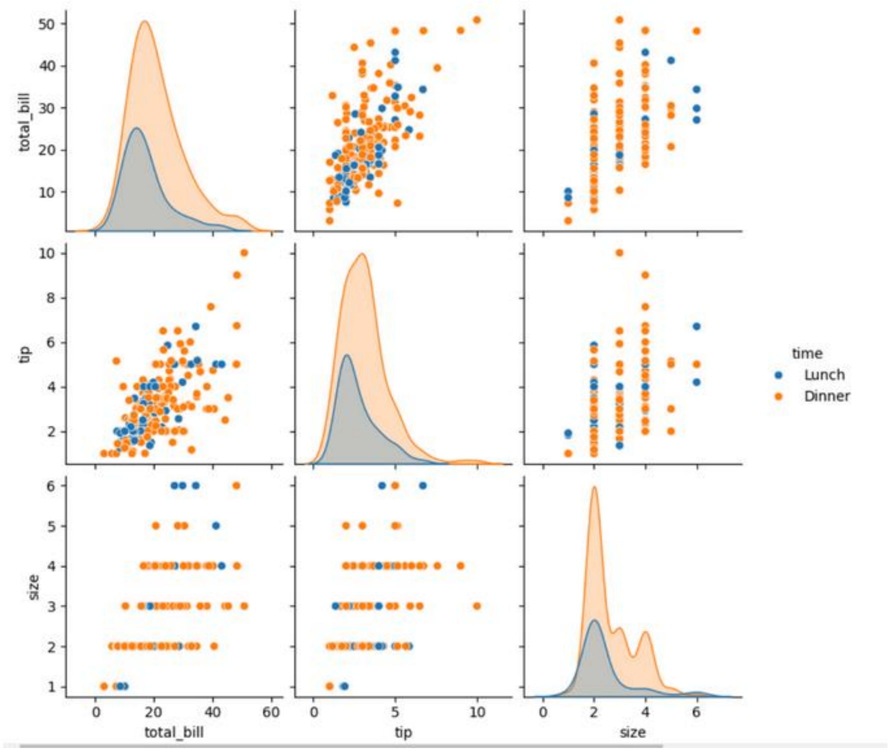
sns.jointplot(x=tips.tip,y=tips.total_bill,kind="reg")



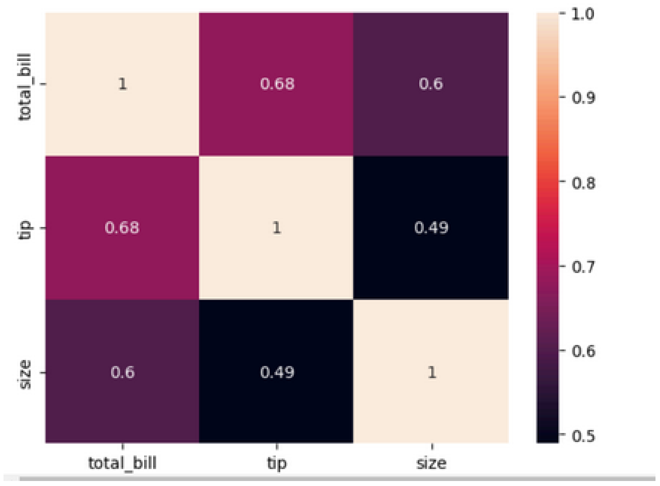
sns.jointplot(x=tips.tip,y=tips.total_bill,kind="hex")



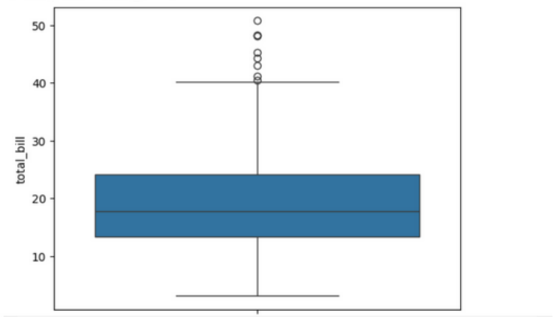
sns.pairplot(tips,hue='time')



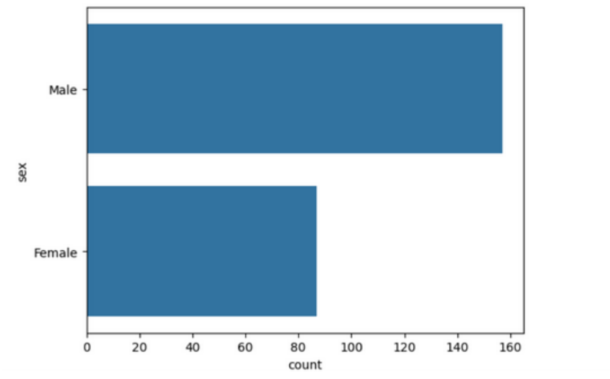
sns.heatmap(tips.corr(numeric_only=True),annot=True)



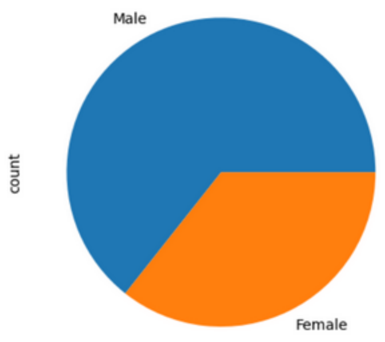
sns.boxplot(tips.total_bill)

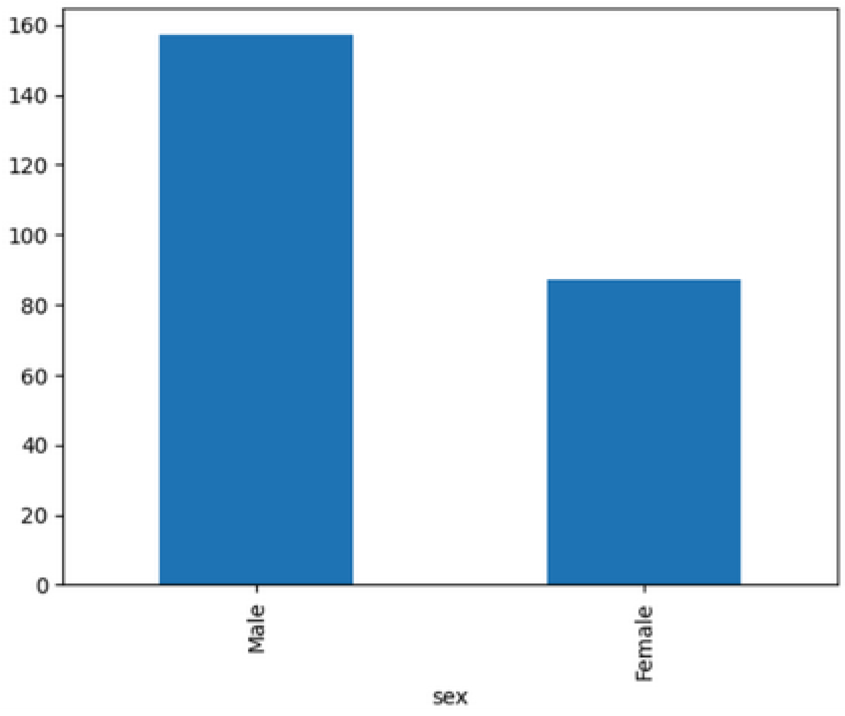


```
sns.countplot(tips.sex)
```



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

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





```
#Random Sampling and Sampling Distribution
#230701004
#ABHINAYA LAKSHMI.S
# 10.09.2024
import numpy as np
import matplotlib.pyplot as plt
population_mean = 50
population_std = 10
population_size = 100000
population = np.random.normal(population_mean, population_std, population_size)
plt.figure(figsize=(8, 5))
plt.hist(population, bins=50, color='skyblue', edgecolor='black', alpha=0.7)
plt.title('Population Distribution')
plt.xlabel('Value')
plt.ylabel('Frequency')
plt.axvline(population_mean, color='red', linestyle='dashed', linewidth=1.5, label='Population Mean')
plt.legend()
plt.show()
sample_sizes = [30, 50, 100]
num_samples = 1000
sample_means = {}
for size in sample_sizes:
sample_means[size] = []
for _ in range(num_samples):
sample = np.random.choice(population, size=size, replace=False)
sample_means[size].append(np.mean(sample))
plt.figure(figsize=(12, 8))
for i, size in enumerate(sample_sizes):
plt.subplot(len(sample_sizes), 1, i + 1)
plt.hist(sample_means[size], bins=30, alpha=0.7, color='orange', edgecolor='black',
label=f'Sample Size {size}')
```

```
plt.axvline(np.mean(population), color='red', linestyle='dashed', linewidth=1.5, label='Population
Mean')

plt.title(f'Sampling Distribution of the Sample Mean (Sample Size {size})')

plt.xlabel('Sample Mean')

plt.ylabel('Frequency')

plt.legend()

plt.tight_layout()

plt.show()

plt.figure(figsize=(12, 8))

for i, size in enumerate(sample_sizes):

plt.subplot(len(sample_sizes), 1, i + 1)

plt.hist(sample_means[size], bins=30, alpha=0.7, color='purple', edgecolor='black',

label=f'Sample Size {size}', density=True)

plt.axvline(np.mean(population), color='red', linestyle='dashed', linewidth=1.5, label='Population
Mean')

plt.title(f'Sampling Distribution (Sample Size {size}) - CLT Demonstration')

plt.xlabel('Sample Mean')

plt.ylabel('Density')

plt.legend()

plt.tight_layout()

plt.show()
```

```
# Z-Test
# 230701004
# ABHINAYA LAKSHMI.S
# 10.09.2024

import numpy as np
import scipy.stats as stats
sample_data = np.array([
152, 148, 151, 149, 147, 153, 150, 148, 152, 149,
151, 150, 149, 152, 151, 148, 150, 152, 149, 150,
148, 153, 151, 150, 149, 152, 148, 151, 150, 153
])
population_mean = 150
sample_mean = np.mean(sample_data)
sample_std = np.std(sample_data, ddof=1)
n = len(sample_data)
z_statistic = (sample_mean - population_mean) / (sample_std / np.sqrt(n))
p_value = 2 * (1 - stats.norm.cdf(np.abs(z_statistic)))
print(f"Sample Mean: {sample_mean:.2f}")
print(f"Z-Statistic: {z_statistic:.4f}")
print(f"P-Value: {p_value:.4f}")
alpha = 0.05
if p_value < alpha:
print("Reject the null hypothesis: The average weight is significantly different from 150 grams.")
else:
print("Fail to reject the null hypothesis: There is no significant difference in average weight from 150
grams.")
```

```
# T-Test

# 230701004

# ABHINAYA LAKSHMI.S

# 08.10.2024


import numpy as np

import scipy.stats as stats

np.random.seed(42)

sample_size = 25

sample_data = np.random.normal(loc=102, scale=15, size=sample_size)

population_mean = 100

sample_mean = np.mean(sample_data)

sample_std = np.std(sample_data, ddof=1)

n = len(sample_data)

t_statistic, p_value = stats.ttest_1samp(sample_data, population_mean)

print(f"Sample Mean: {sample_mean:.2f}")

print(f"T-Statistic: {t_statistic:.4f}")

print(f"P-Value: {p_value:.4f}")

alpha = 0.05

if p_value < alpha:

print("Reject the null hypothesis: The average IQ score is significantly different from 100.")

else:

print("Fail to reject the null hypothesis: There is no significant difference in average IQ score from
100."
```

```
# Anova TEST
# 230701004
# ABHINAYA LAKSHMI.S
# 08.10.2024

import numpy as np
import scipy.stats as stats
np.random.seed(42)
n_plants = 25
growth_A = np.random.normal(loc=10, scale=2, size=n_plants)
growth_B = np.random.normal(loc=12, scale=3, size=n_plants)
growth_C = np.random.normal(loc=15, scale=2.5, size=n_plants)
f_statistic, p_value = stats.f_oneway(growth_A, growth_B, growth_C)
print("Treatment A Mean Growth:", np.mean(growth_A))
print("Treatment B Mean Growth:", np.mean(growth_B))
print("Treatment C Mean Growth:", np.mean(growth_C))
print()
print(f"F-Statistic: {f_statistic:.4f}")
print(f"P-Value: {p_value:.4f}")
alpha = 0.05
if p_value < alpha:
print("Reject the null hypothesis: There is a significant difference in mean growth rates among the
three
treatments.")
else:
print("Fail to reject the null hypothesis: There is no significant difference in mean growth rates
among the
three treatments.")
if p_value < alpha:
all_data = np.concatenate([growth_A, growth_B, growth_C])
treatment_labels = ['A'] * n_plants + ['B'] * n_plants + ['C'] * n_plants
tukey_results = pairwise_tukeyhsd(all_data, treatment_labels, alpha=0.05)
print("\nTukey's HSD Post-hoc Test:")
print(tukey_results)
```

```
# Feature Scaling

# 230701004

# ABHINAYA LAKSHMI.S

# 22.10.2024


import numpy as np

import pandas as pd

df = pd.read_csv('/content/pre-process_datasample.csv')

print("Original Data:")

print(df)

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

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

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

from sklearn.impute import SimpleImputer

age_imputer = SimpleImputer(strategy="mean")

salary_imputer = SimpleImputer(strategy="mean")

age_imputer.fit(features[:, [1]])

salary_imputer.fit(features[:, [2]])

features[:, [1]] = age_imputer.transform(features[:, [1]])

features[:, [2]] = salary_imputer.transform(features[:, [2]])

print("Features after handling missing values:")

print(features)

from sklearn.preprocessing import OneHotEncoder

oh = OneHotEncoder(sparse_output=False)

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

print("OneHotEncoded 'Country' column:")

print(Country)

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

print("Final dataset with OneHotEncoded 'Country' and other features:")

print(final_set)

from sklearn.preprocessing import StandardScaler
```

```
sc = StandardScaler()

sc.fit(final_set)

feat_standard_scaler = sc.transform(final_set)

print("Standardized features:")

print(feat_standard_scaler)

from sklearn.preprocessing import MinMaxScaler

mms = MinMaxScaler(feature_range=(0, 1))

mms.fit(final_set)

feat_minmax_scaler = mms.transform(final_set)

print("Normalized features:")

print(feat_minmax_scaler)
```

```
# Linear Regression

# 230701004

# ABHINAYA LAKSHMI.S

# 29.10.2024


import numpy as np

import pandas as pd

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

df

df.info()

df.dropna(inplace=True)

df.info()

df.describe()

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

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

from sklearn.model_selection import train_test_split

x_train,x_test,y_train,y_test=train_test_split(features,label,test_size=0.2,random_state=23)

from sklearn.linear_model import LinearRegression

model=LinearRegression()

model.fit(x_train,y_train)

model.score(x_train,y_train)

model.score(x_test,y_test)

model.coef_

model.intercept_

import pickle

pickle.dump(model,open('SalaryPred.model','wb'))

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

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)

print("Estimated Salary for {} years of experience is {}: " .format(yr_of_exp,Salary)
# Logistic Regression

# 230701004

#ABHINAYA LAKSHMI.S

# 05.11.2024

import numpy as np

import pandas as pd

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

df

df.head()

features=df.iloc[:,[2,3]].values

label=df.iloc[:,4].values

features

label

from sklearn.model_selection import train_test_split

from sklearn.linear_model import LogisticRegression

for i in range(1,401):

x_train,x_test,y_train,y_test=train_test_split(features,label,test_size=0.2,random_state=i)

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)

x_train,x_test,y_train,y_test=train_test_split(features,label,test_size=0.2,random_state=314)

finalModel=LogisticRegression()

finalModel.fit(x_train,y_train)

print(finalModel.score(x_train,y_train))

print(finalModel.score(x_test,y_test))

from sklearn.metrics import classification_report

print(classification_report(label,finalModel.predict(features)))
```