Spring 2024: CS5720

Neural Networks & Deep Learning - ICP-4

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Github Link: https://github.com/venkatavinayvarma/NeuralNetworks_ICP4.git

Video Link: https://drive.google.com/drive/folders/1B0X1eq38WGeVXGh2-kyPpdM1e71SFWM5?usp=sharing

1. Data Manipulation

a. Read the provided CSV file 'data.csv'.

b. https://drive.google.com/drive/folders/1h8C3mLsso-R-sIOLsvoYwPLzy2fJ4IOF?usp=sharing

c. Show the basic statistical description about the data.

d. Check if the data has null values. i. Replace the null values with the mean

e. Select at least two columns and aggregate the data using: min, max, count, mean.

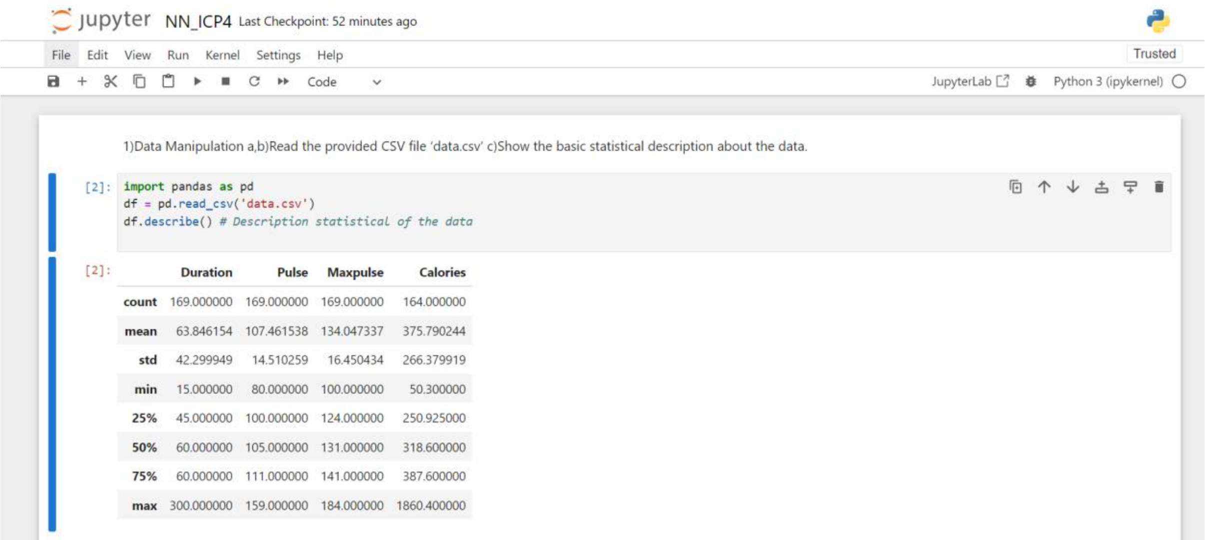
f. Filter the dataframe to select the rows with calories values between 500 and 1000.

g. Filter the dataframe to select the rows with calories values > 500 and pulse < 100.

h. Create a new "df_modified" dataframe that contains all the columns from df except for "Maxpulse". i. Delete the "Maxpulse" column from the main df dataframe

j. Convert the datatype of Calories column to int datatype.

k. Using pandas create a scatter plot for the two columns (Duration and Calories).


jupyter NN_ICP4 Last Checkpoint: 52 minutes ago
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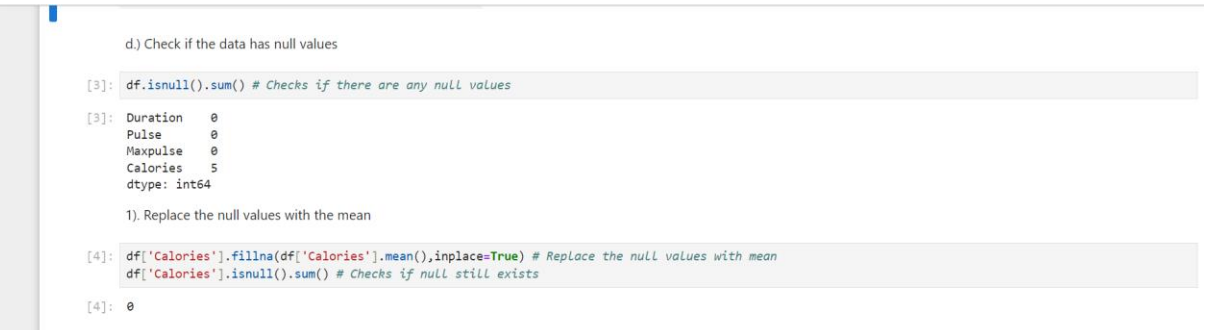
Trusted
Code
JupyterLab
Python 3 (ipykernel)

1)Data Manipulation a,b)Read the provided CSV file 'data.csv' c)Show the basic statistical description about the data.

```
[2]: import pandas as pd
     df = pd.read_csv('data.csv')
     df.describe() # Description statistical of the data
```

[2]:

	Duration	Pulse	Maxpulse	Calories
count	169.000000	169.000000	169.000000	164.000000
mean	63.846154	107.461538	134.047337	375.790244
std	42.299949	14.510259	16.450434	266.379919
min	15.000000	80.000000	100.000000	50.300000
25%	45.000000	100.000000	124.000000	250.925000
50%	60.000000	105.000000	131.000000	318.600000
75%	60.000000	111.000000	141.000000	387.600000
max	300.000000	159.000000	184.000000	1860.400000



d.) Check if the data has null values

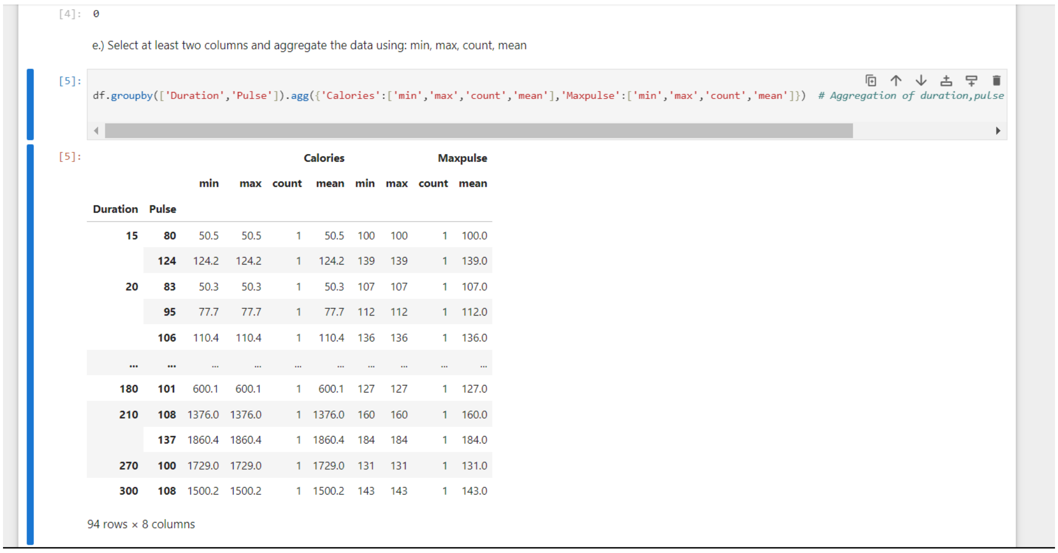
```
[3]: df.isnull().sum() # Checks if there are any null values
```

```
[3]: Duration    0
     Pulse       0
     Maxpulse    0
     Calories    5
     dtype: int64
```

1). Replace the null values with the mean

```
[4]: df['Calories'].fillna(df['Calories'].mean(),inplace=True) # Replace the null values with mean
     df['Calories'].isnull().sum() # Checks if null still exists
```

```
[4]: 0
```



```
[4]: 0
```

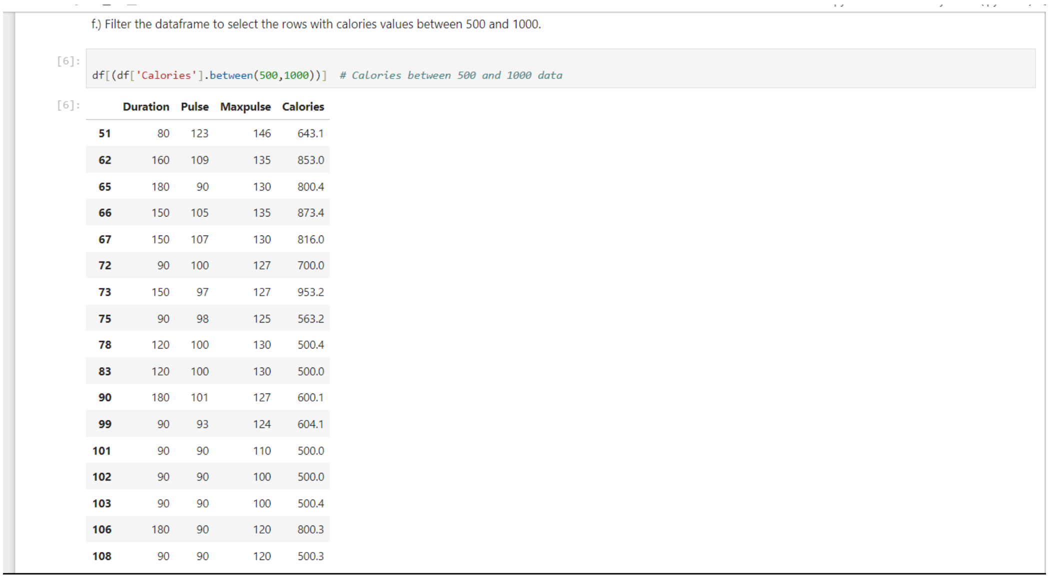
e.) Select at least two columns and aggregate the data using: min, max, count, mean

```
[5]: df.groupby(['Duration','Pulse']).agg({'Calories':['min','max','count','mean'],'Maxpulse':['min','max','count','mean']})  # Aggregation of duration,pulse
```

[5]:

		Calories				Maxpulse			
		min	max	count	mean	min	max	count	mean
Duration	Pulse								
15	80	50.5	50.5	1	50.5	100	100	1	100.0
	124	124.2	124.2	1	124.2	139	139	1	139.0
20	83	50.3	50.3	1	50.3	107	107	1	107.0
	95	77.7	77.7	1	77.7	112	112	1	112.0
	106	110.4	110.4	1	110.4	136	136	1	136.0
...	...	...	...	...	...	...	...	...	...
180	101	600.1	600.1	1	600.1	127	127	1	127.0
210	108	1376.0	1376.0	1	1376.0	160	160	1	160.0
	137	1860.4	1860.4	1	1860.4	184	184	1	184.0
270	100	1729.0	1729.0	1	1729.0	131	131	1	131.0
300	108	1500.2	1500.2	1	1500.2	143	143	1	143.0

94 rows × 8 columns



f.) Filter the dataframe to select the rows with calories values between 500 and 1000.

```
[6]: df[(df['Calories'].between(500,1000))]  # Calories between 500 and 1000 data
```

[6]:

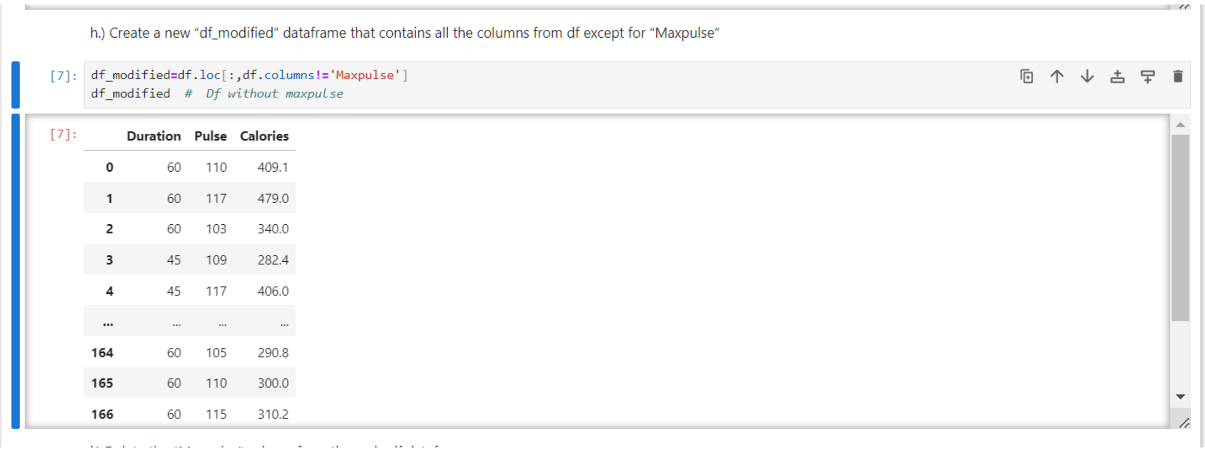
	Duration	Pulse	Maxpulse	Calories
51	80	123	146	643.1
62	160	109	135	853.0
65	180	90	130	800.4
66	150	105	135	873.4
67	150	107	130	816.0
72	90	100	127	700.0
73	150	97	127	953.2
75	90	98	125	563.2
78	120	100	130	500.4
83	120	100	130	500.0
90	180	101	127	600.1
99	90	93	124	604.1
101	90	90	110	500.0
102	90	90	100	500.0
103	90	90	100	500.4
106	180	90	120	800.3
108	90	90	120	500.3

g.) Filter the dataframe to select the rows with calories values > 500 and pulse < 100.

```
[6]:  df[(df['Calories'] > 500) & (df['Pulse'] <= 100)] # Calories >500 and pulse<100 data
```

[6]:

	Duration	Pulse	Maxpulse	Calories
65	180	90	130	800.4
70	150	97	129	1115.0
72	90	100	127	700.0
73	150	97	127	953.2
75	90	98	125	563.2
78	120	100	130	500.4
79	270	100	131	1729.0
87	120	100	157	1000.1
99	90	93	124	604.1
103	90	90	100	500.4
106	180	90	120	800.3
108	90	90	120	500.3

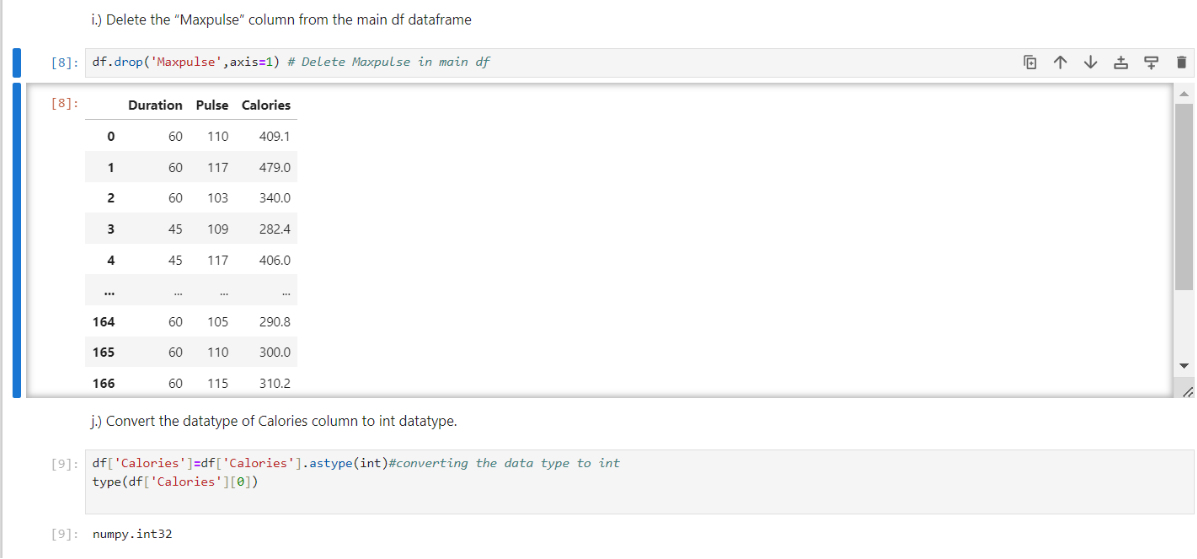


h.) Create a new "df_modified" dataframe that contains all the columns from df except for "Maxpulse"

```
[7]:  df_modified=df.loc[:,df.columns!='Maxpulse']
      df_modified  #  Df without maxpulse
```

[7]:

	Duration	Pulse	Calories
0	60	110	409.1
1	60	117	479.0
2	60	103	340.0
3	45	109	282.4
4	45	117	406.0
...	...	...	...
164	60	105	290.8
165	60	110	300.0
166	60	115	310.2



i.) Delete the "Maxpulse" column from the main df dataframe

```
[8]:  df.drop('Maxpulse',axis=1) # Delete Maxpulse in main df
```

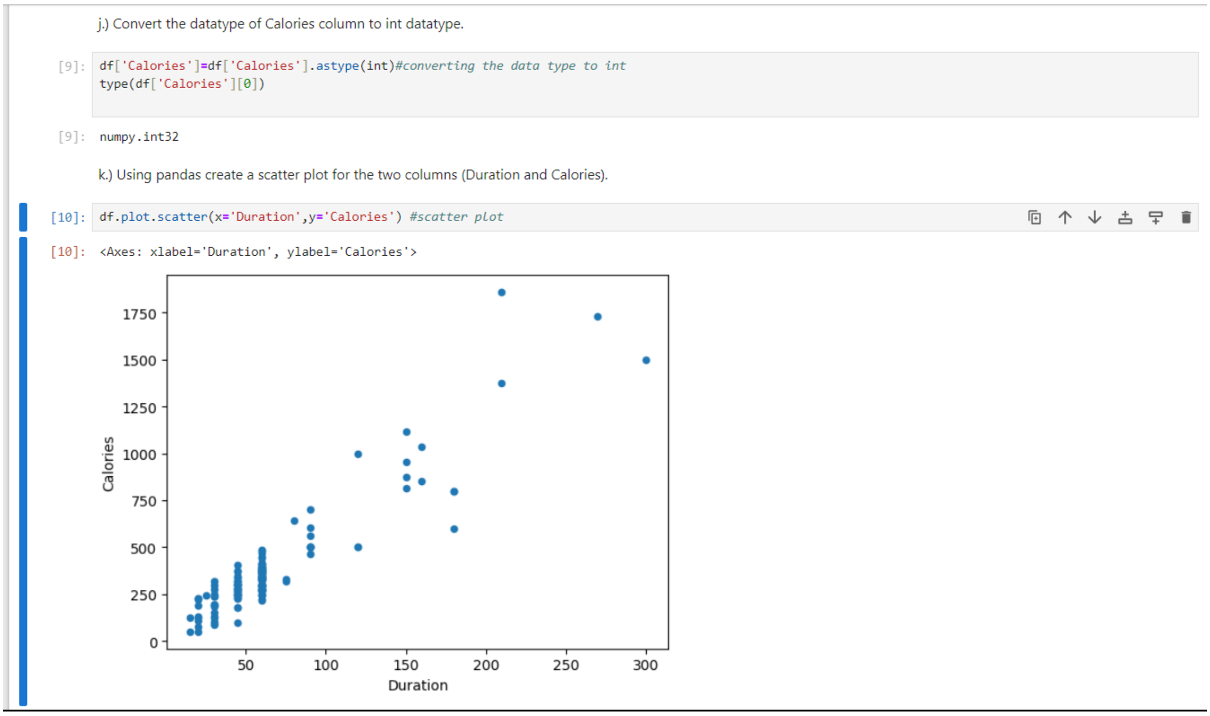
[8]:

	Duration	Pulse	Calories
0	60	110	409.1
1	60	117	479.0
2	60	103	340.0
3	45	109	282.4
4	45	117	406.0
...	...	...	...
164	60	105	290.8
165	60	110	300.0
166	60	115	310.2

j.) Convert the datatype of Calories column to int datatype.

```
[9]:  df['Calories']=df['Calories'].astype(int)#converting the data type to int
      type(df['Calories'][0])
```

```
[9]:  numpy.int32
```



j.) Convert the datatype of Calories column to int datatype.

```
[9]: df['Calories']=df['Calories'].astype(int)#converting the data type to int
     type(df['Calories'][0])
```

```
[9]: numpy.int32
```

k.) Using pandas create a scatter plot for the two columns (Duration and Calories).

```
[10]: df.plot.scatter(x='Duration',y='Calories') #scatter plot
```

```
[10]: <Axes: xlabel='Duration', ylabel='Calories'>
```

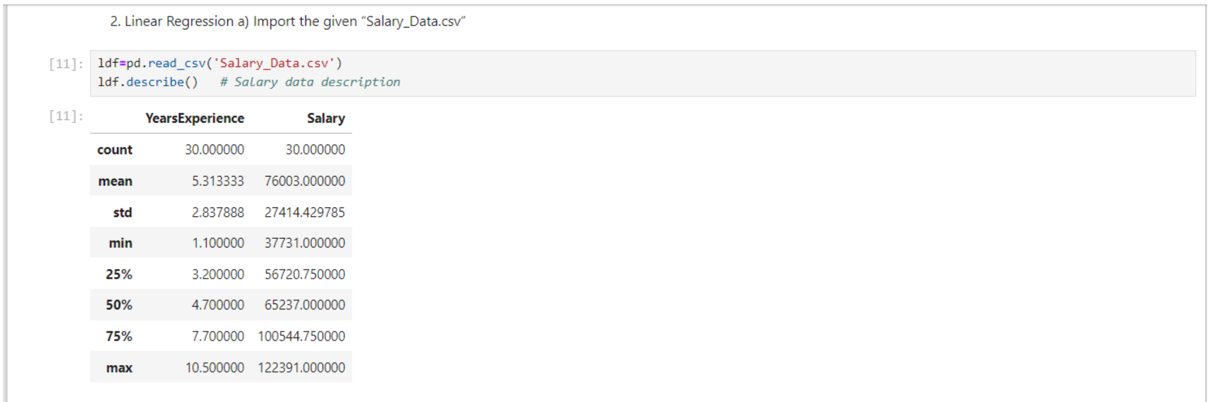
2. Linear Regression a) Import the given "Salary_Data.csv"

b) Split the data in train_test partitions, such that1/3 of the data is reserved as test subset.

c) Train and predict the model.

d) Calculate the mean_squared error

e) Visualize both train and test data using scatter plot.

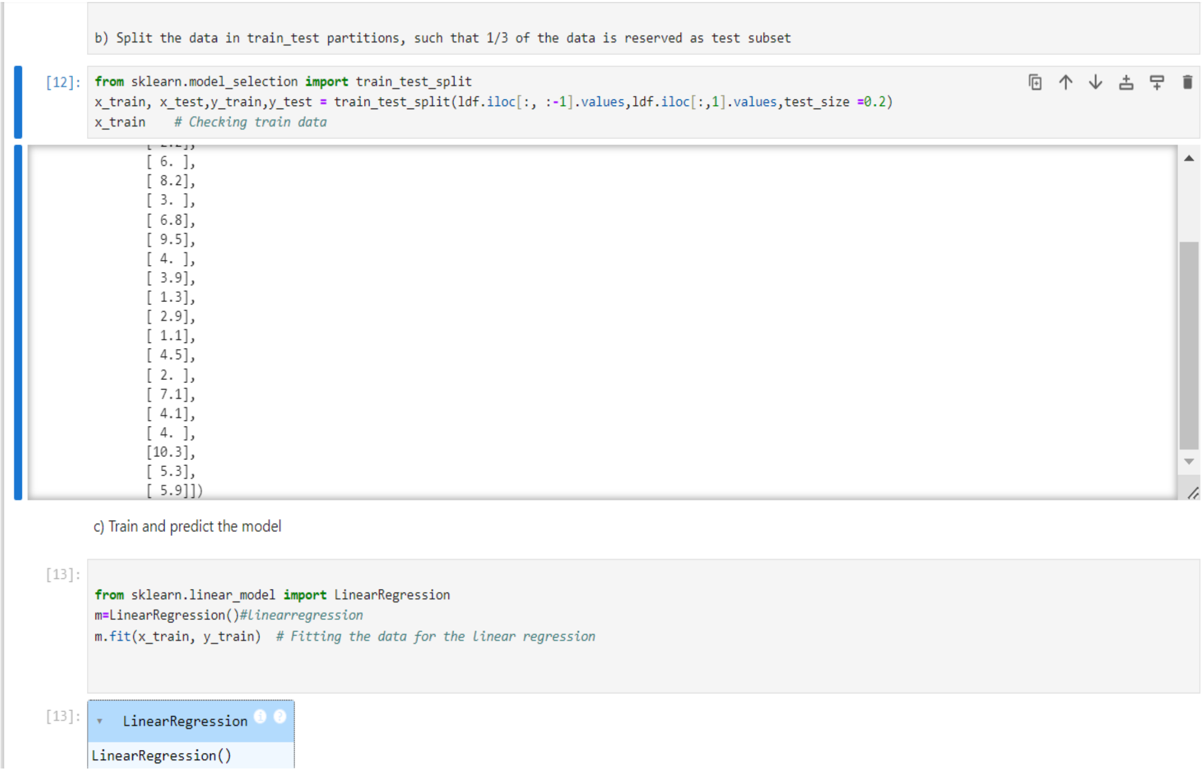


2. Linear Regression a) Import the given "Salary_Data.csv"

```
[11]: ldf=pd.read_csv('Salary_Data.csv')
      ldf.describe()    # Salary data description
```

[11]:

	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



b) Split the data in train_test partitions, such that 1/3 of the data is reserved as test subset

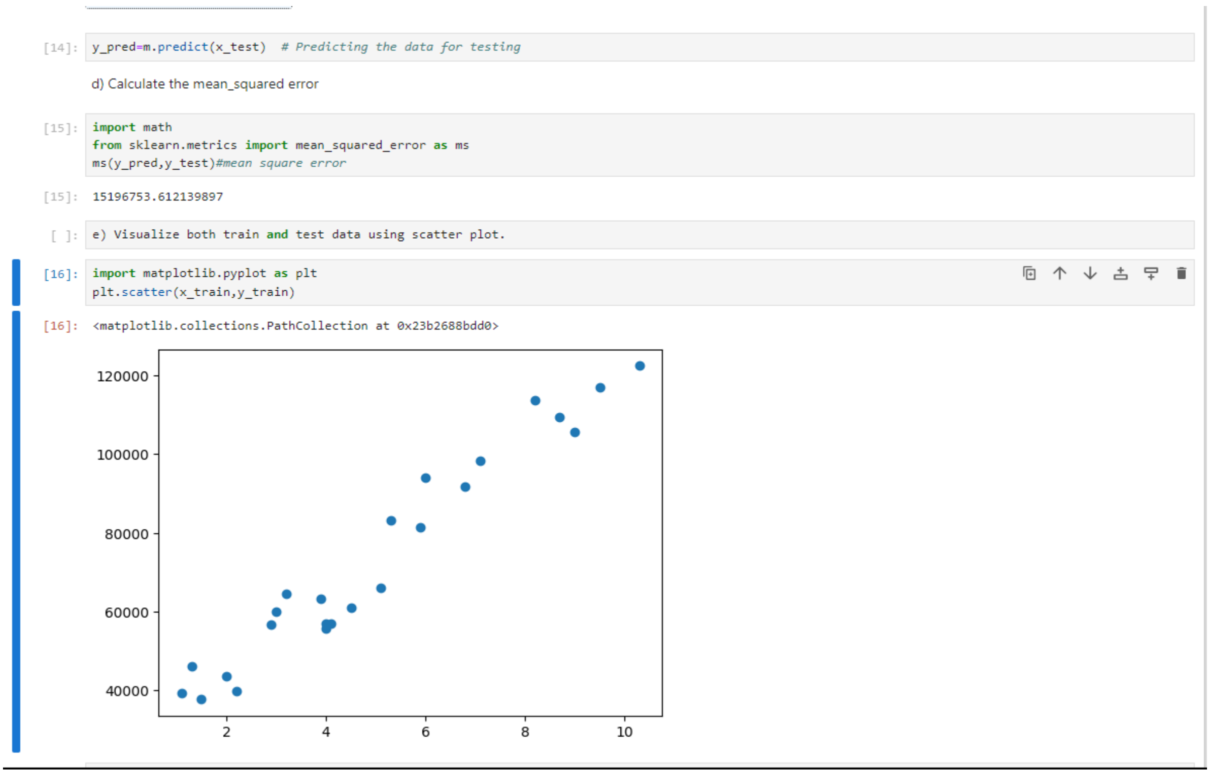
[12]:
```
from sklearn.model_selection import train_test_split
x_train, x_test,y_train,y_test = train_test_split(ldf.iloc[:, :-1].values,ldf.iloc[:,1].values,test_size =0.2)
x_train    # Checking train data
```

```
       [ 6. ],
       [ 8.2],
       [ 3. ],
       [ 6.8],
       [ 9.5],
       [ 4. ],
       [ 3.9],
       [ 1.3],
       [ 2.9],
       [ 1.1],
       [ 4.5],
       [ 2. ],
       [ 7.1],
       [ 4.1],
       [ 4. ],
       [10.3],
       [ 5.3],
       [ 5.9]])
```

c) Train and predict the model

[13]:
```
from sklearn.linear_model import LinearRegression
m=LinearRegression()#linearregression
m.fit(x_train, y_train)  # Fitting the data for the linear regression
```

[13]:
```
▾ LinearRegression
LinearRegression()
```



```
[14]: y_pred=m.predict(x_test)  # Predicting the data for testing
```

d) Calculate the mean_squared error

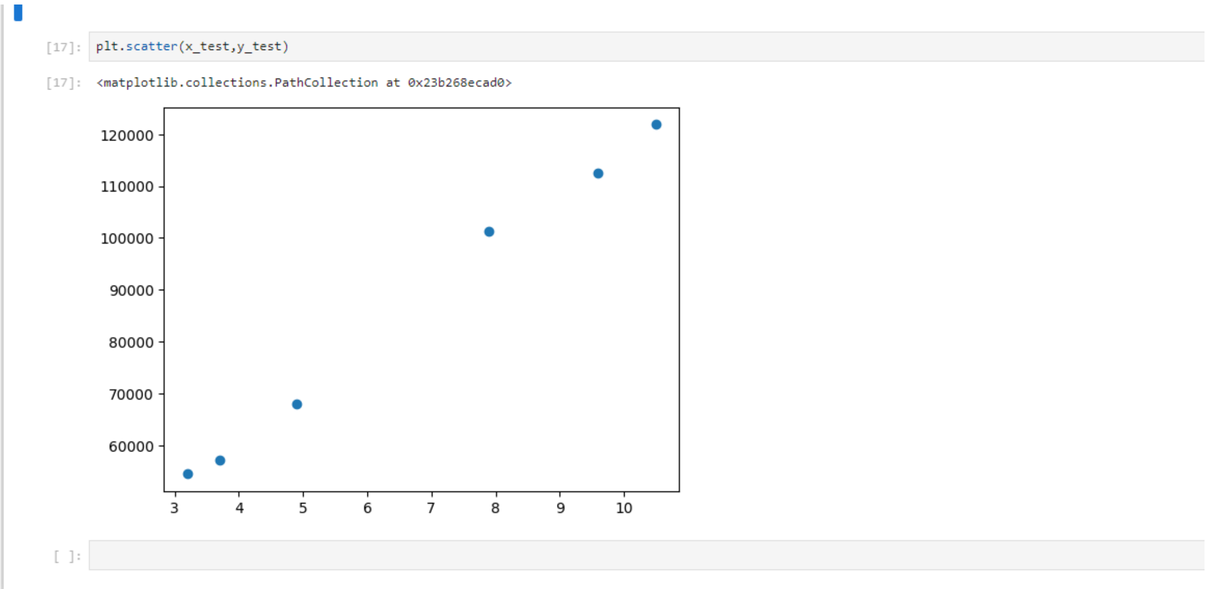
```
[15]: import math
      from sklearn.metrics import mean_squared_error as ms
      ms(y_pred,y_test)#mean square error

[15]: 15196753.612139897

[ ]: e) Visualize both train and test data using scatter plot.

[16]: import matplotlib.pyplot as plt
      plt.scatter(x_train,y_train)

[16]: <matplotlib.collections.PathCollection at 0x23b2688bdd0>
```



```
[17]: plt.scatter(x_test,y_test)

[17]: <matplotlib.collections.PathCollection at 0x23b268ecad0>
```

```
[ ]:
```