Fall 2023: CS5720 – NN &DL

In-Class Programming Assignment-4

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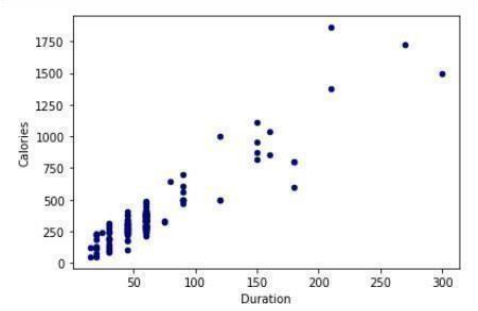
1. Data Manipulation

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 and1000.
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).

Example



Files

..
sample_data
Salary_Data.csv
data.csv

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```
[1] import numpy as np
    import pandas as pd
```

```
# 1(a) Import the given "Data.csv"
dst_Data = pd.read_csv('data.csv')
dst_Data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 169 entries, 0 to 168
Data columns (total 4 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   Duration  169 non-null    int64
 1   Pulse     169 non-null    int64
 2   Maxpulse  169 non-null    int64
 3   Calories  164 non-null    float64
dtypes: float64(1), int64(3)
memory usage: 5.4 KB
```

```
[5] #(c) Show the basic statistical description about the data.
    dst_Data.head()
```

	Duration	Pulse	Maxpulse	Calories
0	60	110	130	409.1
1	60	117	145	479.0
2	60	103	135	340.0
3	45	109	175	282.4

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import pandas as pd

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<class 'pandas.core.frame.DataFrame'>
RangeIndex: 169 entries, 0 to 168
Data columns (total 4 columns):
 #   Column   Non-Null Count Dtype
--- ------   -------------- -----
 0   Duration 169 non-null   int64
 1   Pulse   169 non-null   int64
 2   Maxpulse 169 non-null   int64
 3   Calories 164 non-null   float64
dtypes: float64(1), int64(3)
memory usage: 5.4 KB

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	Duration	Pulse	Maxpulse	Calories
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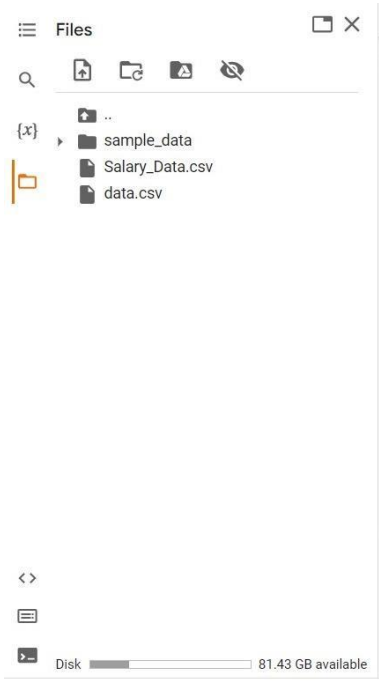

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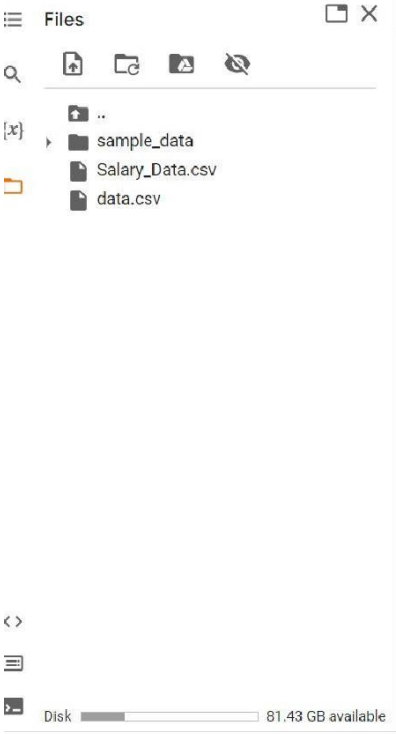
```
Calories    375.790244
dtype: float64
```

	Duration	Pulse	Maxpulse	Calories
0	60	110	130	409.100000
1	60	117	145	479.000000
2	60	103	135	340.000000
3	45	109	175	282.400000
4	45	117	148	406.000000
5	60	102	127	300.000000
6	60	110	136	374.000000
7	45	104	134	253.300000
8	30	109	133	195.100000
9	60	98	124	269.000000
10	60	103	147	329.300000
11	60	100	120	250.700000
12	60	106	128	345.300000
13	60	104	132	379.300000
14	60	98	123	275.000000
15	60	98	120	215.200000
16	60	100	120	300.000000
17	45	90	112	375.790244
18	60	103	123	323.000000
19	45	97	125	243.000000

```
#(e)Select at least two columns and aggregate the data using: min, max, count, mean.
res = dst_Data.agg({'Calories': ['mean', 'min','max', 'count'],'Pulse': ['mean', 'min', 'max', 'count
print(res)
```

	Calories	Pulse
mean	375.790244	107.461538
min	50.300000	80.000000
max	1860.400000	159.000000



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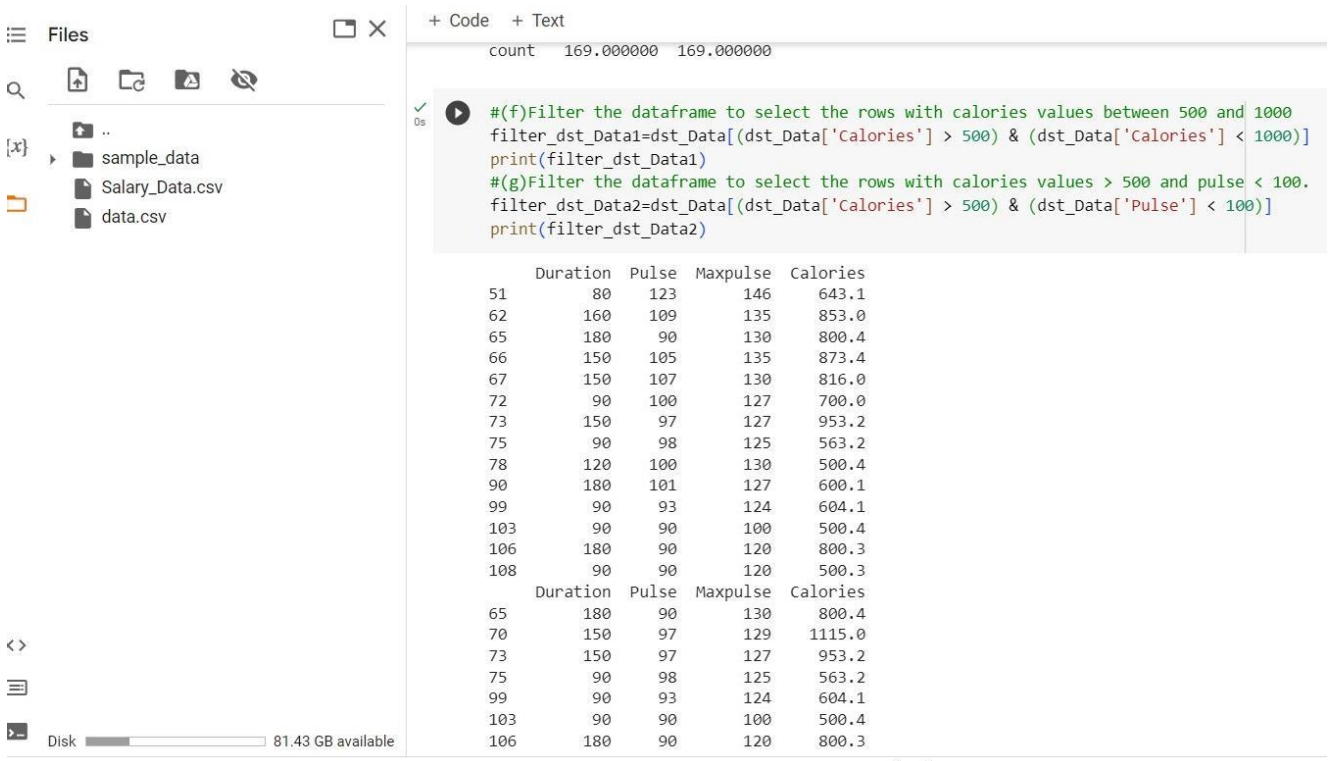
count	169.000000	169.000000	

```
#(f)Filter the dataframe to select the rows with calories values between 500 and 1000
filter_dst_Data1=dst_Data[(dst_Data['Calories'] > 500) & (dst_Data['Calories'] < 1000)]
print(filter_dst_Data1)
#(g)Filter the dataframe to select the rows with calories values > 500 and pulse < 100.
filter_dst_Data2=dst_Data[(dst_Data['Calories'] > 500) & (dst_Data['Pulse'] < 100)]
print(filter_dst_Data2)
```

	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
90	180	101	127	600.1
99	90	93	124	604.1
103	90	90	100	500.4
106	180	90	120	800.3
108	90	90	120	500.3

	Duration	Pulse	Maxpulse	Calories
65	180	90	130	800.4
70	150	97	129	1115.0
73	150	97	127	953.2
75	90	98	125	563.2
99	90	93	124	604.1
103	90	90	100	500.4
106	180	90	120	800.3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Disk
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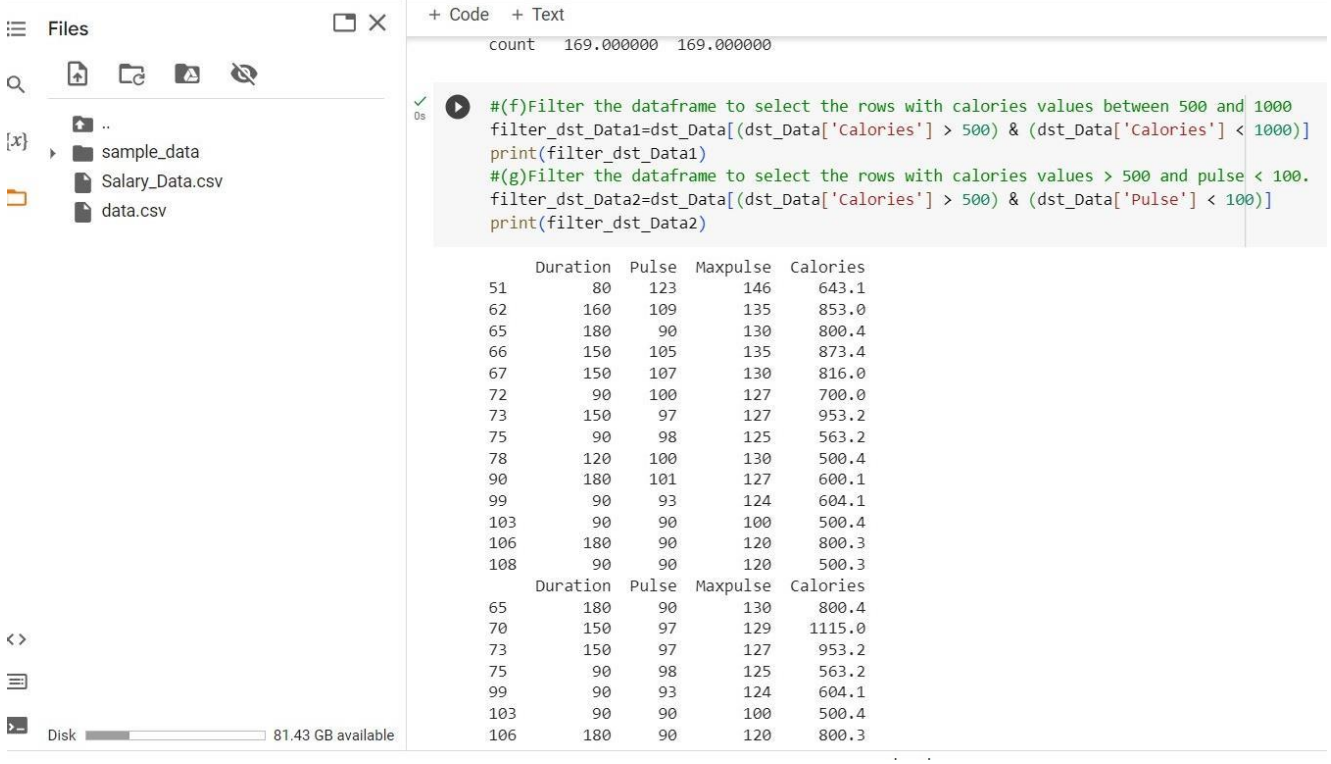
print(filter_dst_Data1)
#(g)Filter the dataframe to select the rows with calories values > 500 and pulse < 100.
filter_dst_Data2=dst_Data[(dst_Data['Calories'] > 500) & (dst_Data['Pulse'] < 100)]
print(filter_dst_Data2)
Duration Pulse Maxpulse Calories
51 80 123 146 643.1
62 160 109 135 853.0
65 180 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
90 180 101 127 600.1
99 90 93 124 604.1
103 90 90 100 500.4
106 180 90 120 800.3
108 90 90 120 500.3
Duration Pulse Maxpulse Calories
65 180 90 130 800.4
70 150 97 129 1115.0
73 150 97 127 953.2
75 90 98 125 563.2
99 90 93 124 604.1
103 90 90 100 500.4
106 180 90 120 800.3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99 90 93 124 604.1
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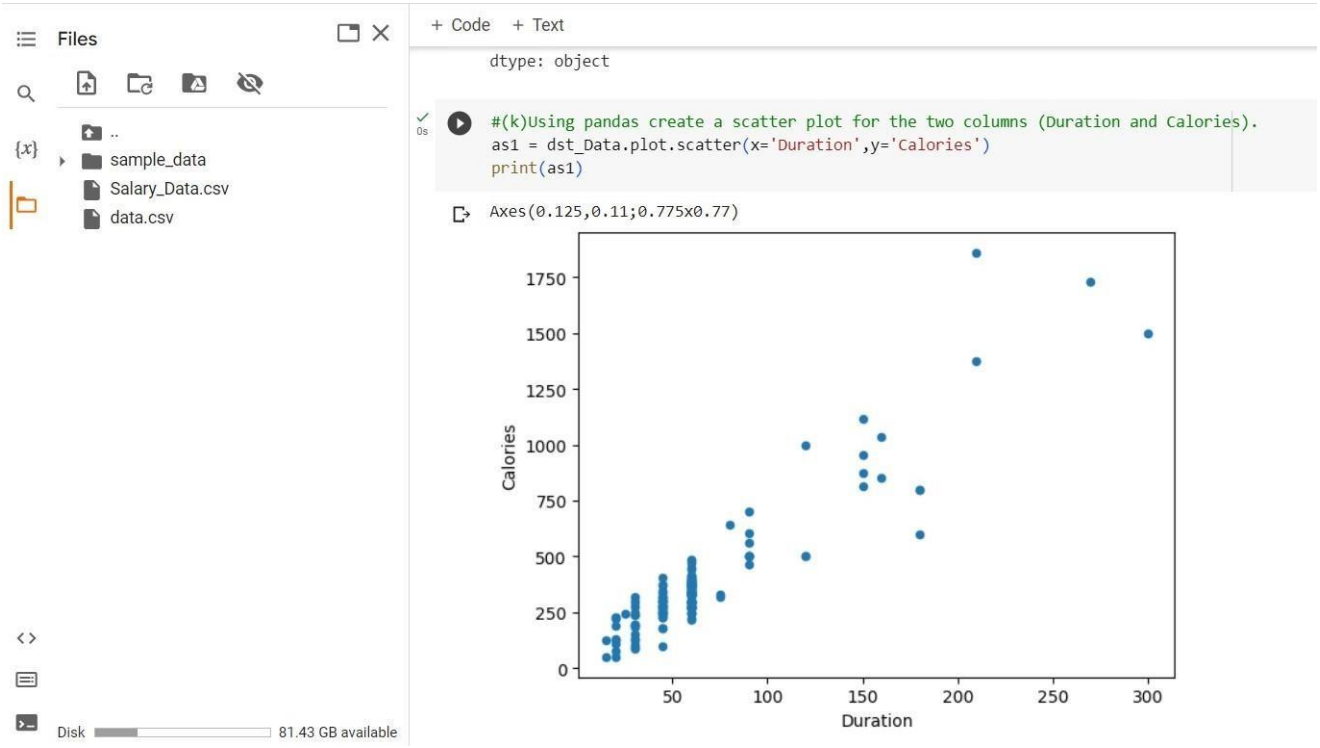
73 150 97 127 953.2
75 90 98 125 563.2
99 90 93 124 604.1
103 90 90 100 500.4
106 180 90 120 800.3



2. Linear Regression

a) Import the given “Salary_Data.csv”
b) Split the data in train_test partitions, such that 1/3 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.

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..
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```
# 2(a) Import the given "Salary_Data.csv"
dst_Sal = pd.read_csv('Salary_Data.csv')
dst_Sal.info()
dst_Sal.head()
```

```
<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     float64
dtypes: float64(2)
memory usage: 608.0 bytes
```

	YearsExperience	Salary
0	1.1	39343.0
1	1.3	46205.0
2	1.5	37731.0
3	2.0	43525.0
4	2.2	39891.0

```
[19] A = dst_Sal.iloc[:, :-1].values   #excluding last column i.e., years of experience column
     B = dst_Sal.iloc[:, 1].values     #only salary column
```

```
[20] # (b) Split the data in train_test partitions, such that 1/3 of the data is reserved as test subset
```

f)

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```
[20] # (b) Split the data in train_test partitions, such that 1/3 of the data is reserved as test subset.
from sklearn.model_selection import train_test_split
A_train, A_test, B_train, B_test = train_test_split(A, B, test_size=1/3, random_state=0)
```

```
[21] # (c) Train and predict the model.
from sklearn.linear_model import LinearRegression
reg = LinearRegression()
reg.fit(A_train, B_train)
B_Pred = reg.predict(A_test)
B_Pred
```

```
array([ 40835.10590871, 123079.39940819,  65134.55626083,  63265.36777221,
       115602.64545369, 108125.8914992 , 116537.23969801,  64199.96201652,
        76349.68719258, 100649.1375447 ])
```

```
# (d) Calculate the mean_squared error
S_error = (B_Pred - B_test) ** 2
Sum_Serror = np.sum(S_error)
mean_squared_error = Sum_Serror / B_test.size
mean_squared_error
```

```
21026037.329511296
```

```
# (e) Visualize both train and test data using scatter plot.
import matplotlib.pyplot as plt
# Training Data set
plt.scatter(A_train, B_train)
plt.plot(A_train, reg.predict(A_train), color='red')
plt.title('Training Set')
```

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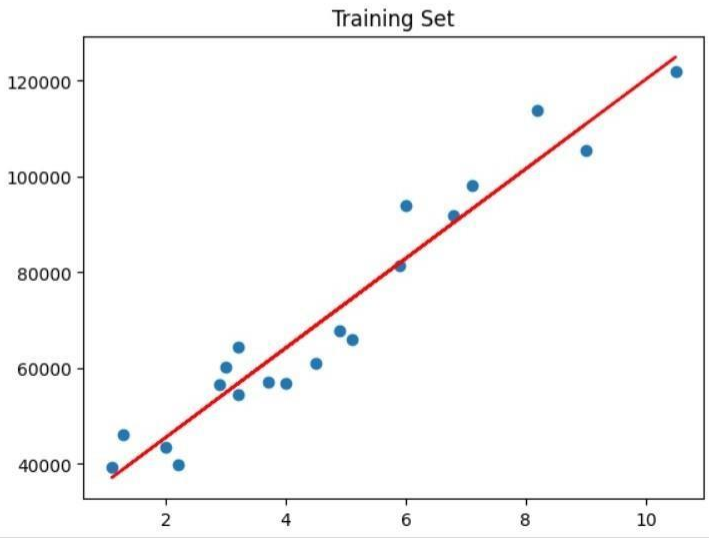
```
plt.show()

# Testing Data set
plt.scatter(A_test, B_test)
plt.plot(A_test, reg.predict(A_test), color='red')
plt.title('Testing Set')
plt.show()
```



Files

..
sample_data
Salary_Data.csv
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