

# Fall 2023: CS5720 – NN &DL

## In-Class Programming Assignment-4

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**Video link:**

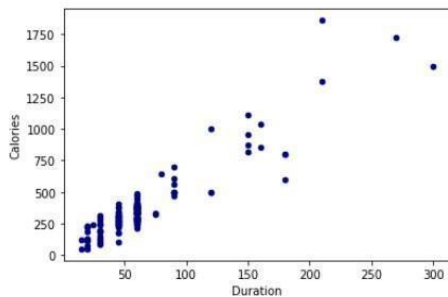
<https://drive.google.com/file/d/1vtwvP3D5EPCRqBB43ekU6o4MoYTX8va2/view?usp=sharing>

**Github link:** <https://github.com/rkr31032001/Neural-networks/blob/main/icp4.ipynb>

### 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).

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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Files

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Salary\_Data.csv

data.csv

Os

[8]

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

[9]

#(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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Files

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Os

#(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
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75	90	98	125	563.2
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103	90	90	100	500.4
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sample\_data

Salary\_Data.csv

data.csv

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count 169.000000 169.000000

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#(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
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106	180	90	120	800.3

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data.csv

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count 169.000000 169.000000

0s

#(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)]

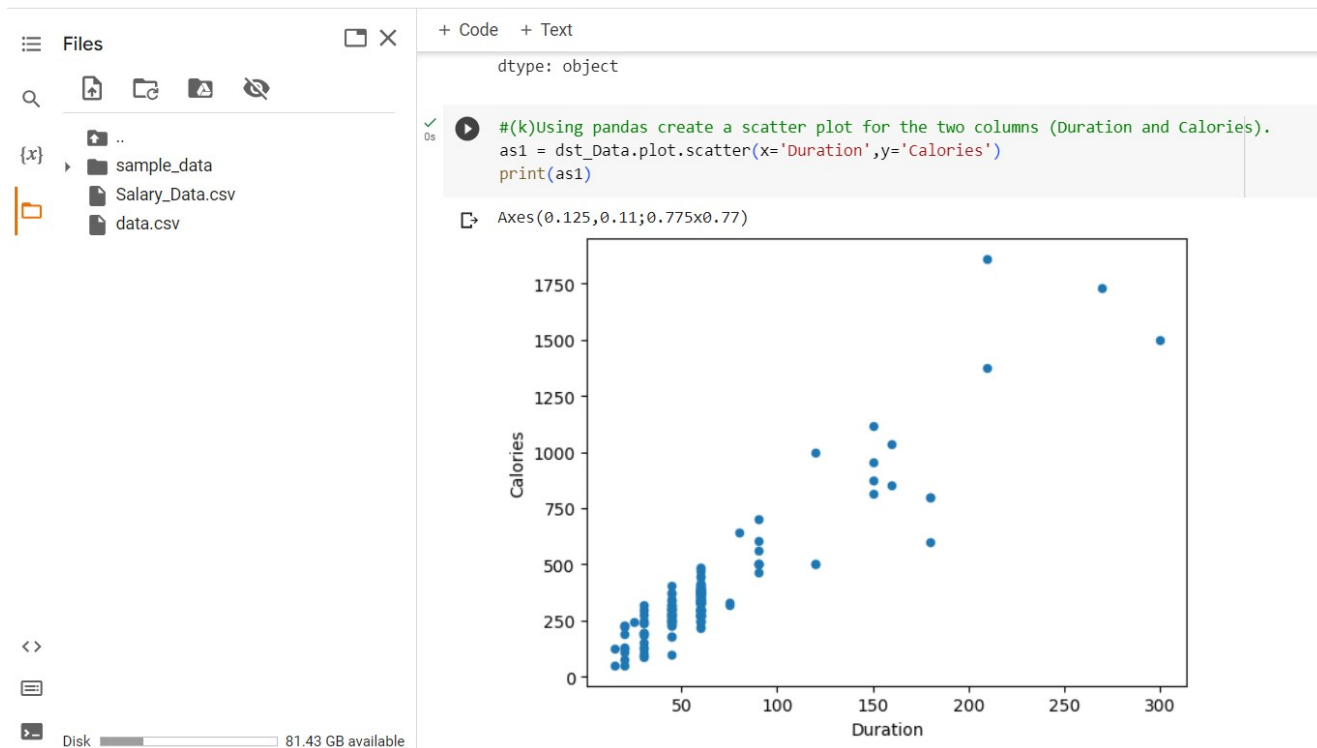
print(filter\_dst\_Data1)

#(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



## 2. Linear Regression

- Import the given “Salary\_Data.csv”
- Split the data in train\_test partitions, such that 1/3 of the data is reserved as test subset.
- Train and predict the model.
- Calculate the mean\_squared error
- Visualize both train and test data using scatter plot.

Files

sample\_data  
Salary\_Data.csv  
data.csv

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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

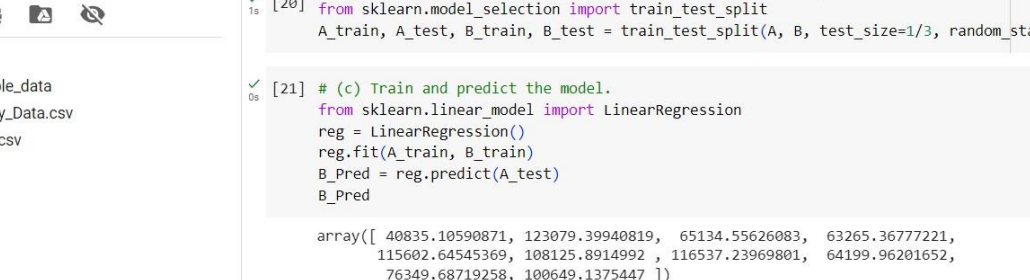
	YearsExperience	Salary
0	1.1	39343.0
1	1.3	46205.0
2	1.5	37731.0
3	2.0	43525.0
4	2.2	39891.0

```
[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
```

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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
```

f)



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

# (c) Train and predict the model.
[21] 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
[22] 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.
[23] 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')
```

Files

sample\_data  
Salary\_Data.csv  
data.csv

```
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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()
```

Training Set

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Files



- ..
- sample\_data
- Salary\_Data.csv
- data.csv



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Testing Set

