Spring 2024: CS5720

NEURAL NETWORK AND DEEP LEARNING

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Git Hub Link:https://github.com/Afrozmohammad19/Assignment4

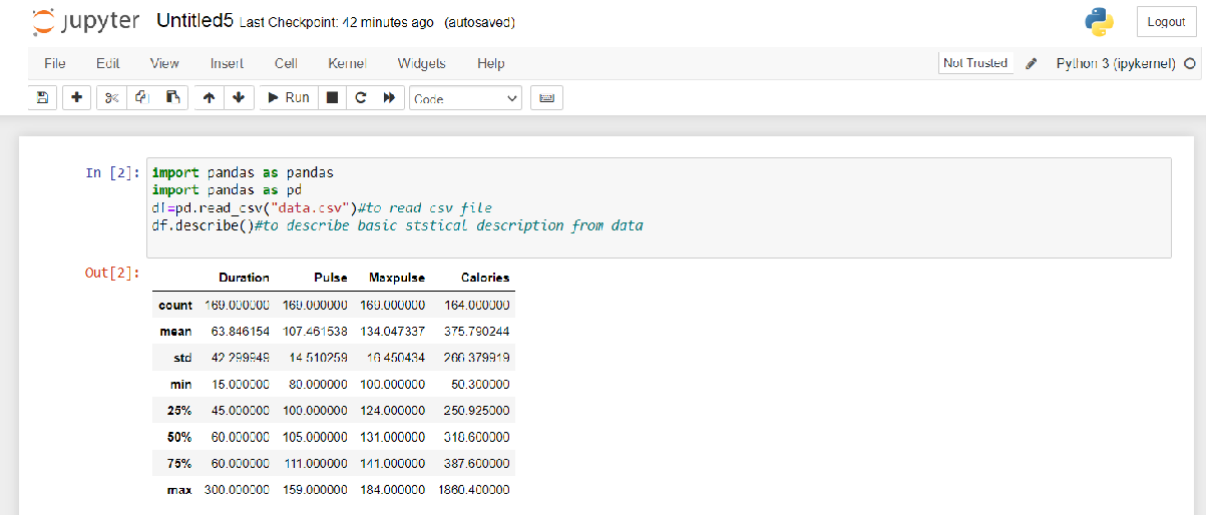
Video Link:
https://drive.google.com/file/d/1hLAM6PGa_l4a2wT9u77PaW0jMC5Om3Yo/view?usp=sharing

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.

Output:



	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.

i. Replace the null values with the mean

```
In [4]: df.fillna(df.mean(),inplace=True)#replace null values with mean value
        print(df)#print after replacing with mean
```

	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
4	45	117	148	406.0
..	...	...	...	...
164	60	105	140	290.8
165	60	110	145	300.0
166	60	115	145	310.2
167	75	120	150	320.4
168	75	125	150	330.4

[169 rows x 4 columns]

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

```
In [5]: df=df[["Duration","Pulse","Maxpulse","Calories"]]
        aggregate={"Duration":["max","min","count","mean"],
                   "Pulse":["max","min","count","mean"],
                   "Maxpulse":["max","min","count","mean"],
                   "Calories":["max","min","count","mean"]}# to find max,min,count,mean of all the columns
        aggregate_df=df.agg(aggregate)#function to aggregate
        print(aggregate_df)#print the aggregate
```

	Duration	Pulse	Maxpulse	Calories
max	300.000000	159.000000	184.000000	1860.400000
min	15.000000	80.000000	100.000000	50.300000
count	169.000000	169.000000	169.000000	169.000000
mean	63.846154	107.461538	134.047337	375.790244

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

```
In [6]: calories_in_range=(df["Calories"]>=500) & (df["Calories"]<=1000)#defining range of values to be displayed
        filters_result=df[calories_in_range]#adding the defined range to new variable
        print(filters_result)#printing the new result
```

	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.

```
In [7]: calories_pulse_filter=(df["Calories"]>500)&(df["Pulse"]<100)#defining range
        filters_result=df[calories_pulse_filter]#adding the result to new variable
        print(filters_result)#printing the result
```

	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
108	90	90	120	500.3

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

```
In [8]: df_modified=df.drop(columns=["Maxpulse"])#displaying every column except Maxpulse
        print(df_modified)#printing the rersult

     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
167        75    120     320.4
168        75    125     330.4

[169 rows x 3 columns]
```

i. Delete the “Maxpulse” column from the main df dataframe

```
In [9]: del df["Maxpulse"]#command to delete entire row
        print(df)

     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
167        75    120     320.4
168        75    125     330.4

[169 rows x 3 columns]
```

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

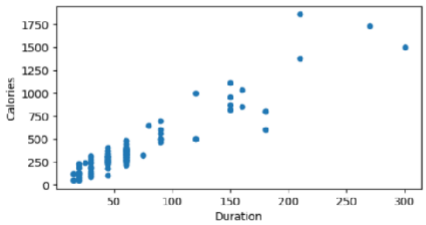
```
In [10]: df['Calories'] = df['Calories'].fillna(0).astype(int)#converting to int data type
         print(df)

     Duration  Pulse  Calories
0          60    110       409
1          60    117       479
2          60    103       340
3          45    109       282
4          45    117       406
..        ...    ...       ...
164        60    105       290
165        60    110       300
166        60    115       310
167        75    120       320
168        75    125       330

[169 rows x 3 columns]
```

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

```
In [11]: import matplotlib.pyplot as plt
         df.plot(kind='scatter', x='Duration', y='Calories', figsize=(6,3))
         plt.show()
```



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.

Output:

jupyter Untitled5 Last Checkpoint: an hour ago (autosaved)

Duration

In [13]:
```
import pandas as pd
from sklearn.metrics import mean_squared_error
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split


salariesData = pd.read_csv('Salary_Data (2).csv') #importing data from the CSV file
df.describe()
```

Out[13]:

	Duration	Pulse	Calories
count	169.000000	169.000000	169.000000
mean	63.846154	107.461538	375.544379
std	42.299949	14.510259	262.411685
min	15.000000	80.000000	50.000000
25%	45.000000	100.000000	253.000000
50%	60.000000	105.000000	321.000000
75%	60.000000	111.000000	384.000000
max	300.000000	159.000000	1860.000000

In [14]:
```
#splitting the data in to training and testing
X = salariesData.iloc[:, :-1].values
Y= salariesData.iloc[:, 1].values
```

In [14]:
```
#splitting the data in to training and testing
X = salariesData.iloc[:, :-1].values
Y= salariesData.iloc[:, 1].values
```

In [15]:
```
#splitting 1/3 of the data
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size = 1/3, random_state = 0)
```

In [16]:
```
# Fitting Simple Linear Regression to the training set
reg = LinearRegression()
reg.fit(X_train, Y_train)
```

Out[16]:
```
▾ LinearRegression
LinearRegression()
```

In [17]:
```
# Predicting the Test set result
pred = reg.predict(X_test)
```

In [18]:
```
# Calculating the Mean squared error
mse = mean_squared_error(Y_test, pred)
```

In [19]:
```
#Visualising the Training set results and Test set results
plt.scatter(X_train, Y_train, color = 'blue')
plt.scatter(X_test, Y_test, color = 'red')
plt.title('Salary Data')
plt.xlabel('Experience (Years)')
plt.ylabel('Salary')
plt.show()
```