dm-sem6

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C.K.Pithawala College of Engineering and Technology, Surat Subject: Data Mining(3160714) Practical file Computer Engineering Department Submitted To: Dr. Ami Tusharkant Choksi

Submitted By: Name: Vanshi Patel - 200090107010 Dataset: Bigmac Price

[ ]:
```
import pandas as pd
import numpy as np
import math
import scipy
from scipy.stats import chi2
```

[ ]:
```
from google.colab import files
uploaded = files.upload()
```

```
<IPython.core.display.HTML object>
```

```
Saving bigmacPrice.csv.csv to bigmacPrice.csv.csv
```

[ ]:
```
from google.colab import files
uploaded = files.upload()
```

```
<IPython.core.display.HTML object>
```

```
Saving swiggy.csv to swiggy.csv
```

[ ]:
```
from google.colab import files
uploaded = files.upload()
```

```
<IPython.core.display.HTML object>
```

```
Saving profile.csv to profile.csv
```

[ ]:
```
from google.colab import files
uploaded = files.upload()
```

```
<IPython.core.display.HTML object>
```

```
Saving BigmacPrice.csv to BigmacPrice.csv
```

[ ]:
```
from google.colab import files
uploaded = files.upload()
```

```
<IPython.core.display.HTML object>

Saving Ubereat_US_Merchant.csv to Ubereat_US_Merchant.csv
```

[ ]:

```
from google.colab import files
uploaded = files.upload()
```

```
<IPython.core.display.HTML object>

Saving zomato_Hyderabad.csv to zomato_Hyderabad (1).csv
```

#CO2160714.1 Assignment:

1.Analyze 5 data sets from the UCI repository. Print the following details about each data set number of records/instances (b) number of incomplete records (c) number of attributes

[ ]:

```
dataList = ['swiggy.csv','profile.csv','BigmacPrice.csv','Ubereat_US_Merchant.
 ↪csv','zomato_Hyderabad.csv']

for i in range(5):
  current_data=pd.read_csv(dataList[i])
  df_current_data=pd.DataFrame(current_data)
  print(df_current_data.head())
  print("Number of records/instances = " + str(df_current_data.count()))
  print("Number of incomplete records = " + str(df_current_data.isna().sum().
 ↪sum()))
  print("Number of attributes = " + str(df_current_data.shape[1]))
```

```
       id               name    city rating     rating_count   cost  \
0  567335      AB FOODS POINT  Abohar     --  Too Few Ratings    200
1  531342  Janta Sweet House  Abohar    4.4      50+ ratings    200
2  158203  theka coffee desi  Abohar    3.8     100+ ratings    100
3  187912          Singh Hut  Abohar    3.7      20+ ratings    250
4  543530      GRILL MASTERS  Abohar     --  Too Few Ratings    250

                      cuisine          lic_no  \
0            Beverages,Pizzas  22122652000138
1               Sweets,Bakery  12117201000112
2                   Beverages  22121652000190
3            Fast Food,Indian  22119652000167
4  Italian-American,Fast Food  12122201000053

                                                link  \
0  https://www.swiggy.com/restaurants/ab-foods-po…
1  https://www.swiggy.com/restaurants/janta-sweet…
2  https://www.swiggy.com/restaurants/theka-coffe…
3  https://www.swiggy.com/restaurants/singh-hut-n…
4  https://www.swiggy.com/restaurants/grill-maste…
```

```
                                             address              menu
0  AB FOODS POINT, NEAR RISHI NARANG DENTAL CLINI…  Menu/567335.json
1  Janta Sweet House, Bazar No.9, Circullar Road,…  Menu/531342.json
2         theka coffee desi, sahtiya sadan road city  Menu/158203.json
3    Singh Hut, CIRCULAR ROAD NEAR NEHRU PARK ABOHAR  Menu/187912.json
4  GRILL MASTERS, ADA Heights, Abohar - Hanumanga…  Menu/543530.json
Number of records/instances = id              148541
name            148455
city            148541
rating          148455
rating_count    148455
cost            148410
cuisine         148442
lic_no          148312
link            148541
address         148455
menu            148541
dtype: int64
Number of incomplete records = 803
Number of attributes = 11
   Unnamed: 0 gender  age                                id  became_member_on  \
0           0    NaN  118  68be06ca386d4c31939f3a4f0e3dd783          20170212
1           1      F   55  0610b486422d4921ae7d2bf64640c50b          20170715
2           2    NaN  118  38fe809add3b4fcf9315a9694bb96ff5          20180712
3           3      F   75  78afa995795e4d85b5d9ceeca43f5fef          20170509
4           4    NaN  118  a03223e636434f42ac4c3df47e8bac43          20170804

     income
0       NaN
1  112000.0
2       NaN
3  100000.0
4       NaN
Number of records/instances = Unnamed: 0          17000
gender              14825
age                 17000
id                  17000
became_member_on    17000
income              14825
dtype: int64
Number of incomplete records = 4350
Number of attributes = 6
         date currency_code       name  local_price  dollar_ex  dollar_price
0  2000-04-01           ARS  Argentina         2.50          1          2.50
1  2000-04-01           AUD  Australia         2.59          1          2.59
2  2000-04-01           BRL     Brazil         2.95          1          2.95
3  2000-04-01           GBP    Britain         1.90          1          1.90
4  2000-04-01           CAD     Canada         2.85          1          2.85
```

```
Number of records/instances = date             1946
currency_code    1946
name             1946
local_price      1946
dollar_ex        1946
dollar_price     1946
dtype: int64
Number of incomplete records = 0
Number of attributes = 6
   index            city state zipcode  \
0      0  Alexander City    AL   35010
1      1     Albertville    AL   35951
2      2  Alexander City    AL   35010
3      3     Albertville    AL   35950
4      4  Alexander City    AL   35010

                                          address  \
0  4097 U S Highway 280, Alexander City, AL 35010
1       7300 Hwy 431 North, Albertville, AL 35951
2   4097 Us Highway 280, Alexander City, AL 35010
3          7959 Us Hwy 431, Albertville, AL 35950
4      977 Jefferson St, Alexander City, AL 35010

                                 loc_name  \
0  The Saucy Hen (4097 U. S. HIGHWAY 280)
1        Burger King (7300 Hwy 431 North)
2    MrBeast Burger (4097 US Highway 280)
3         Taco Bell (7959 Us Highway 431)
4                             The Station

                             loc_number  \
0  0623b7ac-598d-5016-bdd2-febb44d79b12
1  62a60773-5644-4d73-b969-a4922ce70fa6
2  308b1654-60f1-51d4-bfe2-ed7c849442ac
3  ef86513f-3973-4315-b938-bb6f230c5c58
4  9507eb1b-5afc-4ee1-a566-526d9e2ba2d0

                                                 url           promotion  \
0  https://www.ubereats.com/store/the-saucy-hen-4…                 NaN
1  https://www.ubereats.com/store/burger-king-730…                 NaN
2  https://www.ubereats.com/store/mrbeast-burger-…                 NaN
3  https://www.ubereats.com/store/taco-bell-7959-…  Spend $15, Save $5
4  https://www.ubereats.com/store/the-station/950…                 NaN

    latitude  …  review_count  review_rating price_bucket  \
0  32.923880  …           NaN            NaN           $$
1  34.277260  …           NaN            NaN            $
2  32.923880  …           NaN            NaN           $$
```

```
3  34.280000  …           NaN            NaN            $
4  32.956127  …           NaN            NaN            $

                                             img1  \
0  https://tb-static.uber.com/prod/image-proc/pro…
1  https://d1ralsognjng37.cloudfront.net/028932d2…
2  https://d1ralsognjng37.cloudfront.net/a22dc334…
3  https://d1ralsognjng37.cloudfront.net/1c1b3198…
4  https://d1ralsognjng37.cloudfront.net/3b0a4d53…

                                             img2  \
0  https://tb-static.uber.com/prod/image-proc/pro…
1  https://d1ralsognjng37.cloudfront.net/86583cc1…
2  https://d1ralsognjng37.cloudfront.net/3f86d609…
3  https://d1ralsognjng37.cloudfront.net/c8f6f1ea…
4  https://d1ralsognjng37.cloudfront.net/bb83adfa…

                                             img3  \
0  https://tb-static.uber.com/prod/image-proc/pro…
1  https://d1ralsognjng37.cloudfront.net/0601a57e…
2  https://d1ralsognjng37.cloudfront.net/e0829c89…
3  https://d1ralsognjng37.cloudfront.net/e669e864…
4  https://d1ralsognjng37.cloudfront.net/2156d6be…

                                             img4  \
0  https://tb-static.uber.com/prod/image-proc/pro…
1  https://d1ralsognjng37.cloudfront.net/b745dbc7…
2  https://d1ralsognjng37.cloudfront.net/0e41e2d9…
3  https://d1ralsognjng37.cloudfront.net/e4053d9a…
4  https://d1ralsognjng37.cloudfront.net/aa8f2ad2…

                                             img5           scan_date TID
0  https://tb-static.uber.com/prod/image-proc/pro…  2022-11-09 18:03:43   1
1  https://d1ralsognjng37.cloudfront.net/33efde32…  2022-11-09 18:03:43   2
2  https://d1ralsognjng37.cloudfront.net/6284a890…  2022-11-09 18:03:43   3
3  https://d1ralsognjng37.cloudfront.net/30fe7bae…  2022-11-09 18:03:43   4
4  https://d1ralsognjng37.cloudfront.net/8a90ff8a…  2022-11-09 18:03:43   5

[5 rows x 25 columns]
Number of records/instances = index             1000
city                999
state              1000
zipcode             997
address            1000
loc_name           1000
loc_number         1000
url                1000
promotion           110
```

```
latitude              1000
longitude             1000
is_open               1000
closed_message         986
delivery_fee             3
delivery_time           14
review_count           374
review_rating          418
price_bucket           856
img1                   953
img2                   953
img3                   953
img4                   953
img5                   953
scan_date             1000
TID                   1000
dtype: int64
Number of incomplete records = 4478
Number of attributes = 25
                                               links                names  \
0  https://www.zomato.com/hyderabad/sahara-bakers…        Sahara Bakers
1   https://www.zomato.com/hyderabad/kfc-abids/order                  KFC
2  https://www.zomato.com/hyderabad/subbaiah-gari…  Subbaiah Gari Hotel
3  https://www.zomato.com/hyderabad/paradise-biry…     Paradise Biryani
4  https://www.zomato.com/hyderabad/pista-house-b…   Pista House Bakery

  ratings                                            cuisine  price
0     3.7            Chinese, Bakery, Sichuan, Pizza, Burger    100
1     3.9    Burger, Fast Food, Biryani, Desserts, Beverages    100
2     4.1                       South Indian, Andhra, Mithai    100
3     3.9                Biryani, Kebab, Desserts, Beverages    100
4     4.3  Fast Food, Sandwich, Pizza, Burger, Wraps, Rol…    100
Number of records/instances = links      657
names      657
ratings    657
cuisine    657
price      657
dtype: int64
Number of incomplete records = 0
Number of attributes = 5
```

##Dataset 1: Swiggy

```
[ ]: print("total number of rcords:",(data_swiggy.shape[0]))
     print("total number of incomplete records:",pd.isnull(data_swiggy).sum())
     print("total number of attributes:",(data_swiggy.shape[1]))

     #OUTPUT
```

```
total number of rcords: 148541
total number of incomplete records: id                 0
name              86
city               0
rating            86
rating_count      86
cost             131
cuisine           99
lic_no           229
link               0
address           86
menu               0
dtype: int64
total number of attributes: 11
```

##Dataset 2: Zomato

[ ]:

```
print("total number of rcords:",(data_zomato.shape[0]))
print("total number of incomplete records:",pd.isnull(data_zomato).sum())
print("total number of attributes:",(data_zomato.shape[1]))

#OUTPUT
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
<ipython-input-5-fdfaa3485e81> in <cell line: 1>()
----> 1 print("total number of rcords:",(data_zomato.shape[0]))
      2 print("total number of incomplete records:",pd.isnull(data_zomato).sum( )
      3 print("total number of attributes:",(data_zomato.shape[1]))
      4 
      5 #OUTPUT

NameError: name 'data_zomato' is not defined
```

##Dataset 3: Uber

[ ]:

```
print("total number of rcords:",(data_Ubereat.shape[0]))
print("total number of incomplete records:",pd.isnull(data_Ubereat).sum())
print("total number of attributes:",(data_Ubereat.shape[1]))

#OUTPUT
```

```
total number of rcords: 1000
total number of incomplete records: index                0
city                 1
state                0
zipcode              3
address              0
```

```
loc_name            0
loc_number          0
url                 0
promotion         890
latitude            0
longitude           0
is_open             0
closed_message     14
delivery_fee      997
delivery_time     986
review_count      626
review_rating     582
price_bucket      144
img1               47
img2               47
img3               47
img4               47
img5               47
scan_date           0
TID                 0
dtype: int64
total number of attributes: 25
```

##Dataset 4: McD

[ ]:

```
print("total number of rcords:",(data_BigmacPrice.shape[0]))
print("total number of incomplete records:",pd.isnull(data_BigmacPrice).sum())
print("total number of attributes:",(data_BigmacPrice.shape[1]))

#OUTPUT
```

```
total number of rcords: 1946
total number of incomplete records: date             0
currency_code    0
name             0
local_price      0
dollar_ex        0
dollar_price     0
dtype: int64
total number of attributes: 6
```

##Dataset 5: Profiles

[ ]:

```
print("total number of rcords:",(data_profile.shape[0]))
print("total number of incomplete records:",pd.isnull(data_profile).sum())
print("total number of attributes:",(data_profile.shape[1]))

#OUTPUT
```

```
total number of rcords: 17000
total number of incomplete records: Unnamed: 0              0
gender              2175
age                    0
id                     0
became_member_on       0
income              2175
dtype: int64
total number of attributes: 6
```

##2.Assignment:

2. Write a program to implement data cleaning(incomplete, noisy, inconsistent, redundant) on your data set. Implement each technique.

[A] Binning with means and/or mode, boundary

[ ]:
```
a=[0]*12
for i in range(12):
  b=pd.read_csv('zomato_Hyderabad.csv')
  a[i]=b.ratings[i]
```

[ ]:
```
#printing the data
data=a
print(data)

#OUTPUT
```

```
['3.7', '3.9', '4.1', '3.9', '4.3', '4', '4.2', '4.2', '4.1', '4.3', '4.3',
'4.4']
```

[ ]:
```
#sorting the data
data=np.sort(data)
print(data)

#OUTPUT
```

```
['3.7' '3.9' '3.9' '4' '4.1' '4.1' '4.2' '4.2' '4.3' '4.3' '4.3' '4.4']
```

[ ]:
```
#splitting the data into equal parts
y=np.split(data,3)
print(y)

#OUTPUT
```

```
[array(['3.7', '3.9', '3.9', '4'], dtype='<U3'), array(['4.1', '4.1', '4.2',
'4.2'], dtype='<U3'), array(['4.3', '4.3', '4.3', '4.4'], dtype='<U3')]
```

[ ]:

```
#taking empty array for sorting data in bins
bin1=np.zeros((1,4))
bin2=np.zeros((1,4))
bin3=np.zeros((1,4))
print(bin1)
print(bin2)
print(bin3)

#OUTPUT
```

```
[[0. 0. 0. 0.]]
[[0. 0. 0. 0.]]
[[0. 0. 0. 0.]]
```

[ ]:

```
#sorting the data in the bins
bin1=y[0]
bin2=y[1]
bin3=y[2]
print('bin1:',bin1)
print('bin2:',bin2)
print('bin3:',bin3)

#OUTPUT
```

```
bin1: ['3.7' '3.9' '3.9' '4']
bin2: ['4.1' '4.1' '4.2' '4.2']
bin3: ['4.3' '4.3' '4.3' '4.4']
```

Smoothing by bin means

[ ]:

```
n=len(bin1)
```

[ ]:

```
#calculating mean value for bin1
def Mean(bin1,n):

  sum=0
  for i in range(0,n):
      sum = sum +  float(bin1[i])

  return float(sum/n)
print("Mean:",Mean(bin1,n))

#OUTPUT
```

```
Mean: 3.875
```

[ ]:

```
#calculating mean value for bin2
def Mean(bin2,n):

  sum=0
  for i in range(0,n):
      sum = sum +  float(bin2[i])

  return float(sum/n)
print("Mean:",Mean(bin2,n))



#OUTPUT
```

```
Mean: 4.1499999999999995
```

[ ]:

```
#calculating mean value for bin3
def Mean(bin3,n):

  sum=0
  for i in range(0,n):
      sum = sum +  float(bin3[i])

  return float(sum/n)
print("Mean:",Mean(bin3,n))

#OUTPUT
```

```
Mean: 4.324999999999999
```

[ ]:

```
#replacing bin values with the mean
a1=np.full((1,4),(Mean(bin1,n)))
a2=np.full((1,4),(Mean(bin2,n)))
a3=np.full((1,4),(Mean(bin3,n)))
print("bin1:",a1)
print("bin2:",a2)
print("bin3:",a3)

#OUTPUT
```

```
bin1: [[3.875 3.875 3.875 3.875]]
bin2: [[4.15 4.15 4.15 4.15]]
bin3: [[4.325 4.325 4.325 4.325]]
```

Smoothing by bin medians

[ ]:

```
#calculating median for bin1
def Median(bin1,n):
  #check for even case
  if n%2!=0:
    return bin1[int(n/2)]
  else:
    return ((float(bin1[int((n-1)/2)])+float(bin1[int(n/2)]))/2.0)
print("Median:",Median(bin1,n))

#OUTPUT
```

```
Median: 3.9
```

[ ]:

```
#calculating median for bin2
def Median(bin2,n):
  #check for even case
  if n%2!=0:
    return bin2[int(n/2)]
  else:
    return ((float(bin2[int((n-1)/2)])+float(bin2[int(n/2)]))/2.0)
print("Median:",Median(bin2,n))

#OUTPUT
```

```
Median: 4.15
```

[ ]:

```
#calculating median for bin3
def Median(bin3,n):
  #check for even case
  if n%2!=0:
    return bin3[int(n/2)]
  else:
    return ((float(bin3[int((n-1)/2)])+float(bin3[int(n/2)]))/2.0)
print("Median:",Median(bin3,n))

#OUTPUT
```

```
Median: 4.3
```

[ ]:

```
#replacing bin values with the median
b1=np.full((1,4),(Median(bin1,n)))
b2=np.full((1,4),(Median(bin2,n)))
b3=np.full((1,4),(Median(bin3,n)))
print("bin1:",b1)
print("bin2:",b2)
print("bin3:",b3)

#OUTPUT
```

```
bin1: [[3.9 3.9 3.9 3.9]]
bin2: [[4.15 4.15 4.15 4.15]]
bin3: [[4.3 4.3 4.3 4.3]]
```

Smoothing by bin boundaries

[ ]:

```
#checking for the boundry conditions for bin1
a=float(bin1[1])-float(bin1[0])

b=float(bin1[3])-float(bin1[1])

if(a<b):
  bin1[1]=bin1[0]
else:
  bin1[1]=bin1[3]

c=float(bin1[2])-float(bin1[0])

d=float(bin1[3])-float(bin1[2])

if(c<d):
  bin1[2]=bin1[0]
else:
  bin1[2]=bin1[3]
#replacing bin values with the valid boundary conditin value

print("smooth bin1:",bin1)



#OUTPUT
```

```
smooth bin1: ['3.7' '4' '4' '4']
```

[ ]:

```
#checking for the boundry conditions for bin2
a=float(bin2[1])-float(bin2[0])

b=float(bin2[3])-float(bin2[1])

if(a<b):
  bin2[1]=bin2[0]
else:
  bin2[1]=bin2[3]

c=float(bin2[2])-float(bin2[0])

d=float(bin2[3])-float(bin2[2])

if(c<d):
  bin2[2]=bin2[0]
else:
  bin2[2]=bin2[3]
#replacing bin values with the valid boundary conditin value
```

```

print("smooth bin2:",bin2)

#OUTPUT
```

```
smooth bin2: ['4.1' '4.1' '4.2' '4.2']
```

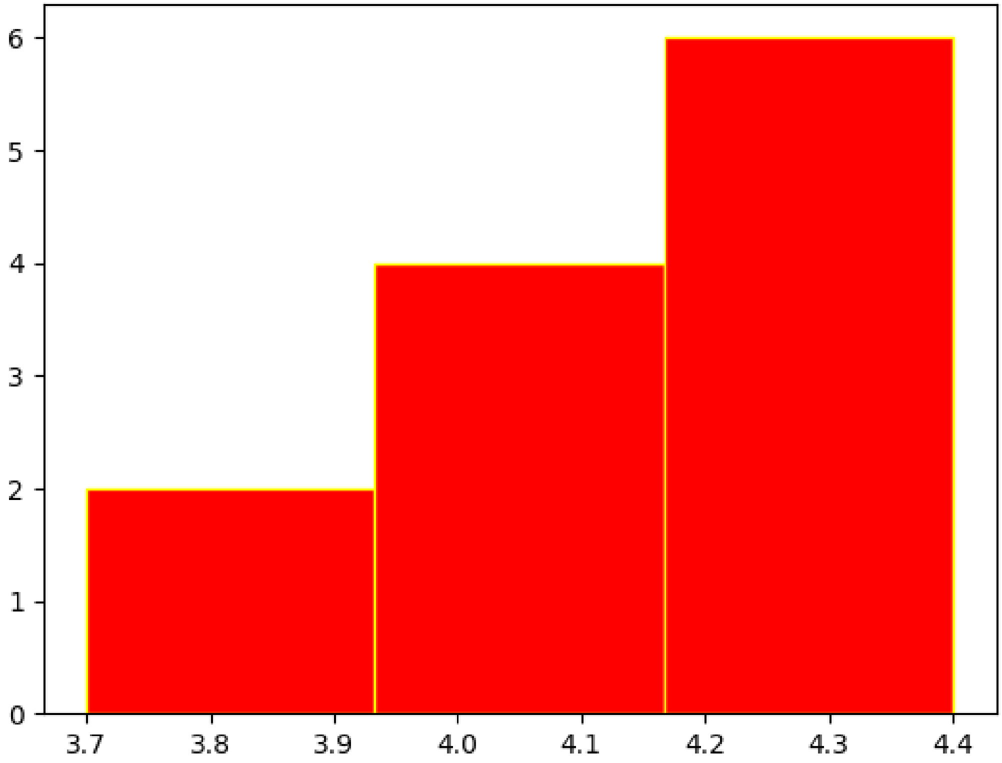
```
[ ]: #checking for the boundry conditions for bin3
     a=float(bin3[1])-float(bin3[0])

     b=float(bin3[3])-float(bin3[1])

     if(a<b):
       bin3[1]=bin3[0]
     else:
       bin3[1]=bin3[3]

     c=float(bin3[2])-float(bin3[0])

     d=float(bin3[3])-float(bin3[2])

     if(c<d):
       bin3[2]=bin3[0]
     else:
       bin3[2]=bin3[3]
     #replacing bin values with the valid boundary conditin value

     print("smooth bin3:",bin3)


     #OUTPUT
```

```
smooth bin3: ['4.3' '4.3' '4.3' '4.4']
```

```
[ ]: print("Bin 1:",bin1,"\nBin 2:",bin2,"\nBin 3:",bin3)

     #OUTPUT
```

```
Bin 1: ['3.7' '4' '4' '4']
Bin 2: ['4.1' '4.1' '4.2' '4.2']
Bin 3: ['4.3' '4.3' '4.3' '4.4']
```

```
[ ]: import matplotlib.pyplot as plt

     height=[3.7, 4, 3.7, 4,
             4.1, 4.1, 4.2, 4.2,
             4.3, 4.3, 4.3, 4.4,
             ]
     plt.hist(height,bins=3,edgecolor="yellow",color="red")
     plt.show()

     #OUTPUT
```



[B] Find covariance(cov) and correlation(r), Sx and Sy are standard deviation, x and ȳ are means. Cov(x,y) = i=1n(Xi-X)(Yi-Y)/(n-1) r(x,y) =Cov(x,y)/sxsy Plot the correlation, to show whether two variables are positively correlated, negatively correlated or no relation between them.

Covariance

[ ]:

```
#covariance

b=[72, 69, 90, 47, 76, 71, 88, 40, 64, 38, 58, 40]
c=[74, 88, 93, 44, 75, 78, 92, 39, 67, 50, 52, 43]

def covariance(x, y):
# Finding the mean of the series x and y
    mean_x = sum(b)/float(len(b))
    mean_y = sum(c)/float(len(c))
```

```
# Subtracting mean from the individual elements
    sub_x = [i - mean_x for i in x]
    sub_y = [i - mean_y for i in y]
    numerator = sum([sub_x[i]*sub_y[i] for i in range(len(sub_x))])
    denominator = len(x)-1
    cov = numerator/denominator
    return cov

#print(mean_x)
cov_func = covariance(b, c)
print("Covariance :", cov_func)

#OUTPUT
```

```
Covariance : 342.70454545454544
```

Correlation

[ ]:

```
#correlation between x and y

x=[72, 69, 90, 47, 76, 71, 88, 40, 64, 38, 58, 40]
y=[74, 88, 93, 44, 75, 78, 92, 39, 67, 50, 52, 43]
import math
mean_x = sum(x)/float(len(x))
#print(mean_x)
sub_x = [i - mean_x for i in x]
#print(sub_x)
#d=sum(sub_x)
d=121
e=(d*d)/len(x)
Sx = round(math.sqrt(e),2)
#print("Standard Deviation of x is :")
#print(Sx)

mean_y = sum(y)/float(len(y))
#print(mean_y)
sub_y = [i - mean_y for i in y]
#print(sub_y)
#f=sum(sub_y)
f=3
g = (f*f)/len(y)
Sy=round(math.sqrt(g),2)
#print("Standard Deviation of y is :")
#print(Sy)
z = Sx*Sy
#print(z)

corr=round(cov_func/z,2)
```

```
print("Correlation between x and y is :",corr)
if corr>0:
    print("x and y are positively correlated")
elif corr<0:
    print("x and y are negatively correlated")
else:
    print("x and y are not correlated")

#OUTPUT
```

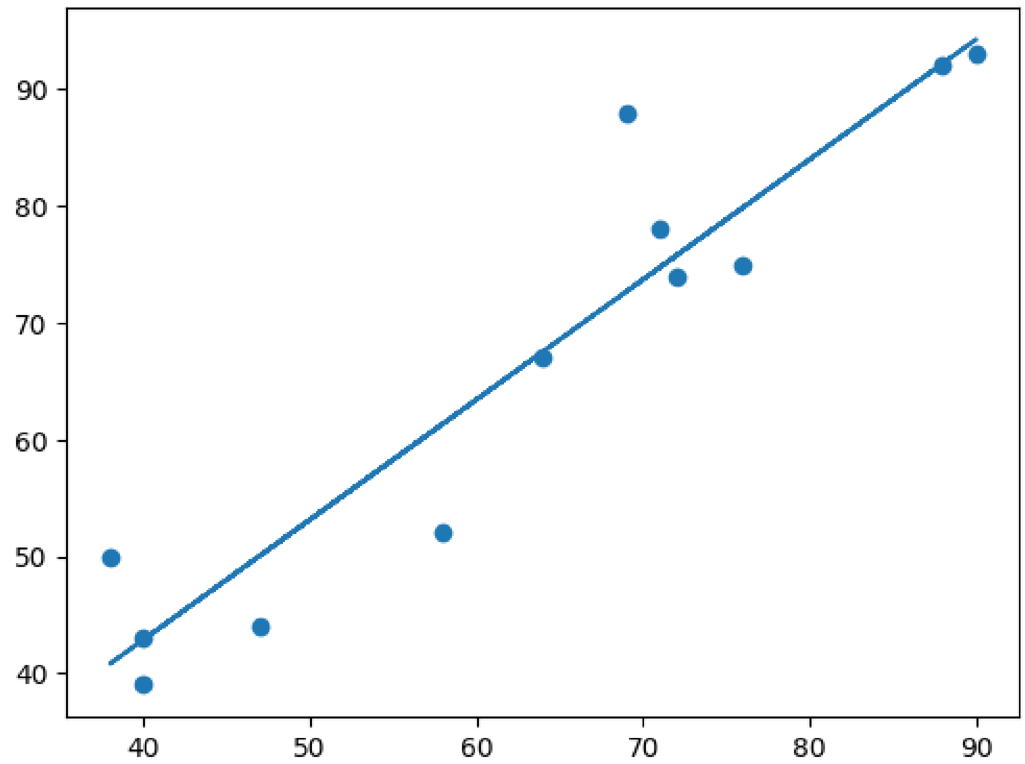
```
Correlation between x and y is : 11.28
x and y are positively correlated
```

[ ]:

```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
#define data
x = np.array([72, 69, 90, 47, 76, 71, 88, 40, 64, 38, 58, 40])
y = np.array([74, 88, 93, 44, 75, 78, 92, 39, 67, 50, 52, 43])
#find line of best fit
a, b = np.polyfit(x, y, 1)

#add points to plot
plt.scatter(x, y)

#add line of best fit to plot
plt.plot(x, a*x+b)

#OUTPUT
```

[ ]:

```
[<matplotlib.lines.Line2D at 0x7f7dbe865990>]
```



0.1 3 Assignment

Implement a chi-square test to detect whether two variables are dependent or independent variables for your dataset.

[ ]:
```
#creating table



ar=np.array([[2.85,9.9],[2.85,1.24]])
df=pd.DataFrame(ar,columns=["Local_Price","Dollar_Price"])
df.index=['CANADA','CHINA']
df

#OUTPUT
```

[ ]:
```
        Local_Price  Dollar_Price
CANADA         2.85          9.90
CHINA          2.85          1.24
```

[ ]:
```
df2=df.copy()#create contingency table with the marginal totals
df2.loc['Column_Total']=df2.sum(numeric_only=True, axis=0)
```

```
df2.loc[:,'Row_Total']=df2.sum(numeric_only=True, axis=1)
df2

#OUTPUT
```

```
[ ]:               Local_Price  Dollar_Price  Row_Total
     CANADA                2.85          9.90      12.75
     CHINA                 2.85          1.24       4.09
     Column_Total          5.70         11.14      16.84
```

```
[ ]: from sqlalchemy import String
     n=df2.at["Column_Total","Row_Total"] # grand total
     exp=df2.copy()                       #create dataframe with expected counts
     for x in exp.index[0:-1]:
       for y in exp.columns[0:-1]:
         #round expected values to 6 decimal places to get the maximum available
         v=str (((df2.at[x,"Row_Total"])*(df2.at["Column_Total",y]) )/n)
         exp.at[x,y]=float(v)

     exp=exp.iloc[[0,1],[0,1]]
     exp

     #OUTPUT
```

```
[ ]:         Local_Price  Dollar_Price
     CANADA     4.315618      8.434382
     CHINA      1.384382      2.705618
```

```
[ ]: #calculate chi-squared test statistics
     tstat=np.sum(((df-exp)**2/exp).values)
     print("chi square test statistic:",tstat)

     #OUTPUT
```

```
chi square test statistic: 3.0979474878906106
```

```
[ ]: dof=(len(df.columns)-1)*(len(df.index)-1)#determine degrees of freedom
     dof

     #OUTPUT
```

```
[ ]: 1
```

```
[ ]: pval=1-chi2.cdf(tstat,dof)
     pval

     #OUTPUT
```

[ ]: 0.07839107056704153

[ ]:
```
#print value of p
alpha=0.05
print("p value is"+str(round(pval,5)))
if pval<=alpha:
  print("Dependent (reject H0)")
else:
  print("Independent (H0 holds true)")


#OUTPUT
```

```
p value is0.07839
Independent (H0 holds true)
```

0.2 4 Assignment

Write a program to implement normalization techniques (a)min max (b) z-score (c) decimal scaling on your data set.

[ ]:
```
import statistics
```

[ ]:
```
a=[0]*10
for i in range(10):
  b=pd.read_csv('BigmacPrice.csv')
  a[i]=b.dollar_ex[i]
```

[ ]:
```
data=a
print(data)

#OUTPUT
```

```
[1, 1, 1, 1, 1, 514, 8, 39, 8, 1]
```

[ ]:
```
data=np.sort(data)
print(data)

#OUTPUT
```

```
[  1   1   1   1   1   1   8   8  39 514]
```

[ ]:
```
# A MINMAX METHOD

def minMax(num,list):
  minNum=int(input("Enter Minimum setting:\t"))
  maxNum=int(input("Enter Maximum setting:\t"))
  ans=round(((num-min(list))/(max(list)-min(list))*(maxNum-minNum))+minNum,2)
  return ans

#OUTPUT
```

[ ]:

```
# B ZSCORE METHOD

def zscore(num,mean,stdDv):
  return round((num-mean)/stdDv,2)
```

[ ]:

```
#   C DECIMAL SCALING METHOD

def descaling(num,maxNum):
  digit=len(str(maxNum))
  div=pow(10,digit)
  return num/div
```

[ ]:

```
num=int(input("enetr an item from data: \t"))
print("After doing min-max normalization:",minMax(num,data))
print("After doing z-score normalization:",zscore(num,statistics.
 ↪mean(data),statistics.stdev(data)))
print("After doing descaling normalization:",descaling(num,max(data)))

#OUTPUT
```

```
enetr an item from data:        39
Enter Minimum setting:  0
Enter Maximum setting:  3
After doing min-max normalization: 0.22
After doing z-score normalization: -0.11
After doing descaling normalization: 0.039
```

0.3 5 Assignment

Write a program to implement data reduction techniques for your data.

[ ]:

```
df=pd.read_csv('BigmacPrice.csv')
df.head(10)

#OUTPUT
```

[ ]:

```
         date currency_code           name  local_price  dollar_ex  \
0  2000-04-01           ARS      Argentina         2.50          1
1  2000-04-01           AUD      Australia         2.59          1
2  2000-04-01           BRL         Brazil         2.95          1
3  2000-04-01           GBP        Britain         1.90          1
4  2000-04-01           CAD         Canada         2.85          1
5  2000-04-01           CLP          Chile      1260.00        514
```

```
6  2000-04-01           CNY           China         9.90          8
7  2000-04-01           CZK  Czech Republic        54.37         39
8  2000-04-01           DKK         Denmark        24.75          8
9  2000-04-01           EUR       Euro area         2.56          1

   dollar_price
0          2.50
1          2.59
2          2.95
3          1.90
4          2.85
5          2.45
6          1.24
7          1.39
8          3.09
9          2.56
```

```
[ ]: k=int(input())
     data=df['dollar_ex'].head(k)
     data

     #OUTPUT
```

```
10
```

```
[ ]: 0      1
     1      1
     2      1
     3      1
     4      1
     5    514
     6      8
     7     39
     8      8
     9      1
     Name: dollar_ex, dtype: int64
```

```
[ ]: d=[i for i in data]
     d.sort()
     d

     #OUTPUT
```

```
[ ]: [1, 1, 1, 1, 1, 1, 8, 8, 39, 514]
```

```
[ ]: a=min(d)
     b=max(d)
```

```
n=3
w=round((b-1)/n,2)
w


#OUTPUT
```

```
[ ]: 171.0
```

```
[ ]: #using equi-width binning
dict={'b1':[],'b2':[],'b3':[]}
i=0
j=1
k=0
while i<3:
  if i==2:
    for z in range(k,len(d)):
      dict['b3'].append(d[z])
    break
  if d[k]<=(a+j*w):
    dict[f'b{i+1}'].append(d[k])
    k +=1
  else:
    i +=1
    j +=1
dict

#OUTPUT
```

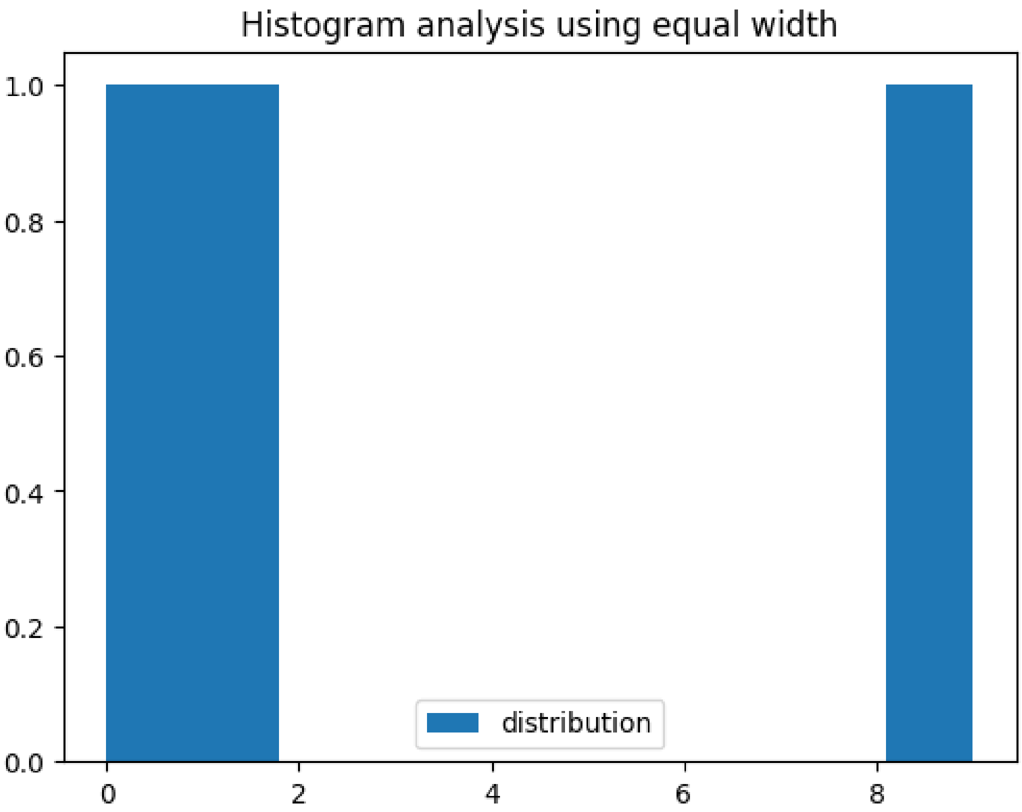
```
[ ]: {'b1': [1, 1, 1, 1, 1, 1, 8, 8, 39], 'b2': [], 'b3': [514]}
```

```
[ ]: #using equi-frequency binning
d=[i for i in data]
d.sort()
div=len(d)%3
i,j,k=0,0,0
array=[[],[],[]]
while i<3:
  array[i].append(d[j])
  j +=1
  k +=1
  if k==len(d)//3:
    if (div>0):
      array[i].append(d[j+1])
      j +=1
      div -=1
    k=0
    i +=1
array

#OUTPUT
```

```
[ ]: [[1, 1, 1, 1], [1, 1, 8], [8, 39, 514]]
```

[ ]:

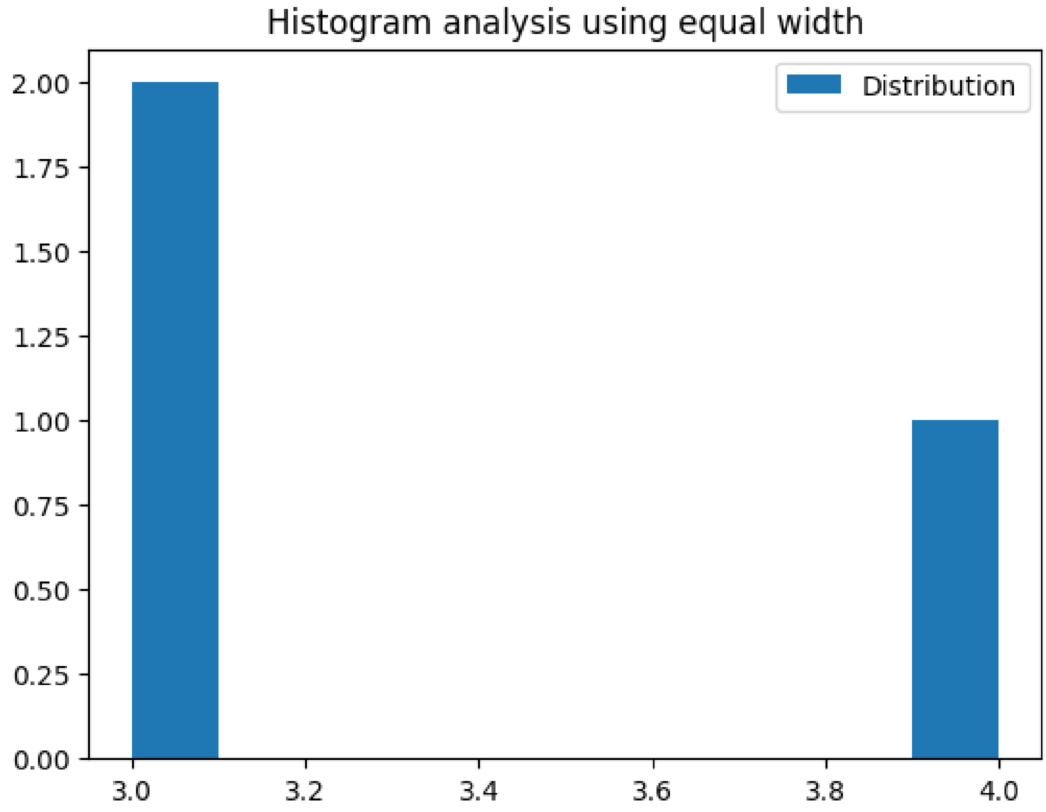
```
import matplotlib.pyplot as plt
p=[len(dict[f'b{i+1}']) for i in range(3)]
plt.title('Histogram analysis using equal width')
legend=['distribution']
bin=[f'[-,{a+w+1})',f'[{a+w+1},{a+2*w+2})',f'[{a+2*w+2},+)']
plt.hist(p)
plt.legend(legend)
plt.show()

#OUTPUT
```



[ ]:

```
p=[len(array[i]) for i in range(3)]
plt.title('Histogram analysis using equal width')
legend=['Distribution']
```

```
bin=[f'[-,{a+w+1})',f'[{a+w+1},{a+2*w+2})',f'[{a+2*w+2},+)']
plt.hist(p)
plt.legend(legend)
plt.show()

#OUTPUT
```



0.4 6 Assignment

Write a program to implement any method of data discretization.

[ ]:

```
a=[0]*12
for i in range(12):
  b=pd.read_csv('BigmacPrice.csv')
  a[i]=b.dollar_price[i]
```

[ ]:

```
#printing the data
data=a
print(data)

#OUTPUT
```

```
[2.5, 2.59, 2.95, 1.9, 2.85, 2.45, 1.24, 1.39, 3.09, 2.56, 1.46, 1.22]
```

[ ]:

```
#sorting the data
data=np.sort(data)
print(data)

#OUTPUT
```

```
[1.22 1.24 1.39 1.46 1.9  2.45 2.5  2.56 2.59 2.85 2.95 3.09]
```

[ ]:

```
#splitting the data into equal parts
y=np.split(data,3)
print(y)

#OUTPUT
```

```
[array([1.22, 1.24, 1.39, 1.46]), array([1.9 , 2.45, 2.5 , 2.56]), array([2.59,
2.85, 2.95, 3.09])]
```

[ ]:

```
#taking empty array for sorting data in bins
bin1=np.zeros((1,4))
bin2=np.zeros((1,4))
bin3=np.zeros((1,4))
print(bin1)
print(bin2)
print(bin3)

#OUTPUT
```

```
[[0. 0. 0. 0.]]
[[0. 0. 0. 0.]]
[[0. 0. 0. 0.]]
```

[ ]:

```
#sorting the data in the bins
bin1=y[0]
bin2=y[1]
bin3=y[2]
print('bin1:',bin1)
print('bin2:',bin2)
print('bin3:',bin3)

#OUTPUT
```

```
bin1: [1.22 1.24 1.39 1.46]
bin2: [1.9  2.45 2.5  2.56]
bin3: [2.59 2.85 2.95 3.09]
```

Binning by Equal Width

[ ]:

```
#take number of bins equals to 3
#finding width
a=[]
b=[]
c=[]
width=(data[11]-data[0])/3;
d=math.ceil(width)#take upper bound
print("width=",d)
e=d+data[0]
f=e+d
g=f+d

#OUTPUT
```

```
width= 1
```

[ ]:

```
z=0
for i in range(12):
  if(data[i]>=e):
    a.append(data[i])
    z=z+1
    break
  else:
    a.append(data[i])
    z=z+1
print(a)

#OUTPUT
```

```
[1.22, 1.24, 1.39, 1.46, 1.9, 2.45]
```

[ ]:

```
k=z
y=0
for i in range(z,12):
  if(data[i]>=f):
    break
  else:
    b.append(data[i])
    k=k+1
print(b)

#OUTPUT
```

```
[2.5, 2.56, 2.59, 2.85, 2.95, 3.09]
```

[ ]:

```
for i in range(k,12):
  if(data[i]>=g):
    break
  else:
    c.append(data[i])
print(c)

#OUTPUT
```

```
[]
```

[ ]:

```
#printing the bin values
print("Bin1=",a)
print("Bin2=",b)
print("Bin3=",c)

#OUTPUT
```

```
Bin1= [1.22, 1.24, 1.39, 1.46, 1.9, 2.45]
Bin2= [2.5, 2.56, 2.59, 2.85, 2.95, 3.09]
Bin3= []
```

#CO2160714.2 Assignment:

0.5 7 Assignment

Implement apriori algorithm and show the output as candidate sets in each iteration, as well as show association rules generated, without using standard apriori method from the python libraries.

[ ]:

```
# minimum support, minimum confidence
a=3
b=75
print("Min_Support_count=",a)
print("Min_Confidence=",b,"%")
import pandas as pd
import pandas as np
#creating the Dataframe
r=  pd.DataFrame({
'TID':[1,2,3,4],
'Item':[["11", "12", "13", "14"], ["12", "13"],["13", "14"], ["12", "13", "14"]]
})
r

#OUTPUT
```

```
Min_Support_count= 3
Min_Confidence= 75 %
```

[ ]:

```
   TID              Item
0    1  [11, 12, 13, 14]
1    2          [12, 13]
2    3          [13, 14]
```

```
3    4      [12, 13, 14]
```

Genarating Candidate Set C1

```
[ ]: Items=["11", "12", "13", "14"]
     sum=0
     t=[0,0,0,0]
     for i in range(4):
       for j in range(4):
         sum=sum+r.Item[j].count(r.Item[0][i])
       #print(sum)
       t[i]=sum
       sum=0
     #print(t)
     Items=["11","12", "13", "14"]
     support=(t)
     c1=pd.DataFrame({
       "Itemset":Items,
       "support_count":support
     })
     c1

     #OUTPUT
```

```
[ ]:   Itemset  support_count
     0      11              1
     1      12              3
     2      13              4
     3      14              3
```

Frequent Itemset L1

```
[ ]: #removing the itemsets whose support count is less than minimum support count␣
       ↪L1 = c1[c1['support_count'] >= 3]
     #frequent itemset L1
     L1 = c1[c1['support_count']>=3]
     L1
     L1.index=['0', '1', '2']
     print(" Frequent Itemset L1")
     L1

     #OUTPUT
```

```
 Frequent Itemset L1
```

```
[ ]:   Itemset  support_count
     0      12              3
     1      13              4
```

```
2      14                3
```

Generating Candidate Set C2

[ ]:

```
#candidate set c2 obtained by pairing itemsets of L1 with itself
c2= [(a, b) for i, a in enumerate (L1.Itemset) for b in L1.Itemset[i + 1:]]
#print("possible pairs for candidate set c2 are : ", c2)
```

[ ]:

```
#finding the support count of paired itemsets
sum=0
f=[0,0,0]
for i in range(3):
  for j in range(4):
    if (c2[i][0] in r.Item[j]) and (c2[i][1] in r.Item[j]):
      sum=sum+1
  f[i]=sum
  sum=0
#print (f)

# candidate set C2 will be
Item1= [('12', '13'), ('12', '14'), ('13', '14')]
support1=(f)
C2=pd.DataFrame({
  "Itemset": Item1,
  "support_count": support1
})
C2

#OUTPUT
```

[ ]:

```
    Itemset  support_count
0  (12, 13)              3
1  (12, 14)              2
2  (13, 14)              3
```

Frequent Itemset L2

[ ]:

```
L2= C2[C2['support_count'] >= 3]
L2
L2.index=['0', '1']
print(" Frequent Itemset L2")
L2

#OUTPUT
```

```
 Frequent Itemset L2
```

```
[ ]:     Itemset  support_count
     0  (12, 13)              3
     1  (13, 14)              3
```

Generating Candidate Set C3

```
[ ]: itemset_list_2 = L2['Itemset']
     b = []
     c3_itemset_list = []
     #Loop for making of 3-itemset candidate generation
     for i in itemset_list_2:
       for j in i:
         if j not in b:
           b.append(j)

     #print(b)

     sum=0
     for i in range(1):
       for j in range(4):
         if (b[0] in r.Item[j]) and (b[1] in r.Item[j]) and (b[2] in r.Item[j]):
           sum=sum+1
     #print (sum)

     Item1=[b]
     support1=(sum)
     C3=pd.DataFrame({
       "Itemset": Item1,
       "support_count": support1
     })
     C3

     #OUTPUT
```

```
[ ]:         Itemset  support_count
     0  [12, 13, 14]              2
```

```
[ ]: genearting_rules= L2['Itemset'].tolist()
     #print(gr)
     rules = []
     for item in genearting_rules:
       reverse_item = item[::-1]
       if item not in rules:
         rules.append(item)
       if reverse_item not in rules:
         rules.append(reverse_item)
```

```
rules

#calculating the confidence
print('The rules are as follows: ')
for i in range(4):
  print(f'R{i}:', rules[i][0], '=>', rules[i][1])
  if(i==0 or i==1):
    for j in range(1):
      b=100*L2.support_count[j]/L1.support_count[i]
      print('Confidence = ',b,'%')
      if b >= 75:
        print (f'R(i+1) is accepted\n')
      else:
        print(f'R{i+1} is rejected\n')
  else:
    for j in range(1):
      b=100*L2.support_count[j+1]/L1.support_count[i-1]
      print('Confidence = ',b,'%')
      if b >= 75:
        print (f'R{i+1} is accepted\n')
      else:
        print(f'R{i+1} is rejected\n')

#OUTPUT
```

```
The rules are as follows:
R0: 12 => 13
Confidence =  100.0 %
R(i+1) is accepted

R1: 13 => 12
Confidence =  75.0 %
R(i+1) is accepted

R2: 13 => 14
Confidence =  75.0 %
R3 is accepted

R3: 14 => 13
Confidence =  100.0 %
R4 is accepted
```

0.6 8 Assignment

Implement any algorithm that removes the limitations of an apriori algorithm. (Transaction reduction, DIC, DHT, FP-tree) without using any python machine learning library.

[ ]:

```
def transaction_reduction(data, min_support):
    # Get the support count for each item
    support_count = {}
    for transaction in data:
        for item in transaction:
            if item not in support_count:
                support_count[item] = 1
            else:
                support_count[item] += 1

    # Remove transactions that do not contain frequent items
    reduced_data = []
    for transaction in data:
        reduced_transaction = []
        for item in transaction:
            if support_count[item] >= min_support:
                reduced_transaction.append(item)
        if len(reduced_transaction) > 0:
            reduced_data.append(reduced_transaction)

    return reduced_data

#OUTPUT
```

[ ]:

```
data = [["11", "12", "13", "14"], ["12", "13"],["13", "14"], ["12", "13", "14"]]
min_support = 3
reduced_data = transaction_reduction(data, min_support)
print(reduced_data)

#OUTPUT
```

```
[['12', '13', '14'], ['12', '13'], ['13', '14'], ['12', '13', '14']]
```

#CO2160714.3 Assignment:

0.7 9 Assignment

Write programs to implement the following Classification methods. (a)distance based (b)statistics based (c)tree based (d)neural Network based

(a) Distance based

[ ]:

```
import pandas as pd
import numpy as np
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import train_test_split
from sklearn.metrics import confusion_matrix
```

```
df = pd.read_csv('bigmacPrice.csv.csv')

# Select the features and target
X = df[['HP', 'Attack', 'Defense', 'Sp_Atk', 'Sp_Def', 'Speed']]
y = df['isLegendary']

# Split the data into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.5)

# Create a k-NN classifier with k=5
knn = KNeighborsClassifier(n_neighbors=5)

# Fit the classifier to the training data
knn.fit(X_train, y_train)

# Predict the labels of the test set
y_pred = knn.predict(X_test)

# Calculate the confusion matrix
cm = confusion_matrix(y_test, y_pred)
print(f'Confusion matrix:\n{cm}')

# Calculate the accuracy of the classifier
accuracy = knn.score(X_test, y_test)
print(f'Accuracy: {accuracy}')

#OUTPUT
```

```
Confusion matrix:
[[337   3]
 [ 11  10]]
Accuracy: 0.961218836565097
```

(b) Statistics based

[ ]:

```
import pandas as pd
from sklearn.naive_bayes import GaussianNB
from sklearn.model_selection import train_test_split
from sklearn.metrics import confusion_matrix

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

# Select the features and target
X = df[['HP', 'Attack', 'Defense', 'Sp_Atk', 'Sp_Def', 'Speed']]
y = df['isLegendary']

# Split the data into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.5)
```

```python
# Create a Gaussian Naive Bayes classifier
gnb = GaussianNB()

# Fit the classifier to the training data
gnb.fit(X_train, y_train)

# Predict the labels of the test set
y_pred = gnb.predict(X_test)

# Calculate the confusion matrix
cm = confusion_matrix(y_test, y_pred)
print(f'Confusion matrix:\n{cm}')

# Calculate the accuracy of the classifier
accuracy = knn.score(X_test, y_test)
print(f'Accuracy: {accuracy}')

#OUTPUT
```

```
Confusion matrix:
[[328  12]
 [  2  19]]
Accuracy: 0.9529085872576177
```

(c) Tree based

[ ]:

```python
import pandas as pd
from sklearn.tree import DecisionTreeClassifier
from sklearn.model_selection import train_test_split
from sklearn.metrics import confusion_matrix


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

# Select the features and target
X = df[['HP', 'Attack', 'Defense', 'Sp_Atk', 'Sp_Def', 'Speed']]
y = df['isLegendary']

# Split the data into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2)

# Create a decision tree classifier
clf = DecisionTreeClassifier()

# Fit the classifier to the training data
clf.fit(X_train, y_train)
```

```
# Predict the labels of the test set
y_pred = clf.predict(X_test)

# Calculate the confusion matrix
cm = confusion_matrix(y_test, y_pred)
print(f'Confusion matrix:\n{cm}')

# Calculate the accuracy of the classifier
accuracy = clf.score(X_test, y_test)
print(f'Accuracy: {accuracy}')

#OUTPUT
```

```
Confusion matrix:
[[132   5]
 [  4   4]]
Accuracy: 0.9379310344827586
```

(d) Neural Network based

[ ]:

```
import pandas as pd
from sklearn.neural_network import MLPClassifier
from sklearn.model_selection import train_test_split



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

# Select the features and target
X = df[['HP', 'Attack', 'Defense', 'Sp_Atk', 'Sp_Def', 'Speed']]
y = df['isLegendary']

# Split the data into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2)

# Create a multi-layer perceptron classifier
clf = MLPClassifier(hidden_layer_sizes=(5,), max_iter=1000)

# Fit the classifier to the training data
clf.fit(X_train, y_train)

# Predict the labels of the test set
y_pred = clf.predict(X_test)

# Calculate the confusion matrix
cm = confusion_matrix(y_test, y_pred)
print(f'Confusion matrix:\n{cm}')

# Calculate the accuracy of the classifier
```

```
accuracy = clf.score(X_test, y_test)
print(f'Accuracy: {accuracy}')

#OUTPUT
```

```
Confusion matrix:
[[133   0]
 [ 12   0]]
Accuracy: 0.9172413793103448
```

0.8 10 Assignment

Write a program to implement following Prediction methods: (a) Linear (b) Logistic regression

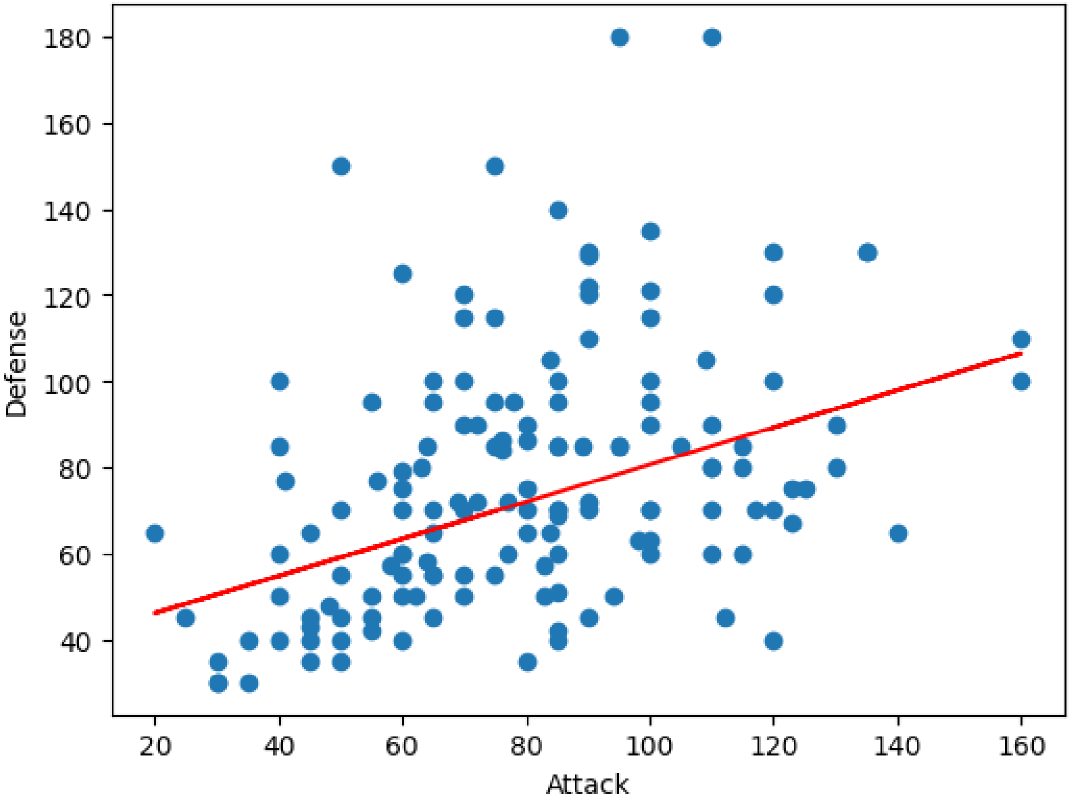
(a) Linear

[ ]:

```
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split


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

X = df['Attack'].values.reshape(-1, 1)
y = df['Defense'].values.reshape(-1, 1)

# Split the data into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2)

# Create a linear regression model
reg = LinearRegression()

# Fit the model to the training data
reg.fit(X_train, y_train)

# Predict the target values of the test set
y_pred = reg.predict(X_test)

# Calculate the accuracy of the classifier
accuracy = reg.score(X_test, y_test)
print(f'Accuracy: {accuracy}')

# Plot the true vs predicted values
plt.scatter(X_test, y_test)
plt.xlabel('Attack')
plt.ylabel('Defense')
```

```
# Add a regression line to the plot
plt.plot(X_test, y_pred, color='red')

plt.show()

#OUTPUT
```

```
Accuracy: 0.13421000406535633
```



(b) Logistic regression

```
[ ]: import pandas as pd
     from sklearn.linear_model import LogisticRegression
     from sklearn.model_selection import train_test_split

     # Load the Pokémon dataset
     df = pd.read_csv('bigmacPrice.csv.csv')

     # Select the features and target variable
     X = df[['Attack','Defense']]
```

```
y = df['isLegendary']

# Split the data into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2)

# Create a logistic regression model
log_reg = LogisticRegression()

# Fit the model to the training data
log_reg.fit(X_train, y_train)

# Predict the target values of the test set
y_pred = log_reg.predict(X_test)

# Calculate the accuracy of the model
accuracy = log_reg.score(X_test, y_test)

print(f'Accuracy: {accuracy}')

#OUTPUT
```

```
Accuracy: 0.9448275862068966
```

#**CO2160714.4 Assignment:**

##**11 Assignment**

Using the weka tool for your data set, make the following table for classification and clustering algorithms.

#**CO2160714.5 Assignment:**

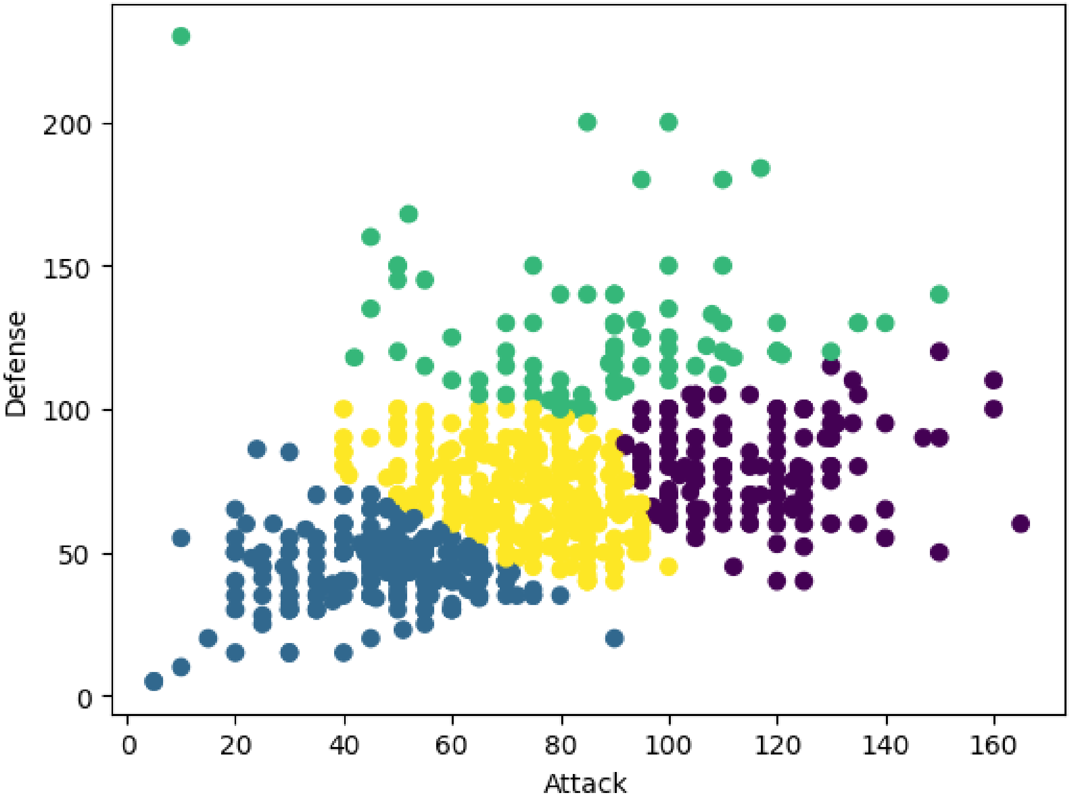
##**12 Assignment Implement any 2 unsupervised clustering algorithms.**

[ ]:

```
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans

# Load the Pokémon dataset
df = pd.read_csv('bigmacPrice.csv.csv')

# Select the features to use for clustering
X = df[['Attack', 'Defense']]

# Create a KMeans model with 4 clusters
kmeans = KMeans(n_clusters=4)
```

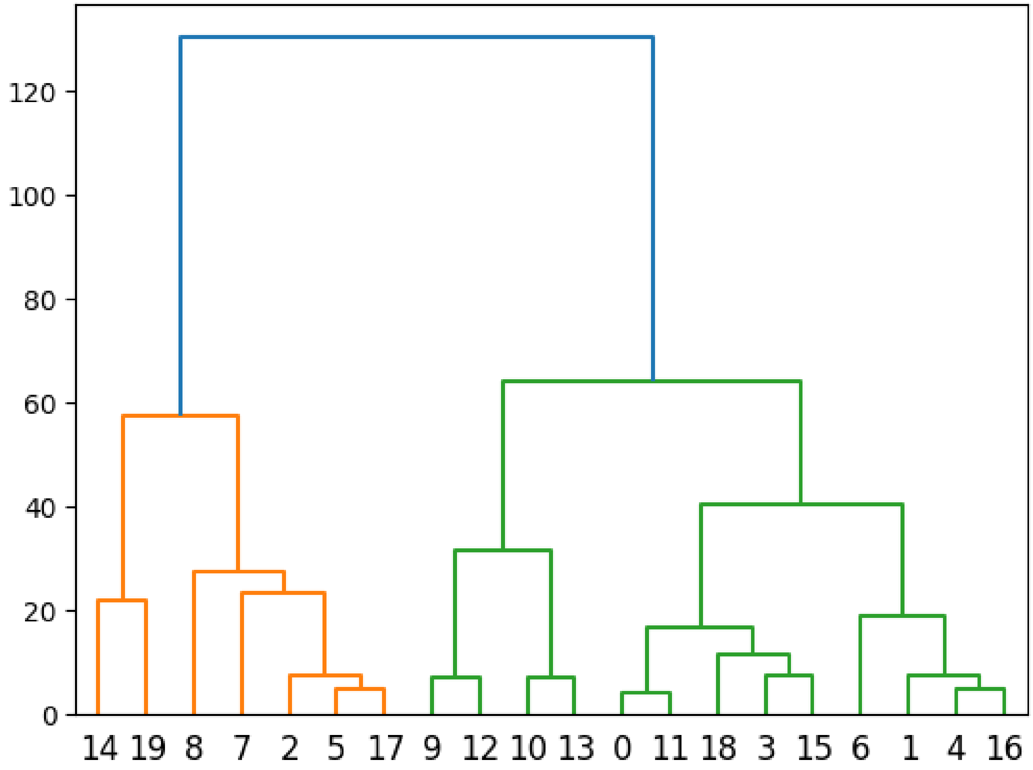
```
# Fit the model to the data
kmeans.fit(X)

# Predict the cluster labels for each data point
y_pred = kmeans.predict(X)

# Plot the data points and color them by cluster label
plt.scatter(X['Attack'], X['Defense'], c=y_pred)
plt.xlabel('Attack')
plt.ylabel('Defense')
plt.show()

#OUTPUT
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870:
FutureWarning: The default value of `n_init` will change from 10 to 'auto' in
1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
```



[ ]:
```
import pandas as pd
from scipy.cluster.hierarchy import dendrogram, linkage
```

```
# Load the Pokémon dataset
df = pd.read_csv('bigmacPrice.csv.csv')

# Select the features to use for clustering
X = df[['Attack', 'Defense']].head(20)

# Perform hierarchical clustering on the data
Z = linkage(X, 'ward')

# Plot the dendrogram
dendrogram(Z)
plt.show()

#OUTPUT
```



#**CO2160714.6 Assignment:**

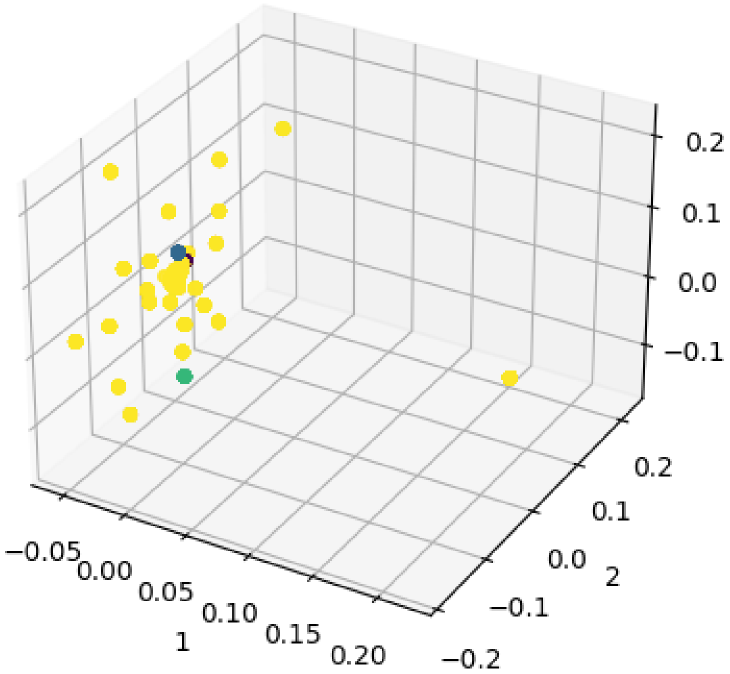
##**OEP**

Implement text mining/clustering algorithm.

[ ]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.cluster import KMeans
from sklearn.decomposition import PCA
from mpl_toolkits.mplot3d import Axes3D

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

df['name'] = df['currency_code'] + ' ' + str(df['local_price']) + ' ' +␣
 ↪str(df['dollar_price'])
# Apply TfidfVectorizer to the text column
vectorizer = TfidfVectorizer(stop_words='english')
text_matrix = vectorizer.fit_transform(df['name'])
# Apply K-Means clustering with k=4
kmeans = KMeans(n_clusters=4, random_state=42)
kmeans.fit(text_matrix)
# Visualize the clusters in 3D with PCA
pca = PCA(n_components=3)
text_pca = pca.fit_transform(text_matrix.toarray())
fig = plt.figure()
ax = fig.add_subplot(111, projection='3d')
ax.scatter(text_pca[:, 0], text_pca[:, 1], text_pca[:, 2], c=kmeans.labels_)
ax.set_xlabel('1')
ax.set_ylabel('2')
ax.set_zlabel('3')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870:
FutureWarning: The default value of `n_init` will change from 10 to 'auto' in
1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
```



0.2
0.1
0.0
−0.1
0.2
0.1
0.0
2
−0.1
−0.2
−0.05
0.00
0.05
0.10
0.15
0.20
1