Assignment No. 3

Aim : Descriptive Statistics - Measures of Central Tendency and variability Perform the following operations on any open source dataset (e.g., data.csv).

1. Provide summary statistics (mean, median, minimum, maximum, standard deviation) for a dataset (age, income etc.) with numeric variables grouped by one of the qualitative (categorical) variable. For example, if your categorical variable is age groups and quantitative variable is income, then provide summary statistics of income grouped by the age groups. Create a list that contains a numeric value for each response to the categorical variable.

2. Write a Python program to display some basic statistical details like percentile, mean, standard deviation etc. of the species of 'Iris-setosa', 'Iris-versicolor' and 'Iris-versicolor' of iris.csv dataset.

Provide the codes with outputs and explain everything that you do in this step.

Code :

[1]:
```
import pandas as pd

df1 = pd.read_csv("Customers.csv")
df1
```

[1]:

	CustomerID	Genre	Age	Annual_income_(k$)	Spending_score
0	37	male	53	102	20
1	25	male	42	94	92
2	36	male	52	124	30
3	16	male	29	27	25
4	184	male	47	118	18
..	…	…	…	…	…
194	37	male	22	33	16
195	75	male	30	82	71
196	18	male	39	85	86
197	183	female	78	130	30
198	129	female	52	50	75

[199 rows x 5 columns]

[2]:
```
column_name = 'CustomerID'
column_mean = df1["CustomerID"].mean()
print(column_mean)
```

```
106.74371859296483
```

[3]:
```
column_name = 'Annual_income_(k$)'
column_mean = df1["Annual_income_(k$)"].mean()
print(column_mean)
```

```
82.84422110552764
```

[4]:
```
column_name = 'Spending_score'
column_mean = df1["Spending_score"].mean()
print(column_mean)
```

```
50.120603015075375
```

[12]:
```
df1['Row_Mean'] = df1[['CustomerID', 'Spending_score']].mean(axis=1)

print(df1)
```

```
     CustomerID   Genre  Age  Annual_income_(k$)  Spending_score  Row_Mean
0            37    male   53                 102              20      28.5
1            25    male   42                  94              92      58.5
2            36    male   52                 124              30      33.0
3            16    male   29                  27              25      20.5
4           184    male   47                 118              18     101.0
..          …      …  …                   …               …       …
194          37    male   22                  33              16      26.5
195          75    male   30                  82              71      73.0
196          18    male   39                  85              86      52.0
197         183  female   78                 130              30     106.5
198         129  female   52                  50              75     102.0

[199 rows x 6 columns]
```

[13]:
```
column_name = 'CustomerID'
column_median = df1["CustomerID"].median()
print(column_median)
```

```
111.0
```

[14]:
```
column_name = 'Spending_score'
column_median = df1["Spending_score"].median()
print(column_median)
```

```
48.0
```

[15]:
```
df1['Row_Median'] = df1[['CustomerID', 'Spending_score']].median(axis=1)

print(df1)
```

```
     CustomerID   Genre  Age  Annual_income_(k$)  Spending_score  Row_Mean  \
0            37    male   53                 102              20      28.5
1            25    male   42                  94              92      58.5
2            36    male   52                 124              30      33.0
3            16    male   29                  27              25      20.5
4           184    male   47                 118              18     101.0
..          …     …  …                   …               …       …
194          37    male   22                  33              16      26.5
195          75    male   30                  82              71      73.0
196          18    male   39                  85              86      52.0
197         183  female   78                 130              30     106.5
198         129  female   52                  50              75     102.0

     Row_Median
0          28.5
1          58.5
2          33.0
3          20.5
4         101.0
..          …
194        26.5
195        73.0
196        52.0
197       106.5
198       102.0

[199 rows x 7 columns]
```

[9]:
```
column_name = 'Annual_income_(k$)'
column_mode = df1["Annual_income_(k$)"].mode()
print(column_mode)
```

```
0    33
dtype: int64
```

[10]:
```
column_name = 'Age'
column_mode = df1["Age"].mode()
print(column_mode)
```

```
0    58
dtype: int64
```

[16]:
```
column_name = 'CustomerID'
column_min = df1["CustomerID"].min()
print(column_min)
```

```
2
```

[17]:
```
column_name = 'Age'
column_min = df1["Age"].min()
print(column_min)
```

```
20
```

[18]:
```
df1['Row_Min'] = df1[['CustomerID', 'Spending_score']].min(axis=1)

print(df1)
```

```
     CustomerID   Genre  Age  Annual_income_(k$)  Spending_score  Row_Mean  \
0            37    male   53                 102              20      28.5
1            25    male   42                  94              92      58.5
2            36    male   52                 124              30      33.0
3            16    male   29                  27              25      20.5
4           184    male   47                 118              18     101.0
..          …     …  …                   …               …       …
194          37    male   22                  33              16      26.5
195          75    male   30                  82              71      73.0
196          18    male   39                  85              86      52.0
197         183  female   78                 130              30     106.5
198         129  female   52                  50              75     102.0

     Row_Median  Row_Min
0          28.5       20
1          58.5       25
2          33.0       30
3          20.5       16
4         101.0       18
..          …      …
194        26.5       16
195        73.0       71
196        52.0       18
197       106.5       30
198       102.0       75

[199 rows x 8 columns]
```

[19]:
```
column_name = 'Annual_income_(k$)'
column_min = df1["Annual_income_(k$)"].min()
print(column_min)
```

```
11
```

[20]:
```
column_name = 'CustomerID'
column_min = df1["CustomerID"].min()
print(column_min)
```

```
2
```

[22]:
```
column_name = 'CustomerID'
column_max = df1["CustomerID"].max()
print(column_max)
```

```
200
```

[23]:
```
column_name = 'Age'
column_max = df1["Age"].max()
print(column_max)
```

```
80
```

[24]:
```
column_name = 'Spending_score'
column_max = df1["Spending_score"].max()
print(column_max)
```

```
100
```

[25]:
```
df1['Row_Max'] = df1[['CustomerID', 'Age']].max(axis=1)

print(df1)
```

```
     CustomerID   Genre  Age  Annual_income_(k$)  Spending_score  Row_Mean  \
0            37    male   53                 102              20      28.5
1            25    male   42                  94              92      58.5
2            36    male   52                 124              30      33.0
3            16    male   29                  27              25      20.5
4           184    male   47                 118              18     101.0
..          …      …  …                    …               …       …
194          37    male   22                  33              16      26.5
195          75    male   30                  82              71      73.0
196          18    male   39                  85              86      52.0
197         183  female   78                 130              30     106.5
198         129  female   52                  50              75     102.0

     Row_Median  Row_Min  Row_Max
0          28.5       20       53
1          58.5       25       42
2          33.0       30       52
3          20.5       16       29
```

```
4         101.0       18      184
..          …       …       …
194        26.5       16       37
195        73.0       71       75
196        52.0       18       39
197       106.5       30      183
198       102.0       75      129

[199 rows x 9 columns]
```

[27]:
```
column_name = 'CustomerID'
column_standard = df1["CustomerID"].std()
print(column_standard)
```

```
59.00419132725263
```

[28]:
```
column_name = 'Age'
column_standard = df1["Age"].std()
print(column_standard)
```

```
17.236379758179037
```

[29]:
```
column_name = 'Spending_score'
column_standard = df1["Spending_score"].std()
print(column_standard)
```

```
30.427186269535365
```

[30]:
```
df1['Row_Standard'] = df1[['CustomerID', 'Age']].std(axis=1)

print(df1)
```

```
     CustomerID   Genre  Age  Annual_income_(k$)  Spending_score  Row_Mean  \
0            37    male   53                 102              20      28.5
1            25    male   42                  94              92      58.5
2            36    male   52                 124              30      33.0
3            16    male   29                  27              25      20.5
4           184    male   47                 118              18     101.0
..          …     …  …                   …               …       …
194          37    male   22                  33              16      26.5
195          75    male   30                  82              71      73.0
196          18    male   39                  85              86      52.0
197         183  female   78                 130              30     106.5
198         129  female   52                  50              75     102.0

     Row_Median  Row_Min  Row_Max  Row_Standard
0          28.5       20       53     11.313708
1          58.5       25       42     12.020815
```

```
2          33.0       30       52     11.313708
3          20.5       16       29      9.192388
4         101.0       18      184     96.873629
..          …        …        …          …
194        26.5       16       37     10.606602
195        73.0       71       75     31.819805
196        52.0       18       39     14.849242
197       106.5       30      183     74.246212
198       102.0       75      129     54.447222

[199 rows x 10 columns]
```

[31]:
```
df1.groupby(['Genre'])['Age'].mean()
```

[31]:
```
Genre
female    50.097087
male      47.635417
Name: Age, dtype: float64
```

[34]:
```
df_u=df1.rename(columns= {'Annual_income_(k$)':'Income'},inplace=False)
(df_u.groupby(['Genre']).Income.mean())
```

[34]:
```
Genre
female    86.184466
male      79.260417
Name: Income, dtype: float64
```

[35]:
```
from sklearn import preprocessing
enc = preprocessing.OneHotEncoder()
enc_df = pd.DataFrame(enc.fit_transform(df1[['Genre']]).toarray())
enc_df
```

[35]:
```
       0    1
0    0.0  1.0
1    0.0  1.0
2    0.0  1.0
3    0.0  1.0
4    0.0  1.0
..   …  …
194  0.0  1.0
195  0.0  1.0
196  0.0  1.0
197  1.0  0.0
198  1.0  0.0

[199 rows x 2 columns]
```

[37]:
```
df_encode =df_u.join(enc_df)
df_encode
```

[37]:

	CustomerID	Genre	Age	Income	Spending_score	Row_Mean	Row_Median	\
0	37	male	53	102	20	28.5	28.5	
1	25	male	42	94	92	58.5	58.5	
2	36	male	52	124	30	33.0	33.0	
3	16	male	29	27	25	20.5	20.5	
4	184	male	47	118	18	101.0	101.0	
..	…	…	…	…	…	…	…	
194	37	male	22	33	16	26.5	26.5	
195	75	male	30	82	71	73.0	73.0	
196	18	male	39	85	86	52.0	52.0	
197	183	female	78	130	30	106.5	106.5	
198	129	female	52	50	75	102.0	102.0	

	Row_Min	Row_Max	Row_Standard	0	1
0	20	53	11.313708	0.0	1.0
1	25	42	12.020815	0.0	1.0
2	30	52	11.313708	0.0	1.0
3	16	29	9.192388	0.0	1.0
4	18	184	96.873629	0.0	1.0
..	…	…	…	…	…
194	16	37	10.606602	0.0	1.0
195	71	75	31.819805	0.0	1.0
196	18	39	14.849242	0.0	1.0
197	30	183	74.246212	1.0	0.0
198	75	129	54.447222	1.0	0.0

[199 rows x 12 columns]

[38]:
```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from pandas import DataFrame, Series
import seaborn as ans
data = ans.load_dataset("iris")
data
```

[38]:

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	setosa
1	4.9	3.0	1.4	0.2	setosa
2	4.7	3.2	1.3	0.2	setosa
3	4.6	3.1	1.5	0.2	setosa
4	5.0	3.6	1.4	0.2	setosa
..	…	…	…	…	…
145	6.7	3.0	5.2	2.3	virginica

```
146           6.3          2.5           5.0          1.9  virginica
147           6.5          3.0           5.2          2.0  virginica
148           6.2          3.4           5.4          2.3  virginica
149           5.9          3.0           5.1          1.8  virginica

[150 rows x 5 columns]
```

[43]:
```
irisSet = (data['species']== 'Iris-setosa')
print('Iris-setosa')
print(data[irisSet].describe())
```

```
Iris-setosa
       sepal_length  sepal_width  petal_length  petal_width
count           0.0          0.0           0.0          0.0
mean            NaN          NaN           NaN          NaN
std             NaN          NaN           NaN          NaN
min             NaN          NaN           NaN          NaN
25%             NaN          NaN           NaN          NaN
50%             NaN          NaN           NaN          NaN
75%             NaN          NaN           NaN          NaN
max             NaN          NaN           NaN          NaN
```

[44]:
```
irisVer = (data['species']== 'Iris-versicolor')
```

[45]:
```
print('Iris-versicolor')
print(data[irisVer].describe())
```

```
Iris-versicolor
       sepal_length  sepal_width  petal_length  petal_width
count           0.0          0.0           0.0          0.0
mean            NaN          NaN           NaN          NaN
std             NaN          NaN           NaN          NaN
min             NaN          NaN           NaN          NaN
25%             NaN          NaN           NaN          NaN
50%             NaN          NaN           NaN          NaN
75%             NaN          NaN           NaN          NaN
max             NaN          NaN           NaN          NaN
```

[47]:
```
irisVir = (data['species']== 'Iris-virginica')
```

[48]:
```
print('Iris-virginica')
print(data[irisVir].describe())
```

```
Iris-virginica
       sepal_length  sepal_width  petal_length  petal_width
count           0.0          0.0           0.0          0.0
mean            NaN          NaN           NaN          NaN
std             NaN          NaN           NaN          NaN
```

```
min             NaN          NaN          NaN          NaN
25%             NaN          NaN          NaN          NaN
50%             NaN          NaN          NaN          NaN
75%             NaN          NaN          NaN          NaN
max             NaN          NaN          NaN          NaN
```

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