Preprocessing

In [1]:
```
import numpy as np
import matplotlib as mpl
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd
import pandas as pd
```

In [11]:
```
# Create dataframe for training dataset and print five first rows as preview
df = pd.read_csv('new_dataset.csv')
df.head()
```

Out[11]:

	pp	Condition	HR	RMSSD	SCL	Unnamed: 5	Unnamed: 6	Unnamed: 7	Unnamed: 8	Unnam
0	PP1	0	61.0	0.061420	80.239727	0.944941	0.968862	0.023946	0.001300	0.016
1	PP1	0	61.0	0.061420	77.365127	0.930303	0.884570	0.076952	0.001144	0.017
2	PP1	0	64.0	0.049663	77.359559	0.933104	0.931965	0.031468	0.000371	0.023
3	PP1	0	60.0	0.052487	76.728772	0.904466	0.806947	0.105516	0.006459	0.009
4	PP1	0	61.0	0.051189	76.512877	0.929025	0.951412	0.028358	0.001095	0.018

5 rows × 27 columns

In [12]:
```
#columns containg any null value
df.isnull().any()
```

Out[12]:
```
pp             False
Condition      False
HR              True
RMSSD           True
SCL             True
Unnamed: 5     False
Unnamed: 6     False
Unnamed: 7     False
Unnamed: 8     False
Unnamed: 9     False
Unnamed: 10    False
Unnamed: 11    False
Unnamed: 12    False
Unnamed: 13    False
Unnamed: 14     True
Unnamed: 15     True
Unnamed: 16     True
Unnamed: 17     True
Unnamed: 18     True
Unnamed: 19     True
Unnamed: 20     True
Unnamed: 21     True
Unnamed: 22     True
Unnamed: 23     True
Unnamed: 24     True
Unnamed: 25     True
Unnamed: 26     True
dtype: bool
```

In [13]:
```
#total num of null value in columns data
df.isnull().sum()
```

Out[13]:
```
pp               0
Condition        0
HR             561
RMSSD          563
SCL            106
Unnamed: 5       0
Unnamed: 6       0
Unnamed: 7       0
Unnamed: 8       0
Unnamed: 9       0
Unnamed: 10      0
Unnamed: 11      0
Unnamed: 12      0
Unnamed: 13      0
Unnamed: 14     45
Unnamed: 15     45
Unnamed: 16     45
Unnamed: 17     45
Unnamed: 18     45
Unnamed: 19     45
Unnamed: 20     45
Unnamed: 21     45
Unnamed: 22     45
Unnamed: 23     45
Unnamed: 24     45
Unnamed: 25     45
Unnamed: 26     45
dtype: int64
```

In [14]:
```
#not null value and datatype
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3138 entries, 0 to 3137
Data columns (total 27 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   pp           3138 non-null   object 
 1   Condition    3138 non-null   int64  
 2   HR           2577 non-null   float64
 3   RMSSD        2575 non-null   float64
 4   SCL          3032 non-null   float64
 5   Unnamed: 5   3138 non-null   float64
 6   Unnamed: 6   3138 non-null   float64
 7   Unnamed: 7   3138 non-null   float64
 8   Unnamed: 8   3138 non-null   float64
 9   Unnamed: 9   3138 non-null   float64
 10  Unnamed: 10  3138 non-null   float64
 11  Unnamed: 11  3138 non-null   float64
 12  Unnamed: 12  3138 non-null   float64
 13  Unnamed: 13  3138 non-null   float64
 14  Unnamed: 14  3093 non-null   float64
 15  Unnamed: 15  3093 non-null   float64
 16  Unnamed: 16  3093 non-null   float64
 17  Unnamed: 17  3093 non-null   float64
 18  Unnamed: 18  3093 non-null   float64
 19  Unnamed: 19  3093 non-null   float64
 20  Unnamed: 20  3093 non-null   float64
 21  Unnamed: 21  3093 non-null   float64
 22  Unnamed: 22  3093 non-null   float64
 23  Unnamed: 23  3093 non-null   float64
 24  Unnamed: 24  3093 non-null   float64
 25  Unnamed: 25  3093 non-null   float64
 26  Unnamed: 26  3093 non-null   float64
dtypes: float64(25), int64(1), object(1)
memory usage: 662.0+ KB
```

In [15]:
```
#rows and columns
print(df.shape)
```

```
(3138, 27)
```

Removing null values

In [16]:
```
#delete null values from dataset
df = df.dropna(axis = 0, how ='any')
```

In [17]:
```
#after removing null values length of our new dataset
#print("Old data frame length:", len(df), "\nNew data frame length:",len(df1), "\
```

In [18]:
```
print(df.shape)
```

```
(2502, 27)
```

In [22]:
```
df.columns=['PP','Condition','HR', 'RMSSD','SCL','Squality', 'Sneutral','Shappy',
            'SxHeadOrientation','SzHeadOrientation','SmouthOpen','SleftEyeClosed'
            'SrightEyebrowLowered','SrightEyebrowRaised','SgazeDirectionForward',
df['Condition'].unique()
```

Out[22]:
```
array([0, 1], dtype=int64)
```

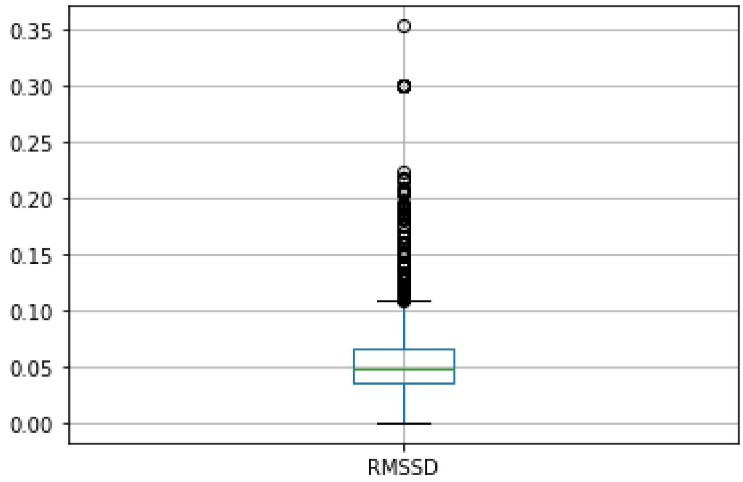
Type Conversion

In [24]:
```
df['PP'] = pd.to_numeric(df['PP'], errors='coerce')
print(df.dtypes)
```

```
PP                      float64
Condition                 int64
HR                      float64
RMSSD                   float64
SCL                     float64
Squality                float64
Sneutral                float64
Shappy                  float64
Ssad                    float64
Sangry                  float64
Ssurprised              float64
Sscared                 float64
Sdisgusted              float64
Svalence                float64
SyHeadOrientation       float64
SxHeadOrientation       float64
SzHeadOrientation       float64
SmouthOpen              float64
SleftEyeClosed          float64
SrightEyeClosed         float64
SleftEyebrowLowered     float64
SleftEyebrowRaised      float64
SrightEyebrowLowered    float64
SrightEyebrowRaised     float64
SgazeDirectionForward   float64
SgazeDirectionLeft      float64
SgazeDirectionRight     float64
dtype: object
```

In [25]:
```
df.boxplot(column=['RMSSD'])
```

Out[25]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x2ee60e8c820>
```



extra

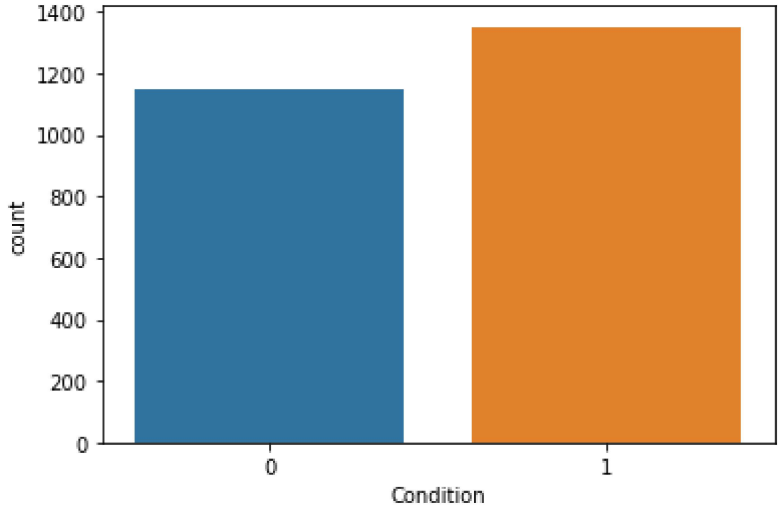
In [33]:
```
grouped = df.groupby(['Condition'])
grouped.aggregate(np.sum)
grouped.size()
```

Out[33]:
```
Condition
0    1150
1    1352
dtype: int64
```

----------DATA VISUALIZATION ----------

In [37]:
```
sns.countplot(df["Condition"])
print(df.Condition.value_counts())
```

```
1    1352
0    1150
Name: Condition, dtype: int64
```



HR RANGE

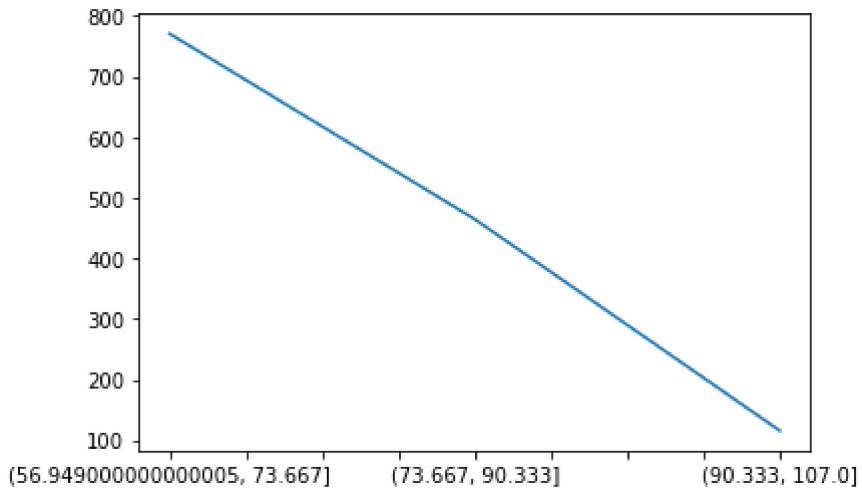
In [27]:
```
p=df['HR'].max()
q=df['HR'].min()
print("Minimum::",q)
print("Maximum::",p)
r=p-q
print("Range::",r)
n=3
a=df['HR'].value_counts(bins=n)# all HR data
print("\n\n---------------Stress or Non Stress HR Data--------------")
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a1=df_filtered_1['HR'].value_counts(bins=n)#stress
a0=df_filtered_0['HR'].value_counts(bins=n)#non stress
print("\n----------------Stress Data HR---------------------")
print(a1)
a1.plot()
```

```
Minimum:: 57.0
Maximum:: 107.0
Range:: 50.0


---------------Stress or Non Stress HR Data--------------
(56.949000000000005, 73.667]    1367
(73.667, 90.333]                 997
(90.333, 107.0]                  138
Name: HR, dtype: int64

----------------Stress Data HR---------------------
(56.949000000000005, 73.667]    771
(73.667, 90.333]                465
(90.333, 107.0]                 116
Name: HR, dtype: int64
```

Out[27]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x2ee616881f0>
```



HRV RANGE

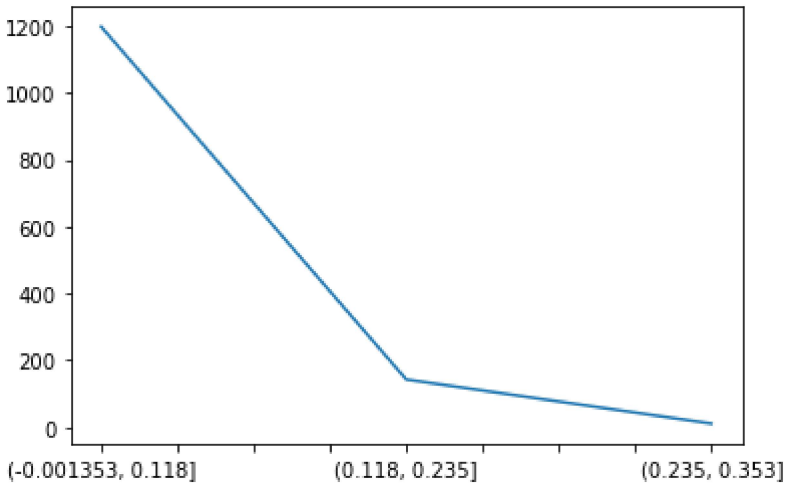
In [28]:
```
p=df['RMSSD'].max()
q=df['RMSSD'].min()
print("Minimum::",q)
print("Maximum::",p)
r=p-q
print("Range::",r,"\n\n")
n=3
a=df['RMSSD'].value_counts(bins=n)#all HRV/RMSSD data
print("---------------Stress or Non Stress HRV/RMSSD Data--------------")
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a1=df_filtered_1['RMSSD'].value_counts(bins=n)#stress data
a0=df_filtered_0['RMSSD'].value_counts(bins=n)#Non stress
print("\n---------------Stress HRV/RMSSD Data--------------")
print(a1)
a1.plot()
```

```
Minimum:: 0.0
Maximum:: 0.352978
Range:: 0.352978


---------------Stress or Non Stress HRV/RMSSD Data--------------
(-0.001353, 0.118]    2319
(0.118, 0.235]         172
(0.235, 0.353]          11
Name: RMSSD, dtype: int64

---------------Stress HRV/RMSSD Data--------------
(-0.001353, 0.118]    1198
(0.118, 0.235]         143
(0.235, 0.353]          11
Name: RMSSD, dtype: int64
```

Out[28]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x2ee616fdc10>
```



GSR DATA RANGE

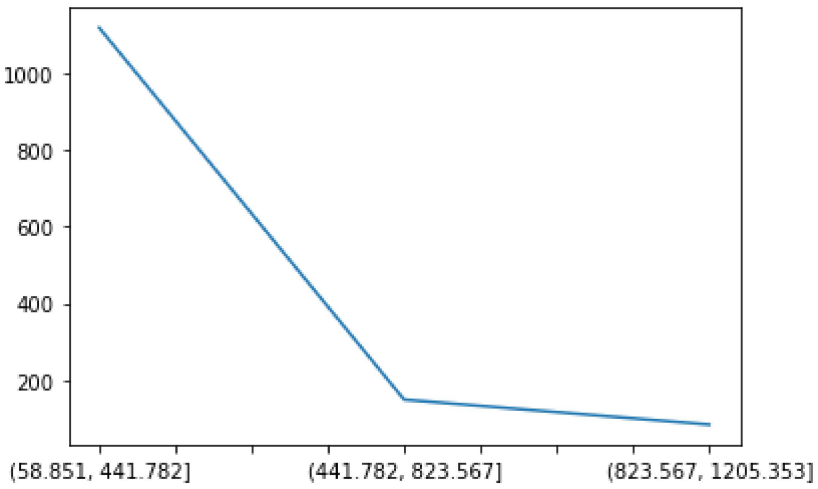
In [29]:
```
p=df['SCL'].max()
q=df['SCL'].min()
print("Minimum::",q)
print("Maximum::",p)
r=p-q
print("Range::",r,"\n\n")
n=3
a=df['SCL'].value_counts(bins=n)#all gsr/scl data
print("---------------Stress or Non Stress SCL Data---------------")
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a0=df_filtered_0['SCL'].value_counts(bins=n)#non stress
a1=df_filtered_1['SCL'].value_counts(bins=n)#non stress
print("\n---------------Stress SCL Data---------------")
print(a1)
a1.plot()
```

```
Minimum:: 53.252680000000005
Maximum:: 1455.23043
Range:: 1401.97775


---------------Stress or Non Stress SCL Data---------------
(51.85, 520.579]      2264
(520.579, 987.905]     188
(987.905, 1455.23]      50
Name: SCL, dtype: int64

---------------Stress SCL Data---------------
(58.851, 441.782]      1119
(441.782, 823.567]      149
(823.567, 1205.353]      84
Name: SCL, dtype: int64
```

Out[29]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x2ee617403a0>
```



In [53]:
```
n=12
a=df['Ssad'].value_counts(bins=n)#all gsr/scl data
print("-------------------Sad Data-------------------")
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a0=df_filtered_0['Ssad'].value_counts(bins=n)#non stress
a1=df_filtered_1['Ssad'].value_counts(bins=n)#non stress
print("\n::::::::::::::::::Non Stress Data::::::::::::::::::::")
print(a0)

n=10
a=df['SleftEyeClosed'].value_counts(bins=n)#all gsr/scl data
print("--------------------Left Eyes Data---------------------")
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a0=df_filtered_0['SleftEyeClosed'].value_counts(bins=n)#non stress
a1=df_filtered_1['SleftEyeClosed'].value_counts(bins=n)#non stress
print("\n::::::::::::::::::::Non Stress Data::::::::::::::::::::")
print(a0)

n=4
a=df['SrightEyeClosed'].value_counts(bins=n)#all gsr/scl data
print("\n---------------Right Eyes Data---------------")
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a0=df_filtered_0['SrightEyeClosed'].value_counts(bins=n)#non stress
a1=df_filtered_1['SrightEyeClosed'].value_counts(bins=n)#non stress
print("\n::::::::::::::::::Stress Data::::::::::::::::::::")
print(a1)

n=8
a=df['SleftEyebrowLowered'].value_counts(bins=n)#all gsr/scl data
print("---------------Left Eyes Data---------------")
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a0=df_filtered_0['SleftEyebrowLowered'].value_counts(bins=n)#non stress
a1=df_filtered_1['SleftEyebrowLowered'].value_counts(bins=n)#non stress
print("\n:::::::::::::::::::::::Non Stress Data:::::::::::::::::::::::")
print(a0)

a=df['SleftEyebrowRaised'].value_counts(bins=n)#all gsr/scl data
print("\n---------------Right Eyes Data---------------")
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a0=df_filtered_0['SleftEyebrowRaised'].value_counts(bins=n)#non stress
a1=df_filtered_1['SleftEyebrowRaised'].value_counts(bins=n)#non stress
print("\n::::::::::::::::::::Non Stress Data:::::::::::::::::::::")
print(a0)

a=df['SrightEyebrowLowered'].value_counts(bins=n)#all gsr/scl data
print("-----------------------Left Eyes Data-----------------------")
```

```
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a0=df_filtered_0['SrightEyebrowLowered'].value_counts(bins=n)#non stress
a1=df_filtered_1['SrightEyebrowLowered'].value_counts(bins=n)#non stress
print("\n::::::::::::::::::::Non Stress Data::::::::::::::::::::")
print(a0)

a=df['SrightEyebrowRaised'].value_counts(bins=n)#all gsr/scl data
print("\n-----------------------Right Eyes Data----------------------")
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a0=df_filtered_0['SrightEyebrowRaised'].value_counts(bins=n)#non stress
a1=df_filtered_1['SrightEyebrowRaised'].value_counts(bins=n)#non stress
print("\n::::::::::::::::::Non Stress Data::::::::::::::::::")
print(a0)

n=15
a=df['Svalence'].value_counts(bins=n)#all gsr/scl data
print("\n----------------------Svalence-----------------------")
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a0=df_filtered_0['Svalence'].value_counts(bins=n)#non stress
a1=df_filtered_1['Svalence'].value_counts(bins=n)#non stress
print("\n:::::::::::::::::::::Non Stress Data:::::::::::::::::::::")
print(a0)

a=df['Shappy'].value_counts(bins=n)#all gsr/scl data
print("\n---------------------Happy Data----------------------")
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a0=df_filtered_0['Shappy'].value_counts(bins=n)#non stress
a1=df_filtered_1['Shappy'].value_counts(bins=n)#non stress
print("\n::::::::::::::::::Non Stress Data::::::::::::::::::::\n")
print(a0)

n=10
a=df['Sangry'].value_counts(bins=n)#all gsr/scl data
print("\n-------------------------Sad Data-------------------------")
print(a)
df_filtered_1 = df.query('Condition == 1')#stress
df_filtered_0 = df.query('Condition == 0')#non stress
a0=df_filtered_0['Sangry'].value_counts(bins=n)#non stress
a1=df_filtered_1['Sangry'].value_counts(bins=n)#non stress
print("\n::::::::::::::::::::Non Stress Data::::::::::::::::::::")
print(a0)
```

```
---------------Sad Data---------------
(-0.0016970000000000002, 0.0581]    1762
(0.0581, 0.116]                      428
(0.116, 0.174]                       174
(0.174, 0.232]                        73
(0.232, 0.29]                         36
(0.29, 0.348]                         20
```

```
(0.464, 0.522]                          3
(0.348, 0.406]                          3
(0.406, 0.464]                          2
(0.639, 0.697]                          1
(0.581, 0.639]                          0
(0.522, 0.581]                          0
Name: Ssad, dtype: int64

::::::::::::::::::Non Stress Data::::::::::::::::::::
(-0.0016970000000000002, 0.0581]    814
(0.0581, 0.116]                     192
(0.116, 0.174]                       77
(0.174, 0.232]                       36
(0.232, 0.29]                        15
(0.29, 0.348]                        10
(0.464, 0.522]                        2
(0.348, 0.406]                        2
(0.639, 0.697]                        1
(0.406, 0.464]                        1
(0.581, 0.639]                        0
(0.522, 0.581]                        0
Name: Ssad, dtype: int64
---------------Left Eyes Data---------------
(-0.00243, 0.143]    1773
(0.143, 0.287]        347
(0.287, 0.43]         164
(0.43, 0.573]         105
(0.573, 0.716]         45
(0.716, 0.86]          35
(0.86, 1.003]          31
(1.289, 1.433]          2
(1.146, 1.289]          0
(1.003, 1.146]          0
Name: SleftEyeClosed, dtype: int64

::::::::::::::::::::Non Stress Data::::::::::::::::::::
(-0.00243, 0.143]    844
(0.143, 0.287]       133
(0.287, 0.43]         69
(0.43, 0.573]         50
(0.573, 0.716]        26
(0.716, 0.86]         21
(0.86, 1.003]          5
(1.289, 1.433]         2
(1.146, 1.289]         0
(1.003, 1.146]         0
Name: SleftEyeClosed, dtype: int64

---------------Right Eyes Data---------------
(-0.001979, 0.245]    2117
(0.245, 0.489]         267
(0.489, 0.734]          82
(0.734, 0.979]          36
Name: SrightEyeClosed, dtype: int64

::::::::::::::::::Stress Data::::::::::::::::::::
(-0.001979, 0.245]    1147
```

```
(0.245, 0.489]         140
(0.489, 0.734]          35
(0.734, 0.979]          30
Name: SrightEyeClosed, dtype: int64
---------------Left Eyes Data---------------
(-0.001983, 0.123]    1519
(0.123, 0.246]         262
(0.246, 0.369]         243
(0.369, 0.491]         173
(0.491, 0.614]         146
(0.614, 0.737]          81
(0.737, 0.86]           51
(0.86, 0.983]           27
Name: SleftEyebrowLowered, dtype: int64

:::::::::::::::::::::::Non Stress Data:::::::::::::::::::::::
(-0.00195, 0.119]    682
(0.237, 0.356]       111
(0.119, 0.237]       103
(0.356, 0.475]        81
(0.475, 0.593]        76
(0.593, 0.712]        42
(0.712, 0.831]        36
(0.831, 0.95]         19
Name: SleftEyebrowLowered, dtype: int64

---------------Right Eyes Data---------------
(-0.001996, 0.124]    1642
(0.124, 0.249]         247
(0.249, 0.373]         168
(0.373, 0.498]         126
(0.498, 0.622]          95
(0.747, 0.871]          81
(0.871, 0.996]          73
(0.622, 0.747]          70
Name: SleftEyebrowRaised, dtype: int64

::::::::::::::::::::Non Stress Data::::::::::::::::::::
(-0.001996, 0.124]    767
(0.124, 0.249]        124
(0.249, 0.373]         80
(0.373, 0.498]         52
(0.871, 0.996]         36
(0.747, 0.871]         33
(0.622, 0.747]         29
(0.498, 0.622]         29
Name: SleftEyebrowRaised, dtype: int64
-----------------------Left Eyes Data-------------------------
(-0.001996, 0.124]    1772
(0.124, 0.249]         243
(0.249, 0.373]         149
(0.373, 0.498]         109
(0.871, 0.996]          97
(0.498, 0.622]          59
(0.747, 0.871]          38
(0.622, 0.747]          35
Name: SrightEyebrowLowered, dtype: int64
```

```
::::::::::::::::::::Non Stress Data::::::::::::::::::::
(-0.001996, 0.124]    805
(0.124, 0.249]        111
(0.249, 0.373]         77
(0.373, 0.498]         51
(0.871, 0.996]         46
(0.498, 0.622]         27
(0.747, 0.871]         18
(0.622, 0.747]         15
Name: SrightEyebrowLowered, dtype: int64

-----------------------Right Eyes Data----------------------
(-0.00214, 0.143]    2022
(0.143, 0.286]        140
(0.858, 1.001]        121
(0.429, 0.572]         64
(0.286, 0.429]         57
(0.715, 0.858]         48
(0.572, 0.715]         48
(1.001, 1.144]          2
Name: SrightEyebrowRaised, dtype: int64

::::::::::::::::::::Non Stress Data::::::::::::::::::::
(-0.00214, 0.143]    947
(0.143, 0.286]        78
(0.858, 1.001]        58
(0.429, 0.572]        23
(0.286, 0.429]        17
(0.572, 0.715]        13
(0.715, 0.858]        12
(1.001, 1.144]         2
Name: SrightEyebrowRaised, dtype: int64

----------------------Svalence-------------------------
(-0.0294, 0.0542]    1117
(-0.113, -0.0294]     803
(-0.197, -0.113]      246
(-0.28, -0.197]       124
(0.0542, 0.138]        99
(-0.364, -0.28]        41
(0.138, 0.221]         32
(0.221, 0.305]         17
(0.305, 0.389]         11
(-0.448, -0.364]        4
(-0.531, -0.448]        3
(0.389, 0.472]          2
(0.556, 0.64]           1
(0.472, 0.556]          1
(-0.617, -0.531]        1
Name: Svalence, dtype: int64

::::::::::::::::::::Non Stress Data::::::::::::::::::::
(-0.0294, 0.0542]    570
(-0.113, -0.0294]    298
(-0.197, -0.113]      88
(0.0542, 0.138]       61
```

```
(-0.28, -0.197]       61
(0.138, 0.221]        23
(-0.364, -0.28]       16
(0.221, 0.305]        13
(0.305, 0.389]        10
(-0.448, -0.364]       3
(0.389, 0.472]         2
(-0.531, -0.448]       2
(0.556, 0.64]          1
(0.472, 0.556]         1
(-0.617, -0.531]       1
Name: Svalence, dtype: int64

--------------------Happy Data-----------------------
(-0.001923, 0.0615]    2163
(0.0615, 0.123]         204
(0.123, 0.185]           57
(0.185, 0.246]           32
(0.308, 0.369]           19
(0.246, 0.308]           19
(0.677, 0.738]            2
(0.369, 0.431]            2
(0.861, 0.923]            1
(0.615, 0.677]            1
(0.554, 0.615]            1
(0.431, 0.492]            1
(0.8, 0.861]              0
(0.738, 0.8]              0
(0.492, 0.554]            0
Name: Shappy, dtype: int64

::::::::::::::::::::Non Stress Data:::::::::::::::::::::::

(-0.001923, 0.0615]    919
(0.0615, 0.123]        119
(0.123, 0.185]          45
(0.185, 0.246]          26
(0.246, 0.308]          18
(0.308, 0.369]          15
(0.677, 0.738]           2
(0.369, 0.431]           2
(0.861, 0.923]           1
(0.615, 0.677]           1
(0.554, 0.615]           1
(0.431, 0.492]           1
(0.8, 0.861]             0
(0.738, 0.8]             0
(0.492, 0.554]           0
Name: Shappy, dtype: int64

-------------------------Sad Data---------------------------
(-0.0013210000000000001, 0.0321]    1951
(0.0321, 0.0642]                     276
(0.0642, 0.0963]                     116
(0.0963, 0.128]                       71
(0.128, 0.16]                         31
(0.16, 0.193]                         24
```

```
(0.193, 0.225]                        18
(0.225, 0.257]                        10
(0.289, 0.321]                         3
(0.257, 0.289]                         2
Name: Sangry, dtype: int64

::::::::::::::::::::Non Stress Data::::::::::::::::::::
(-0.0013210000000000001, 0.0321]    924
(0.0321, 0.0642]                    114
(0.0642, 0.0963]                     34
(0.0963, 0.128]                      31
(0.16, 0.193]                        13
(0.128, 0.16]                        13
(0.193, 0.225]                       11
(0.225, 0.257]                        7
(0.289, 0.321]                        2
(0.257, 0.289]                        1
Name: Sangry, dtype: int64
```

---------- PRE MODELING TASK ----------

SPLITING DATASET

In [48]:
```
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split, GridSearchCV
from sklearn.metrics import accuracy_score, confusion_matrix
from sklearn.neighbors import KNeighborsClassifier, NeighborhoodComponentsAnalysi
from sklearn.decomposition import PCA

X = df.drop(['Condition'], 1)
Y = df['Condition']
#to standardize the range
scaler = StandardScaler()
X_train = scaler.fit_transform(X_train)
X_test = scaler.transform(X_test)

X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size = 0.20, randc
print("X_train",len(X_train))
print("X_test",len(X_test))
print("Y_train",len(Y_train))
print("Y_test",len(Y_test))
```

```
X_train 2001
X_test 501
Y_train 2001
Y_test 501

C:\Users\Drashti\anaconda3\lib\site-packages\sklearn\utils\extmath.py:770: Runt
imeWarning: invalid value encountered in true_divide
  updated_mean = (last_sum + new_sum) / updated_sample_count
C:\Users\Drashti\anaconda3\lib\site-packages\sklearn\utils\extmath.py:711: Runt
imeWarning: Degrees of freedom <= 0 for slice.
  result = op(x, *args, **kwargs)
```