# Machine Learning Assignment 2

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**Video Link :** https://drive.google.com/file/d/1LimeXfq0-P58aUj1e31ate7CUsrdByc0/view?usp=sharing

**Github Link:** https://github.com/YedidiJayanth/Assignment-2

In [107]:
```
import warnings
import numpy as np
import pandas as pd
import seaborn as sns
from sklearn import preprocessing
import matplotlib.pyplot as plt
from sklearn.naive_bayes import GaussianNB
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score, recall_score, precision_score, classification_report, confusion_matrix
warnings.filterwarnings("ignore")
```

In [108]:
```
#1. Read the provided CSV file 'data.csv'. https://drive.google.com/drive/folders/1h8C3mLsso-R-sIOLsvoYwPLzy2fJ4IOF?usp
df = pd.read_csv("/Users/snush/OneDrive/Desktop/dataset/data.csv")
print(df.head())
```

```
   Duration  Pulse  Maxpulse  Calories
0        60    110       130     409.1
1        60    117       145     479.0
2        60    103       135     340.0
3        45    109       175     282.4
4        45    117       148     406.0
```

In [109]:
```
#2. Show the basic statistical description about the data.
print(df.describe())
```

```
         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
```

In [110]:
```
df.isnull().any()
```

In [110]:
```
df.isnull().any()
```

Out[110]:
```
Duration    False
Pulse       False
Maxpulse    False
Calories     True
dtype: bool
```

In [111]:
```
#Replace the null values with the mean
df.fillna(df.mean(), inplace=True)
df.isnull().any()
```

Out[111]:
```
Duration    False
Pulse       False
Maxpulse    False
Calories    False
dtype: bool
```

In [112]:
```
df.agg({'Duration':['min','max','count','mean'],'Pulse':['min','max','count','mean']})
```

Out[112]:

| | Duration | Pulse |
|---|---|---|
| **min** | 15.000000 | 80.000000 |
| **max** | 300.000000 | 159.000000 |
| **count** | 169.000000 | 169.000000 |
| **mean** | 63.846154 | 107.461538 |

Run Code

In [113]:
```
df.loc[(df['Calories']>500)&(df['Calories']<1000)]
```

Out[113]:

| | Duration | Pulse | Maxpulse | Calories |
|---|---|---|---|---|
| **51** | 80 | 123 | 146 | 643.1 |
| **62** | 160 | 109 | 135 | 853.0 |
| **65** | 180 | 90 | 130 | 800.4 |
| **66** | 150 | 105 | 135 | 873.4 |
| **67** | 150 | 107 | 130 | 816.0 |
| **72** | 90 | 100 | 127 | 700.0 |
| **73** | 150 | 97 | 127 | 953.2 |
| **75** | 90 | 98 | 125 | 563.2 |
| **78** | 120 | 100 | 130 | 500.4 |
| **90** | 180 | 101 | 127 | 600.1 |
| **99** | 90 | 93 | 124 | 604.1 |
| **103** | 90 | 90 | 100 | 500.4 |
| **106** | 180 | 90 | 120 | 800.3 |
| **108** | 90 | 90 | 120 | 500.3 |

In [114]:
```
#6. Filter the dataframe to select the rows with calories values > 500 and pulse < 100.
df.loc[(df['Calories']>500)&(df['Pulse']<100)]
```

Out[114]:

| | 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 |

In [115]:
```
#7. Create a new "df_modified" dataframe that contains all the columns from df except for "Maxpulse".
df_modified = df[['Duration','Pulse','Calories']]
df_modified.head()
```

Out[115]:

| | 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 |

In [116]:
```
#8. Delete the "Maxpulse" column from the main df dataframe
del df['Maxpulse']
```

In [117]:
```
df.head()
```

Out[117]:

| | 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 |

In [118]:
```
df.dtypes
```

Out[118]:
```
Duration      int64
Pulse         int64
Calories    float64
dtype: object
```

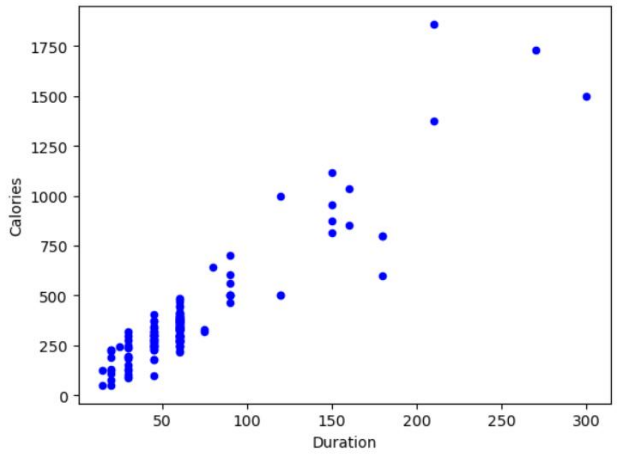
In [119]:
```
df['Calories'] = df['Calories'].astype(np.int64)
df.dtypes
```

Out[119]:
```
Duration    int64
Pulse       int64
Calories    int64
dtype: object
```



In [120]:
```
df.plot.scatter(x='Duration',y='Calories',c='blue')
```

Out[120]: <Axes: xlabel='Duration', ylabel='Calories'>



In [16]:
```
# In[26]:
#Question 2

import warnings
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from scipy.stats.stats import pearsonr
from sklearn.naive_bayes import GaussianNB
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score, recall_score, precision_score, classification_report, confusion_matrix

get_ipython().run_line_magic('matplotlib', 'inline')
# Suppress warnings
warnings.filterwarnings("ignore")
glass_data=pd.read_csv("/Users/snush/OneDrive/Desktop/dataset/glass.csv")
X = glass_data.drop('Type', axis=1)
y = glass_data['Type']
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

In [18]:
```
classifier = GaussianNB()

classifier.fit(X_train, y_train)
```

Out[18]:
```
GaussianNB()
```

In [19]:
```
y_pred = classifier.predict(X_test)
accuracy = classifier.score(X_test, y_test)
print("Accuracy:", accuracy)

print(classification_report(y_test, y_pred))
```

```
Accuracy: 0.5581395348837209
              precision    recall  f1-score   support

           1       0.41      0.64      0.50        11
           2       0.43      0.21      0.29        14
           3       0.40      0.67      0.50         3
           5       0.50      0.25      0.33         4
           6       1.00      1.00      1.00         3
           7       0.89      1.00      0.94         8

    accuracy                           0.56        43
   macro avg       0.60      0.63      0.59        43
weighted avg       0.55      0.56      0.53        43
```

In [30]:
```
from sklearn.svm import SVC, LinearSVC
classifier = LinearSVC()
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

In [31]:
```
svm_classifier = SVC(kernel='linear')
svm_classifier.fit(X_train, y_train)
```

Out[31]:
```
SVC(kernel='linear')
```

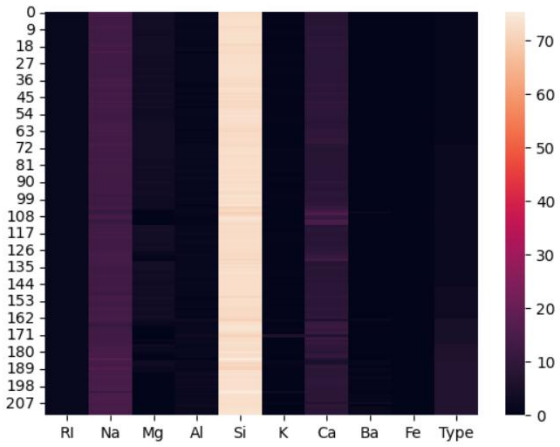
In [32]:
```
y_pred = svm_classifier.predict(X_test)
```

In [33]:
```
accuracy = svm_classifier.score(X_test, y_test)
print("Accuracy:", accuracy)
```

```
Accuracy: 0.7441860465116279
```

In [34]:
```
sns.heatmap(data=glass) #HeatMap Visualization for above dataset
```

Out[34]: <Axes: >




In [35]:
```
sns.scatterplot(data=glass)  #ScatterPlot Visualization for above dataset
```

Out[35]: <Axes: >