Experiment No - 01

**Problem Statement:** Python Libraries for Data Science:

a. Pandas Library b. Numpy Library c. Scikit Learn Library d. Matplotlib.

**Practical Related Theory.**

**Write down each Library functions Description in brief.**

**a) Pandas Library:**

1. **Read Data**: We can read data in pandas data frame as read\_csv(). Two most used data read formats are csv and excel. If we are reading data in excel format, we can also give sheet names as follows. There are other less used options of other file types too.
2. **Head and Tail :** To see the data frame we can use df.head(). Head returns the first rows, if no input is given it will always show above 5 rows.
3. **Shape, Size and Info:** Two most basic functions after reading data is to know the number of rows and columns, and to know the datatype of variables. We can use df.shape, it gives a total number of rows and then columns. df.size() returns the number of rows times number of columns in the data frame. We can also use df.info(), from that we get different information such as rows from RangeIndex, Data columns and then data type of each column. It also includes the information of non-null counts.

**Program :**

df.shape

df.info()

1. **Isna :** to get the total number of null values in a data
2. **Describe:** to understand basic statistics of variables we can use df.describe().It will give you count, mean, standard deviation, and also 5 number summary.
3. **Nunique:** To get the total unique values of variables, we can use df.nunique(). It will give all the unique values a variable contains.
4. **Value Counts:** to get the unique values of a single variable,

**b) Numpy Library :**

NumPy is a Python library used for working with arrays. It also has functions for working in domain of linear algebra, fourier transform, and matrices

1. Import NumPy : once NumPy is installed, import it in your applications by adding the **import** keyword:

2. To find verson :

import numpy as np

print(np.\_\_version\_\_)

Output :

1.16.2

**Functions :**

1. min and max:  used to find the minimum and maximum value of a NumPy array
2. mean:  used to find the mean value of the NumPy array
3. std:  used to find the standard deviation of the NumPy array
4. median:  used to find the median of a NumPy array
5. percentile:  used to find the percentile in a NumPy array
6. stack: used to join the sequence of an array along a new axis
7. vstack: used to join the sequence of an array along a new axis vertically
8. hstack: used to join the sequence of an array along a new axis horizontally
9. sort: used to get a sorted array.

**c) Scikit Library Functions :**

It provides a selection of efficient tools for machine learning and statistical modeling including classification, regression, clustering and dimensionality reduction via a consistence interface in Python

**d) Matplotlib:**

Matplotlib is a comprehensive library for creating static, animated, and interactive visualizations in Python. Matplotlib makes easy things easy and hard things possible.

**Write Python code for the each functions of Library: -**

1. **Panda Library** :
2. Import pandas as pd

df= pd.read\_csv(“sample.csv”)

"\n",

"#print(df.to\_string()) \n",

"\n",

"\n",

"print(df.head(10))"

]

1. **MatPlotLib:**

"source": [

"import pandas as pd\n",

"import matplotlib.pyplot as plt\n",

"\n",

"df = pd.read\_csv('C:/Users/abhay.vyas/Downloads/data.csv')\n",

"\n",

"df.plot()\n",

"\n",

"plt.show()"

]

},

1. import pandas as pd

import matplotlib.pyplot as plt

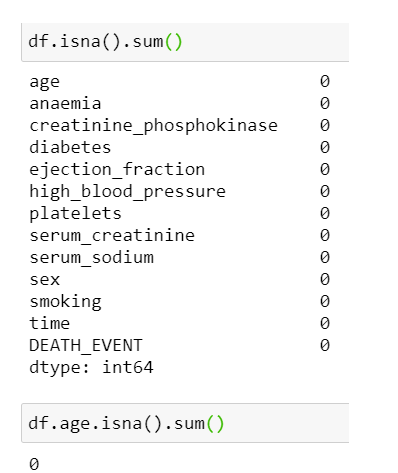
df = pd.read\_csv(&#39;C:/Users/abhay.vyas/Downloads/data.csv&#39;)

df.plot()

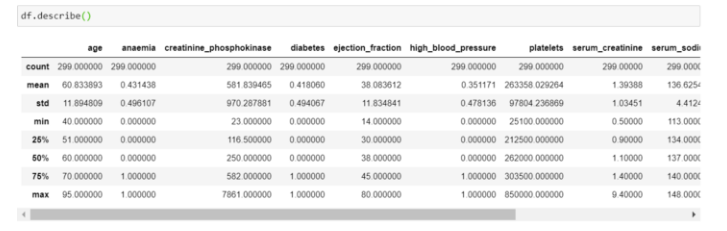
plt.show()

**Write down output of above source code: -**

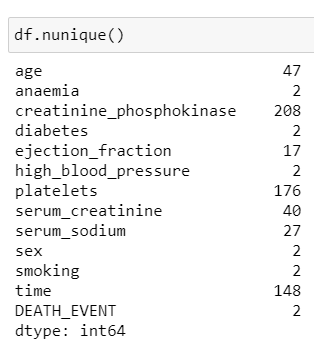
**1.isna ():**



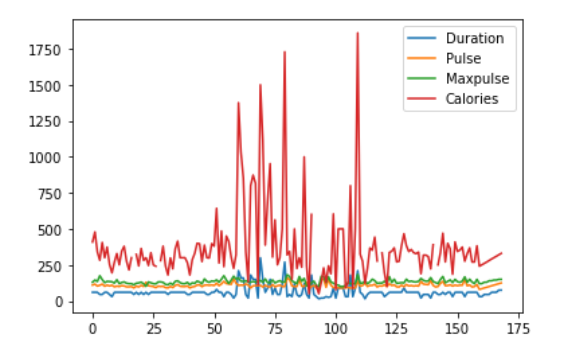
1. **Describe ():**

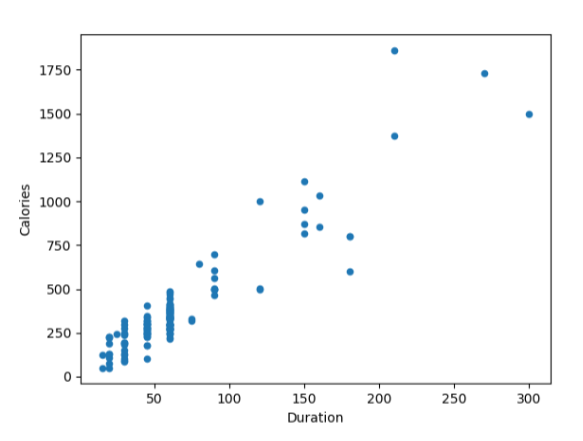


1. **Nunique():**



1. **Matplotlib:**





Experiment No - 02

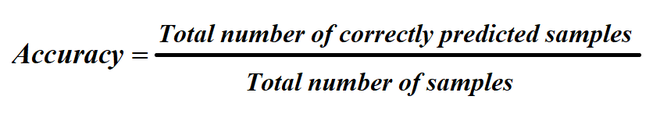
**Problem Statement:** Evaluation Metrics a. Accuracy b. Precision c. Recall d. F1-Score

**Practical Related Theory.**

**Write down description about each Evaluation Metrics in brief**

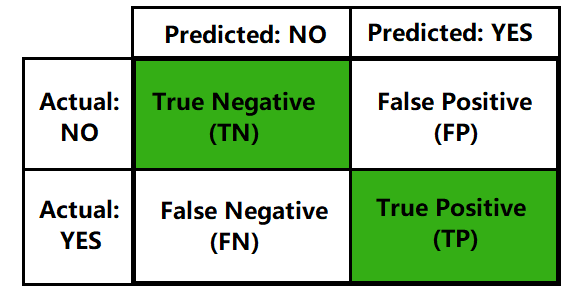
**Accuracy**

The accuracy of a classifier is calculated as the ratio of the total number of correctly predicted samples by the total number of samples.



**Confusion Matrix**

A confusion matrix is an N dimensional square matrix, where N represents total number of target classes or categories. Confusion matrix can be used to evaluate a classifier whenever the data set is imbalanced. Let us consider a binary classification problem i.e. the number of target classes are 2. A typical confusion matrix with two target classes (say “Yes” and “No”) looks like:



**Write Python code for the above problem statement.: -**

**Accuracy:**

|  |
| --- |
| # Importing all necessary libraries |
|  | from sklearn.metrics import accuracy\_score |
|  | # Calculating the accuracy of classifier |
|  | print(f"Accuracy of the classifier is: {accuracy\_score(y\_test, predictions)}") |

Confusion Matrics:

|  |
| --- |
| import matplotlib.pyplot as plt |
|  | from sklearn.metrics import confusion\_matrix |
|  | from sklearn.metrics import plot\_confusion\_matrix |
|  |  |
|  | # confusion\_matrix funnction a matrix containing the summary of predictions |
|  | print(confusion\_matrix(y\_test, predictions)) |
|  |  |
|  | # plot\_confusion\_matrix function is used to visualize the confusion matrix |
|  | plot\_confusion\_matrix(classifier, X\_test, y\_test) |
|  | plt.show() |

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**Write down output of above source code: -**

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Experiment No - 03

**Problem Statement:** Train and Test Sets by Splitting Learn and Test Data.

**Practical Related Theory.**

**Write down theory in brief for the above problem statement.**

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**Write Python code for the above problem statement.: -**

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**Write down output of above source code: -**

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Experiment No - 04

**Problem Statement** Linear Regression: Simple Linear Regression

**Practical Related Theory.**

**Write down theory in brief for the above problem statement.**

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**Write Python code for the above problem statement.: -**

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**Write down output of above source code: -**

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Experiment No - 05

**Problem Statement:** Multivariable Regression

**Practical Related Theory.**

**Write down theory in brief for the above problem statement.**

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**Write Python code for the above problem statement.: -**

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**Write down output of above source code: -**

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Experiment No - 06

**Problem Statement:** Decision Tree Algorithm implementation

**Practical Related Theory.**

**Write down theory in brief for the above problem statement.**

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**Write Python code for the above problem statement.: -**

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**Write down output of above source code: -**

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Experiment No - 07

**Problem Statement:** Random Forest Algorithm implementation. **Practical Related Theory.**

**Write down theory in brief for the above problem statement.**

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**Write Python code for the above problem statement.: -**

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**Write down output of above source code: -**

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Experiment No - 08

**Problem Statement:** Naive Bayes Classification Algorithm implementation.

**Practical Related Theory.**

**Write down theory in brief for the above problem statement.**

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**Write Python code for the above problem statement.: -**

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**Write down output of above source code: -**

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Experiment No - 09

**Problem Statement:** K-Nearest Neighbor Algorithm implementation

**Practical Related Theory.**

**Write down theory in brief for the above problem statement.**

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**Write Python code for the above problem statement.: -**

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**Write down output of above source code: -**

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Experiment No - 10

**Problem Statement:** SVM Algorithm implementation.

**Practical Related Theory.**

**Write down theory in brief for the above problem statement.**

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**Write Python code for the above problem statement.: -**

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**Write down output of above source code: -**

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