```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

data=pd.read_csv('Iris.csv')

data.info() # Non-Null Count no missing values
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 6 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Id             150 non-null    int64
 1   SepalLengthCm  150 non-null    float64
 2   SepalWidthCm   150 non-null    float64
 3   PetalLengthCm  150 non-null    float64
 4   PetalWidthCm   150 non-null    float64
 5   Species        150 non-null    object
dtypes: float64(4), int64(1), object(1)
memory usage: 7.2+ KB
```

```
data.head()
```

```
   Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm
Species
0   1            5.1           3.5            1.4           0.2  Iris-
setosa
1   2            4.9           3.0            1.4           0.2  Iris-
setosa
2   3            4.7           3.2            1.3           0.2  Iris-
setosa
3   4            4.6           3.1            1.5           0.2  Iris-
setosa
4   5            5.0           3.6            1.4           0.2  Iris-
setosa
```

```
data.shape
```

```
(150, 6)
```

```
data.describe()
```

```
               Id  SepalLengthCm  SepalWidthCm  PetalLengthCm
PetalWidthCm
count  150.000000     150.000000    150.000000     150.000000
150.000000
mean    75.500000       5.843333      3.054000       3.758667
1.198667
std     43.445368       0.828066      0.433594       1.764420
0.763161
min      1.000000       4.300000      2.000000       1.000000
```

```
0.100000
25%     38.250000       5.100000      2.800000       1.600000
0.300000
50%     75.500000       5.800000      3.000000       4.350000
1.300000
75%    112.750000       6.400000      3.300000       5.100000
1.800000
max    150.000000       7.900000      4.400000       6.900000
2.500000
```

```
x=data[['Id','SepalLengthCm','SepalWidthCm','PetalLengthCm','PetalWidt
hCm']]
```

```
print(x)
```

```
      Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm
0      1            5.1           3.5            1.4           0.2
1      2            4.9           3.0            1.4           0.2
2      3            4.7           3.2            1.3           0.2
3      4            4.6           3.1            1.5           0.2
4      5            5.0           3.6            1.4           0.2
..   ...            ...           ...            ...           ...
145  146            6.7           3.0            5.2           2.3
146  147            6.3           2.5            5.0           1.9
147  148            6.5           3.0            5.2           2.0
148  149            6.2           3.4            5.4           2.3
149  150            5.9           3.0            5.1           1.8

[150 rows x 5 columns]
```

```
y=data[['Species']]
```

```
print(y)
```

```
            Species
0       Iris-setosa
1       Iris-setosa
2       Iris-setosa
3       Iris-setosa
4       Iris-setosa
..              ...
145  Iris-virginica
146  Iris-virginica
147  Iris-virginica
148  Iris-virginica
149  Iris-virginica

[150 rows x 1 columns]
```

```
from sklearn.model_selection import train_test_split
```

```
x_train,x_test,y_train,y_test=
train_test_split(x,y,test_size=0.33,random_state=0)

print(x_train)
```

```
      Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm
69    70            5.6           2.5            3.9           1.1
135  136            7.7           3.0            6.1           2.3
56    57            6.3           3.3            4.7           1.6
80    81            5.5           2.4            3.8           1.1
123  124            6.3           2.7            4.9           1.8
..   ...            ...           ...            ...           ...
9     10            4.9           3.1            1.5           0.1
103  104            6.3           2.9            5.6           1.8
67    68            5.8           2.7            4.1           1.0
117  118            7.7           3.8            6.7           2.2
47    48            4.6           3.2            1.4           0.2

[100 rows x 5 columns]
```

```
print(x_test)
```

```
      Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm
114  115            5.8           2.8            5.1           2.4
62    63            6.0           2.2            4.0           1.0
33    34            5.5           4.2            1.4           0.2
107  108            7.3           2.9            6.3           1.8
7      8            5.0           3.4            1.5           0.2
100  101            6.3           3.3            6.0           2.5
40    41            5.0           3.5            1.3           0.3
86    87            6.7           3.1            4.7           1.5
76    77            6.8           2.8            4.8           1.4
71    72            6.1           2.8            4.0           1.3
134  135            6.1           2.6            5.6           1.4
51    52            6.4           3.2            4.5           1.5
73    74            6.1           2.8            4.7           1.2
54    55            6.5           2.8            4.6           1.5
63    64            6.1           2.9            4.7           1.4
37    38            4.9           3.1            1.5           0.1
78    79            6.0           2.9            4.5           1.5
90    91            5.5           2.6            4.4           1.2
45    46            4.8           3.0            1.4           0.3
16    17            5.4           3.9            1.3           0.4
121  122            5.6           2.8            4.9           2.0
66    67            5.6           3.0            4.5           1.5
24    25            4.8           3.4            1.9           0.2
8      9            4.4           2.9            1.4           0.2
126  127            6.2           2.8            4.8           1.8
22    23            4.6           3.6            1.0           0.2
44    45            5.1           3.8            1.9           0.4
97    98            6.2           2.9            4.3           1.3
```

```
93    94            5.0            2.3            3.3            1.0
26    27            5.0            3.4            1.6            0.4
137  138            6.4            3.1            5.5            1.8
84    85            5.4            3.0            4.5            1.5
27    28            5.2            3.5            1.5            0.2
127  128            6.1            3.0            4.9            1.8
132  133            6.4            2.8            5.6            2.2
59    60            5.2            2.7            3.9            1.4
18    19            5.7            3.8            1.7            0.3
83    84            6.0            2.7            5.1            1.6
61    62            5.9            3.0            4.2            1.5
92    93            5.8            2.6            4.0            1.2
112  113            6.8            3.0            5.5            2.1
2      3            4.7            3.2            1.3            0.2
141  142            6.9            3.1            5.1            2.3
43    44            5.0            3.5            1.6            0.6
10    11            5.4            3.7            1.5            0.2
60    61            5.0            2.0            3.5            1.0
116  117            6.5            3.0            5.5            1.8
144  145            6.7            3.3            5.7            2.5
119  120            6.0            2.2            5.0            1.5
108  109            6.7            2.5            5.8            1.8
```

```
x_test.count()
```

```
Id               50
SepalLengthCm    50
SepalWidthCm     50
PetalLengthCm    50
PetalWidthCm     50
dtype: int64
```

```
x_train.count()
```

```
Id               100
SepalLengthCm    100
SepalWidthCm     100
PetalLengthCm    100
PetalWidthCm     100
dtype: int64
```

```
print(y_test)
```

```
             Species
114   Iris-virginica
62   Iris-versicolor
33       Iris-setosa
107   Iris-virginica
7        Iris-setosa
100   Iris-virginica
40       Iris-setosa
```

```
86   Iris-versicolor
76   Iris-versicolor
71   Iris-versicolor
134   Iris-virginica
51   Iris-versicolor
73   Iris-versicolor
54   Iris-versicolor
63   Iris-versicolor
37       Iris-setosa
78   Iris-versicolor
90   Iris-versicolor
45       Iris-setosa
16       Iris-setosa
121   Iris-virginica
66   Iris-versicolor
24       Iris-setosa
8        Iris-setosa
126   Iris-virginica
22       Iris-setosa
44       Iris-setosa
97   Iris-versicolor
93   Iris-versicolor
26       Iris-setosa
137   Iris-virginica
84   Iris-versicolor
27       Iris-setosa
127   Iris-virginica
132   Iris-virginica
59   Iris-versicolor
18       Iris-setosa
83   Iris-versicolor
61   Iris-versicolor
92   Iris-versicolor
112   Iris-virginica
2        Iris-setosa
141   Iris-virginica
43       Iris-setosa
10       Iris-setosa
60   Iris-versicolor
116   Iris-virginica
144   Iris-virginica
119   Iris-virginica
108   Iris-virginica
```

```
print(y_train)
```

```
            Species
69   Iris-versicolor
135   Iris-virginica
56   Iris-versicolor
80   Iris-versicolor
```

```
123   Iris-virginica
..               ...
9        Iris-setosa
103   Iris-virginica
67   Iris-versicolor
117   Iris-virginica
47       Iris-setosa

[100 rows x 1 columns]
```

```
from sklearn.linear_model import LogisticRegression

log= LogisticRegression()

log.fit(x_train,y_train)  # training the model
```

```
/home/yokesh/.local/lib/python3.9/site-packages/sklearn/utils/
validation.py:1143: DataConversionWarning: A column-vector y was
passed when a 1d array was expected. Please change the shape of y to
(n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/yokesh/.local/lib/python3.9/site-packages/sklearn/linear_model/
_logistic.py:458: ConvergenceWarning: lbfgs failed to converge
(status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as
shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:

https://scikit-learn.org/stable/modules/linear_model.html#logistic-
regression
  n_iter_i = _check_optimize_result(
```

```
LogisticRegression()
```

```
y_pred=log.predict(x_test)


print(y_pred)
```

```
['Iris-virginica' 'Iris-versicolor' 'Iris-setosa' 'Iris-virginica'
 'Iris-setosa' 'Iris-virginica' 'Iris-setosa' 'Iris-versicolor'
 'Iris-versicolor' 'Iris-versicolor' 'Iris-virginica' 'Iris-
versicolor'
 'Iris-versicolor' 'Iris-versicolor' 'Iris-versicolor' 'Iris-setosa'
 'Iris-versicolor' 'Iris-versicolor' 'Iris-setosa' 'Iris-setosa'
 'Iris-virginica' 'Iris-versicolor' 'Iris-setosa' 'Iris-setosa'
 'Iris-virginica' 'Iris-setosa' 'Iris-setosa' 'Iris-versicolor'
 'Iris-versicolor' 'Iris-setosa' 'Iris-virginica' 'Iris-versicolor'
```

```
 'Iris-setosa' 'Iris-virginica' 'Iris-virginica' 'Iris-versicolor'
 'Iris-setosa' 'Iris-versicolor' 'Iris-versicolor' 'Iris-versicolor'
 'Iris-virginica' 'Iris-setosa' 'Iris-virginica' 'Iris-setosa'
 'Iris-setosa' 'Iris-versicolor' 'Iris-virginica' 'Iris-virginica'
 'Iris-virginica' 'Iris-virginica']
```

```
print(x_train,y_train)
```

```
      Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm
69    70            5.6           2.5            3.9           1.1
135  136            7.7           3.0            6.1           2.3
56    57            6.3           3.3            4.7           1.6
80    81            5.5           2.4            3.8           1.1
123  124            6.3           2.7            4.9           1.8
..   ...            ...           ...            ...           ...
9     10            4.9           3.1            1.5           0.1
103  104            6.3           2.9            5.6           1.8
67    68            5.8           2.7            4.1           1.0
117  118            7.7           3.8            6.7           2.2
47    48            4.6           3.2            1.4           0.2

[100 rows x 5 columns]              Species
69   Iris-versicolor
135   Iris-virginica
56   Iris-versicolor
80   Iris-versicolor
123   Iris-virginica
..                ...
9        Iris-setosa
103   Iris-virginica
67   Iris-versicolor
117   Iris-virginica
47       Iris-setosa

[100 rows x 1 columns]
```

```
print(x_test,y_test)
```

```
      Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm
114  115            5.8           2.8            5.1           2.4
62    63            6.0           2.2            4.0           1.0
33    34            5.5           4.2            1.4           0.2
107  108            7.3           2.9            6.3           1.8
7      8            5.0           3.4            1.5           0.2
100  101            6.3           3.3            6.0           2.5
40    41            5.0           3.5            1.3           0.3
86    87            6.7           3.1            4.7           1.5
76    77            6.8           2.8            4.8           1.4
71    72            6.1           2.8            4.0           1.3
134  135            6.1           2.6            5.6           1.4
51    52            6.4           3.2            4.5           1.5
```

73	74	6.1	2.8	4.7	1.2
54	55	6.5	2.8	4.6	1.5
63	64	6.1	2.9	4.7	1.4
37	38	4.9	3.1	1.5	0.1
78	79	6.0	2.9	4.5	1.5
90	91	5.5	2.6	4.4	1.2
45	46	4.8	3.0	1.4	0.3
16	17	5.4	3.9	1.3	0.4
121	122	5.6	2.8	4.9	2.0
66	67	5.6	3.0	4.5	1.5
24	25	4.8	3.4	1.9	0.2
8	9	4.4	2.9	1.4	0.2
126	127	6.2	2.8	4.8	1.8
22	23	4.6	3.6	1.0	0.2
44	45	5.1	3.8	1.9	0.4
97	98	6.2	2.9	4.3	1.3
93	94	5.0	2.3	3.3	1.0
26	27	5.0	3.4	1.6	0.4
137	138	6.4	3.1	5.5	1.8
84	85	5.4	3.0	4.5	1.5
27	28	5.2	3.5	1.5	0.2
127	128	6.1	3.0	4.9	1.8
132	133	6.4	2.8	5.6	2.2
59	60	5.2	2.7	3.9	1.4
18	19	5.7	3.8	1.7	0.3
83	84	6.0	2.7	5.1	1.6
61	62	5.9	3.0	4.2	1.5
92	93	5.8	2.6	4.0	1.2
112	113	6.8	3.0	5.5	2.1
2	3	4.7	3.2	1.3	0.2
141	142	6.9	3.1	5.1	2.3
43	44	5.0	3.5	1.6	0.6
10	11	5.4	3.7	1.5	0.2
60	61	5.0	2.0	3.5	1.0
116	117	6.5	3.0	5.5	1.8
144	145	6.7	3.3	5.7	2.5
119	120	6.0	2.2	5.0	1.5
108	109	6.7	2.5	5.8	1.8

Species
114 Iris-virginica
62 Iris-versicolor
33 Iris-setosa
107 Iris-virginica
7 Iris-setosa
100 Iris-virginica
40 Iris-setosa
86 Iris-versicolor
76 Iris-versicolor
71 Iris-versicolor
134 Iris-virginica

```
51   Iris-versicolor
73   Iris-versicolor
54   Iris-versicolor
63   Iris-versicolor
37       Iris-setosa
78   Iris-versicolor
90   Iris-versicolor
45       Iris-setosa
16       Iris-setosa
121   Iris-virginica
66   Iris-versicolor
24       Iris-setosa
8        Iris-setosa
126   Iris-virginica
22       Iris-setosa
44       Iris-setosa
97   Iris-versicolor
93   Iris-versicolor
26       Iris-setosa
137   Iris-virginica
84   Iris-versicolor
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61   Iris-versicolor
92   Iris-versicolor
112   Iris-virginica
2        Iris-setosa
141   Iris-virginica
43       Iris-setosa
10       Iris-setosa
60   Iris-versicolor
116   Iris-virginica
144   Iris-virginica
119   Iris-virginica
108   Iris-virginica
```

```
print(x_test,y_pred)
```

```
      Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm
114  115            5.8           2.8            5.1           2.4
62    63            6.0           2.2            4.0           1.0
33    34            5.5           4.2            1.4           0.2
107  108            7.3           2.9            6.3           1.8
7      8            5.0           3.4            1.5           0.2
100  101            6.3           3.3            6.0           2.5
40    41            5.0           3.5            1.3           0.3
86    87            6.7           3.1            4.7           1.5
```

```
76    77            6.8           2.8            4.8           1.4
71    72            6.1           2.8            4.0           1.3
134  135            6.1           2.6            5.6           1.4
51    52            6.4           3.2            4.5           1.5
73    74            6.1           2.8            4.7           1.2
54    55            6.5           2.8            4.6           1.5
63    64            6.1           2.9            4.7           1.4
37    38            4.9           3.1            1.5           0.1
78    79            6.0           2.9            4.5           1.5
90    91            5.5           2.6            4.4           1.2
45    46            4.8           3.0            1.4           0.3
16    17            5.4           3.9            1.3           0.4
121  122            5.6           2.8            4.9           2.0
66    67            5.6           3.0            4.5           1.5
24    25            4.8           3.4            1.9           0.2
8      9            4.4           2.9            1.4           0.2
126  127            6.2           2.8            4.8           1.8
22    23            4.6           3.6            1.0           0.2
44    45            5.1           3.8            1.9           0.4
97    98            6.2           2.9            4.3           1.3
93    94            5.0           2.3            3.3           1.0
26    27            5.0           3.4            1.6           0.4
137  138            6.4           3.1            5.5           1.8
84    85            5.4           3.0            4.5           1.5
27    28            5.2           3.5            1.5           0.2
127  128            6.1           3.0            4.9           1.8
132  133            6.4           2.8            5.6           2.2
59    60            5.2           2.7            3.9           1.4
18    19            5.7           3.8            1.7           0.3
83    84            6.0           2.7            5.1           1.6
61    62            5.9           3.0            4.2           1.5
92    93            5.8           2.6            4.0           1.2
112  113            6.8           3.0            5.5           2.1
2      3            4.7           3.2            1.3           0.2
141  142            6.9           3.1            5.1           2.3
43    44            5.0           3.5            1.6           0.6
10    11            5.4           3.7            1.5           0.2
60    61            5.0           2.0            3.5           1.0
116  117            6.5           3.0            5.5           1.8
144  145            6.7           3.3            5.7           2.5
119  120            6.0           2.2            5.0           1.5
108  109            6.7           2.5            5.8           1.8
['Iris-virginica' 'Iris-versicolor' 'Iris-setosa' 'Iris-virginica'
 'Iris-setosa' 'Iris-virginica' 'Iris-setosa' 'Iris-versicolor'
 'Iris-versicolor' 'Iris-versicolor' 'Iris-virginica' 'Iris-
versicolor'
 'Iris-versicolor' 'Iris-versicolor' 'Iris-versicolor' 'Iris-setosa'
 'Iris-versicolor' 'Iris-versicolor' 'Iris-setosa' 'Iris-setosa'
 'Iris-virginica' 'Iris-versicolor' 'Iris-setosa' 'Iris-setosa'
 'Iris-virginica' 'Iris-setosa' 'Iris-setosa' 'Iris-versicolor'
```

```
 'Iris-versicolor' 'Iris-setosa' 'Iris-virginica' 'Iris-versicolor'
 'Iris-setosa' 'Iris-virginica' 'Iris-virginica' 'Iris-versicolor'
 'Iris-setosa' 'Iris-versicolor' 'Iris-versicolor' 'Iris-versicolor'
 'Iris-virginica' 'Iris-setosa' 'Iris-virginica' 'Iris-setosa'
 'Iris-setosa' 'Iris-versicolor' 'Iris-virginica' 'Iris-virginica'
 'Iris-virginica' 'Iris-virginica']
```

```
from sklearn.metrics import accuracy_score

print(accuracy_score(y_test,y_pred)*100,'%')
```

```
100.0 %
```

```
# there fore the accuracy of this model for the non linear iris data
type is 100 percentage
```