```
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
                                     Dtvpe
- - -
 0
     Id
                    150 non-null
                                     int64
     SepalLengthCm
                    150 non-null
 1
                                     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
                 5.1
                                3.5
                                               1.4
                                                              0.2
    1
                                                                   Iris-
setosa
    2
                 4.9
                                3.0
                                               1.4
                                                              0.2 Iris-
setosa
2
                 4.7
                                3.2
                                               1.3
                                                              0.2
                                                                   Iris-
    3
setosa
                                3.1
3
                 4.6
                                               1.5
                                                              0.2 Iris-
    4
setosa
                 5.0
                                                              0.2 Iris-
    5
                                3.6
                                               1.4
setosa
data.shape
(150, 6)
data.describe()
               Ιd
                   SepalLengthCm SepalWidthCm PetalLengthCm
PetalWidthCm
count 150.000000
                      150.000000
                                     150.000000
                                                     150.000000
150.000000
        75.500000
                        5.843333
                                       3.054000
                                                       3.758667
mean
1.198667
        43.445368
                        0.828066
                                       0.433594
                                                       1.764420
std
0.763161
```

1.000000

min

4.300000

2.000000

```
0.100000
        38.250000
                         5.100000
                                       2.800000
                                                       1.600000
25%
0.300000
50%
        75.500000
                         5.800000
                                       3.000000
                                                       4.350000
1.300000
75%
       112.750000
                         6.400000
                                       3.300000
                                                       5.100000
1.800000
                                                       6.900000
       150.000000
                         7.900000
                                       4.400000
max
2.500000
x=data[['Id','SepalLengthCm','SepalWidthCm','PetalLengthCm','PetalWidt
hCm']]
print(x)
          SepalLengthCm SepalWidthCm PetalLengthCm PetalWidthCm
      Ιd
0
                     5.1
                                   3.5
       1
                                                   1.4
                                                                  0.2
       2
                     4.9
                                   3.0
                                                   1.4
                                                                  0.2
1
                     4.7
2
       3
                                   3.2
                                                   1.3
                                                                  0.2
3
       4
                     4.6
                                   3.1
                                                   1.5
                                                                  0.2
4
       5
                     5.0
                                                                  0.2
                                   3.6
                                                   1.4
145
     146
                    6.7
                                   3.0
                                                   5.2
                                                                  2.3
146
                     6.3
                                   2.5
                                                   5.0
                                                                  1.9
     147
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)
                         SepalWidthCm
                                                       PetalWidthCm
      Ιd
          SepalLengthCm
                                        PetalLengthCm
69
      70
                    5.6
                                   2.5
                                                  3.9
                                                                 1.1
135
     136
                    7.7
                                   3.0
                                                  6.1
                                                                 2.3
                    6.3
56
                                   3.3
                                                  4.7
      57
                                                                 1.6
                    5.5
                                                  3.8
80
      81
                                   2.4
                                                                 1.1
                    6.3
                                   2.7
                                                  4.9
123
     124
                                                                 1.8
     . . .
                                   . . .
                                                  . . .
                                                                 . . .
9
                    4.9
                                   3.1
                                                  1.5
                                                                 0.1
      10
                    6.3
103
     104
                                   2.9
                                                  5.6
                                                                 1.8
      68
                    5.8
                                   2.7
                                                  4.1
67
                                                                 1.0
                    7.7
                                   3.8
                                                  6.7
117
     118
                                                                 2.2
47
      48
                    4.6
                                   3.2
                                                  1.4
                                                                 0.2
[100 rows x 5 columns]
print(x_test)
          Ιd
114
                    5.8
                                   2.8
                                                  5.1
     115
                                                                 2.4
62
      63
                    6.0
                                   2.2
                                                  4.0
                                                                 1.0
                    5.5
33
      34
                                   4.2
                                                  1.4
                                                                 0.2
                    7.3
                                   2.9
                                                  6.3
107
     108
                                                                 1.8
                    5.0
                                   3.4
                                                  1.5
7
       8
                                                                 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
     135
134
                    6.1
                                                  5.6
                                   2.6
                                                                 1.4
51
      52
                    6.4
                                   3.2
                                                  4.5
                                                                 1.5
73
      74
                    6.1
                                                  4.7
                                   2.8
                                                                 1.2
54
      55
                    6.5
                                   2.8
                                                  4.6
                                                                 1.5
63
      64
                    6.1
                                   2.9
                                                  4.7
                                                                 1.4
                    4.9
37
      38
                                   3.1
                                                  1.5
                                                                 0.1
78
      79
                    6.0
                                   2.9
                                                  4.5
                                                                 1.5
                    5.5
90
      91
                                   2.6
                                                  4.4
                                                                 1.2
45
      46
                    4.8
                                   3.0
                                                  1.4
                                                                 0.3
      17
                    5.4
                                   3.9
                                                  1.3
                                                                 0.4
16
```

2.8

3.0

3.4

2.9

2.8

3.6

3.8

2.9

4.9

4.5

1.9

1.4

4.8

1.0

1.9

4.3

2.0

1.5

0.2

0.2

1.8

0.2

0.4

1.3

121

66

24

8 126

22

44

97

122

67

25

127

23

45

98

9

5.6

5.6

4.8

4.4

6.2

4.6

5.1

93 94 26 27 137 138 84 85 27 28 127 128 132 133 59 60 18 19 83 84 61 62 92 93 112 113 2 3 141 142 43 44 10 11 60 61 116 117 144 145 119 120 108 109	5.0 5.4 5.4 5.2 6.4 5.7 6.9 5.8 6.7 6.9 5.4 6.5 6.7 6.7	2.3 3.4 3.1 3.0 3.5 3.0 2.8 2.7 3.8 2.7 3.0 2.6 3.0 2.6 3.1 3.5 3.7 2.0 3.0 3.3 2.2 2.5	3.3 1.6 5.5 4.5 1.5 4.9 5.6 3.7 5.1 4.0 5.3 5.1 1.5 3.5 5.7 5.8	1.0 0.4 1.8 1.5 0.2 1.8 2.2 1.4 0.3 1.6 1.5 1.2 2.1 0.2 2.3 0.6 0.2 1.0 1.8 2.5 1.8
x_test.count()				
Id SepalLengthCm SepalWidthCm PetalLengthCm PetalWidthCm dtype: int64	50 50 50 50 50			
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
     Iris-versicolor
66
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
      Iris-virginica
127
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

56 80

135

Iris-versicolor

Iris-versicolor

Iris-virginica
Iris-versicolor

```
123
      Iris-virginica
         Iris-setosa
9
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-
rearession
  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)
      Ιd
           SepalLengthCm SepalWidthCm PetalLengthCm PetalWidthCm
69
      70
                      5.6
                                      2.5
                                                       3.9
                                                                       1.1
                      7.7
135
                                      3.0
                                                       6.1
                                                                       2.3
     136
56
      57
                      6.3
                                      3.3
                                                       4.7
                                                                       1.6
                      5.5
                                                       3.8
80
      81
                                      2.4
                                                                       1.1
123
     124
                      6.3
                                      2.7
                                                       4.9
                                                                       1.8
                                                       . . .
                      . . .
                                      . . .
                                                                       . . .
9
      10
                      4.9
                                      3.1
                                                       1.5
                                                                       0.1
                      6.3
                                      2.9
                                                       5.6
103
     104
                                                                       1.8
                      5.8
                                                       4.1
                                      2.7
67
      68
                                                                       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 \times 1 columns]
print(x test,y test)
           SepalLengthCm SepalWidthCm PetalLengthCm PetalWidthCm
      Ιd
114
     115
                      5.8
                                      2.8
                                                       5.1
                                                                       2.4
62
      63
                      6.0
                                      2.2
                                                       4.0
                                                                       1.0
33
                      5.5
                                      4.2
                                                       1.4
                                                                       0.2
      34
                      7.3
                                                       6.3
107
     108
                                      2.9
                                                                       1.8
7
                      5.0
                                      3.4
                                                       1.5
       8
                                                                       0.2
100
                      6.3
                                      3.3
                                                       6.0
                                                                       2.5
     101
40
      41
                      5.0
                                      3.5
                                                       1.3
                                                                       0.3
86
      87
                      6.7
                                      3.1
                                                       4.7
                                                                       1.5
                      6.8
                                                       4.8
76
      77
                                      2.8
                                                                       1.4
```

2.8

2.6

3.2

4.0

5.6

4.5

1.3

1.4

1.5

71

51

134

72

52

135

6.1

6.1

73 54 63 37 78 90 45 16 121 66 24 8 126 22 44 97 93 26 137 84 27 127 132 59 18 83 61 92 112 21 43	74 55 64 38 79 91 46 17 122 67 25 9 127 23 45 98 94 27 138 85 28 128 133 60 19 84 62 93 113 3 142 44	6.1 6.1 6.1 6.5 6.9 6.5 6.6 6.8 7 6.1 6.1 7 7 7 8 7 8 7 8 7 8 7 8 7 8 8 7 8 8 8 7 8 8 8 8 8 7 8	2.8 2.9 3.1 2.6 3.9 2.6 3.9 2.8 3.4 2.9 2.3 3.4 3.5 3.0 2.7 3.8 2.7 3.8 2.7 3.6 3.1 3.5 3.1 3.5 3.1 3.5 3.6 3.7 3.6 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7	4.7 4.6 4.7 1.5 4.4 1.3 4.9 4.5 1.9 4.8 1.9 4.3 3.6 5.5 4.5 4.9 5.9 1.7 5.1 4.0 5.3 5.5 1.6	1.2 1.5 1.4 0.1 1.5 1.2 0.3 0.4 2.0 1.5 0.2 0.4 1.3 1.0 0.4 1.8 2.2 1.4 0.3 1.5 2.1 0.3
43	44	5.0	3.5	5.1 1.6	2.3 0.6
10 60	11 61	5.4 5.0	3.7 2.0	1.5 3.5	0.2 1.0
116 144	117 145	6.5 6.7	3.0 3.3	5.5 5.7	1.8 2.5
119	120	6.0	2.2	5.0	1.5
108 Spec	109 ies	6.7	2.5	5.8	1.8
114 62					
33 107	Iris-setosa				
7	Iris-setosa				
100 40	) Iris-virginica Iris-setosa				
86 76	Iris-versicolor Iris-versicolor				
71	Iris-versico	lor			
134	Iris-virgin:	rca			

```
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
         Iris-setosa
8
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
         Iris-setosa
141
      Iris-virginica
43
         Iris-setosa
10
         Iris-setosa
60
     Iris-versicolor
      Iris-virginica
116
144
      Iris-virginica
119
      Iris-virginica
108
      Iris-virginica
print(x_test,y_pred)
      Ιd
          SepalLengthCm
                           SepalWidthCm
                                          PetalLengthCm
                                                          PetalWidthCm
114
     115
                     5.8
                                    2.8
                                                     5.1
                     6.0
                                    2.2
                                                     4.0
62
      63
33
      34
                     5.5
                                    4.2
                                                     1.4
     108
107
                     7.3
                                    2.9
                                                     6.3
```

8

101

41

87

7

100

40

86

5.0

6.3

5.0

6.7

3.4

3.3

3.5

3.1

2.4

1.0 0.2

1.8

0.2

2.5

0.3

1.5

1.5

6.0

1.3

76       77       6.8       2.8       4.8         71       72       6.1       2.8       4.0         134       135       6.1       2.6       5.6	1.4 1.3 1.4
12/ 125 6.1 2.6 5.6	1.4
134 135 6.1 2.6 5.6	
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       121     122     5.6     2.8     4.9	0.4 2.0
66 67 5.6 2.8 4.9 6.0 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     3     4.7     3.2     1.3	2.1 0.2
2 3 4.7 3.2 1.3 141 142 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	0.0
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

<sup>[&#</sup>x27;Iris-virginica' 'Iris-versicolor' 'Iris-setosa' 'Iris-virginica' 'Iris-setosa' 'Iris-virginica' 'Iris-setosa' 'Iris-versicolor' 'Iris-versicolor' 'Iris-versicolor' 'Iris-virginica' 'Irisversicolor'

<sup>&#</sup>x27;Iris-versicolor' 'Iris-versicolor' 'Iris-versicolor' 'Iris-setosa'

<sup>&#</sup>x27;Iris-versicolor' 'Iris-versicolor' 'Iris-setosa' 'Iris-setosa' 'Iris-virginica' 'Iris-versicolor' 'Iris-setosa' 'Iris-setosa'

<sup>&#</sup>x27;Iris-virginica' 'Iris-setosa' 'Iris-setosa' 'Iris-versicolor'

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