```
import pandas as pd
```

```
import numpy as np
```

```
import matplotlib.pyplot as plt
```

```
import seaborn as sns
```

```
boston = pd.read_csv('https://github.com/ybifoundation/Dataset/raw/main/Boston.csv
```

```
iris = pd.read_csv('https://github.com/ybifoundation/Dataset/raw/main/IRIS.csv')
```

```
boston.head()
```

	CRIM	ZN	INDUS	CHAS	NX	RM	AGE	DIS	RAD	TAX	PTRATIO	B
0	0.00632	18.0	2.31	0	0.538	6.575	65.2	4.0900	1	296.0	15.3	396.90
1	0.02731	0.0	7.07	0	0.469	6.421	78.9	4.9671	2	242.0	17.8	396.90
2	0.02729	0.0	7.07	0	0.469	7.185	61.1	4.9671	2	242.0	17.8	392.83
3	0.03237	0.0	2.18	0	0.458	6.998	45.8	6.0622	3	222.0	18.7	394.63
4	0.06905	0.0	2.18	0	0.458	7.147	54.2	6.0622	3	222.0	18.7	396.90

```
iris.head()
```

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa

```
boston.columns
```

```
Index(['CRIM', 'ZN', 'INDUS', 'CHAS', 'NX', 'RM', 'AGE', 'DIS', 'RAD', 'TAX',
       'PTRATIO', 'B', 'LSTAT', 'MEDV'],
      dtype='object')
```

```
X = boston.drop(['MEDV'],axis =1)
```

```
X.head()
```

	CRIM	ZN	INDUS	CHAS	NX	RM	AGE	DIS	RAD	TAX	PTRATIO	B
0	0.00632	18.0	2.31	0	0.538	6.575	65.2	4.0900	1	296.0	15.3	396.90
1	0.02731	0.0	7.07	0	0.469	6.421	78.9	4.9671	2	242.0	17.8	396.90
2	0.02729	0.0	7.07	0	0.469	7.185	61.1	4.9671	2	242.0	17.8	392.83
3	0.03237	0.0	2.18	0	0.458	6.998	45.8	6.0622	3	222.0	18.7	394.63
4	0.06905	0.0	2.18	0	0.458	7.147	54.2	6.0622	3	222.0	18.7	396.90

```
Y = boston['MEDV']
```

```
Y
```

```
0      24.0
1      21.6
2      34.7
3      33.4
4      36.2
       ...
501    22.4
502    20.6
503    23.9
504    22.0
505    11.9
Name: MEDV, Length: 506, dtype: float64
```

```
iris.columns
```

```
Index(['sepal_length', 'sepal_width', 'petal_length', 'petal_width',
       'species'],
      dtype='object')
```

```
x = iris.drop(['species'], axis=1)
```

```
y = iris['species']
```

```
y
```

```
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
Name: species, Length: 150, dtype: object
```

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

```
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
a = le.fit_transform(y)
a
```

```
array([0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2])
```

```
x_train, x_test, y_train, y_test = train_test_split(X,Y, train_size=0.7, random_sta
```

```
X_train, X_test, Y_train, Y_test = train_test_split(x,y, train_size=0.7, random_sta
```

```
x_train.shape, x_test.shape, y_train.shape, y_test.shape
```

```
((354, 13), (152, 13), (354,), (152,))
```

```
X_train.shape, X_test.shape, Y_train.shape, Y_test.shape
```

```
((105, 4), (45, 4), (105,), (45,))
```

```
x_train
```

```
X_train
```

	sepal_length	sepal_width	petal_length	petal_width
84	5.4	3.0	4.5	1.5
13	4.3	3.0	1.1	0.1
64	5.6	2.9	3.6	1.3
39	5.1	3.4	1.5	0.2
79	5.7	2.6	3.5	1.0
...	...	...	...	...
72	6.3	2.5	4.9	1.5
143	6.8	3.2	5.9	2.3
60	5.0	2.0	3.5	1.0
50	7.0	3.2	4.7	1.4
96	5.7	2.9	4.2	1.3

105 rows × 4 columns

```
from sklearn.preprocessing import StandardScaler
```

```
from sklearn.preprocessing import MinMaxScaler
```

```
ss = StandardScaler()
```

```
x_train = ss.fit_transform(x_train)
```

```
X_train = ss.fit_transform(X_train)
```

```
x_train
```

```
array([[-0.14113619, -0.48175769, -0.19860022, ...,  0.00438903,
        -0.05084503, -0.01555641],
       [-0.42121529,  3.02166196, -1.33410259, ..., -1.68641979,
         0.42969249, -1.33650784],
       [-0.41266839, -0.48175769,  0.22414717, ...,  0.14148164,
         0.19739169, -0.10842497],
       ...,
       [-0.38944304, -0.48175769, -0.19860022, ...,  0.00438903,
         0.37963873,  0.77313338],
       [-0.41404001,  0.41002186, -0.81324318, ..., -0.72677154,
         0.43161763,  0.09671754],
       [-0.41578561,  2.06618387, -1.3831586 , ..., -0.04130851,
         0.39707198, -0.68781395]])
```

```
X_train
```

```
array([[-0.97514097,  0.62399509, -1.31675446, -1.28941139],
       [-1.7587364 , -0.27972194, -1.31675446, -1.28941139],
       [ 0.72264911, -0.73158046,  0.77175337,  0.91650626],
       [-1.36693868,  0.39806584, -1.19741116, -1.28941139],
       [ 1.24504606,  0.17213658,  0.65241006,  0.5028967 ],
       [ 0.3308514 , -1.86122675,  0.2347085 , -0.18645256],
       [ 2.55103844, -0.05379268,  1.4878132 ,  1.60585552],
       [ 0.98384759, -0.05379268,  1.30879824,  1.46798567],
       [ 1.11444683, -0.05379268,  0.47339511,  0.36502685],
       [ 0.85324835, -0.27972194,  0.41372346,  0.227157  ],

       [ 0.06965293, -0.73158046,  0.89109667,  1.05437611],
       [-0.06094631, -0.5056512 ,  0.29438015,  0.227157  ],
       [ 1.89804225,  0.39806584,  1.42814154,  0.91650626],
       [ 1.24504606, -0.05379268,  0.95076833,  1.60585552],
       [ 0.3308514 , -1.86122675,  0.83142502,  0.5028967 ],
       [ 0.85324835,  0.17213658,  1.12978328,  0.91650626],
       [ 0.72264911, -1.63529749,  0.47339511,  0.227157  ],
       [-1.23633945,  0.84992435, -1.19741116, -1.28941139],
       [-0.97514097, -1.63529749, -0.18299307, -0.18645256],
       [-0.45274402,  1.97957065, -1.37642611, -1.01367168],
       [ 0.59204988, -0.5056512 ,  0.71208172,  0.91650626],
       [ 1.24504606,  0.17213658,  0.47339511,  0.36502685],
       [-0.19154555, -0.73158046,  0.3540518 ,  0.227157  ],
       [ 0.3308514 , -0.27972194,  0.53306676,  0.5028967 ],
       [-0.45274402,  1.97957065, -1.1377395 , -1.01367168],
       [ 0.46145064, -0.05379268,  0.77175337,  0.91650626],
       [ 1.3756453 , -0.05379268,  1.12978328,  1.33011582],
       [ 0.72264911, -0.5056512 ,  0.89109667,  0.5028967 ],
       [ 0.3308514 , -0.73158046,  0.89109667,  0.64076655],
       [-1.23633945,  0.17213658, -1.19741116, -1.28941139],
       [ 0.46145064, -0.5056512 ,  0.65241006,  0.08928714],
       [ 0.06965293,  2.2054999 , -1.43609776, -1.28941139],
       [-0.45274402,  0.84992435, -1.25708281, -1.01367168],
       [-0.32214479, -1.40936823,  0.05569354, -0.18645256],
       [-1.49753792,  1.30178287, -1.55544107, -1.28941139],
       [-1.62813716, -1.63529749, -1.37642611, -1.15154153],
       [ 0.72264911,  0.62399509,  0.65241006,  0.64076655],
       [-0.32214479,  1.07585361, -1.37642611, -1.28941139],
       [ 0.06965293, -0.73158046,  0.29438015, -0.18645256],
       [-1.7587364 ,  0.39806584, -1.37642611, -1.28941139],
       [-1.36693868,  0.39806584, -1.37642611, -1.28941139],
       [-0.97514097,  0.84992435, -1.25708281, -1.28941139],
       [ 0.06965293, -0.95750971,  0.2347085 ,  0.08928714],
       [ 0.72264911,  0.84992435,  1.18945493,  1.74372538],
       [ 0.46145064, -0.5056512 ,  0.2347085 ,  0.227157  ],
       [-0.06094631, -0.5056512 ,  0.53306676,  0.227157  ],
       [-1.10574021, -1.18343897,  0.53306676,  0.77863641],
       [-1.10574021,  0.17213658, -1.25708281, -1.42728124],
       [-0.97514097,  1.07585361, -1.37642611, -1.15154153],
       [ 1.11444683, -0.27972194,  0.59273841,  0.227157  ],
       [-0.97514097,  1.07585361, -1.19741116, -0.73793197],
       [ 0.3308514 ,  0.84992435,  0.53306676,  0.64076655],
       [ 1.24504606,  0.62399509,  1.24912659,  1.33011582],
       [ 0.72264911, -1.18343897,  0.77175337,  0.5028967 ],
       [ 1.3756453 ,  0.39806584,  1.36846989,  1.60585552],
       [-0.97514097, -2.31308526, -0.06364976, -0.18645256],
       [ 1.63684377,  0.39806584,  0.65241006,  0.36502685],
       [ 0.06094631,  0.27972194,  0.3540518 ,  0.227157  ]])
```

```
[-0.06094631, -0.27972194,  0.3540518 ,  0.227157  ]])
```

```
from sklearn.neighbors import KNeighborsRegressor
```

```
from sklearn.neighbors import KNeighborsClassifier
```

```
knnreg = KNeighborsRegressor(n_neighbors=3)
```

```
knncla = KNeighborsClassifier()
```

```
knnreg.fit(x_train, y_train)
```

```
KNeighborsRegressor(n_neighbors=3)
```

```
knncla.fit(X_train, Y_train)
```

```
KNeighborsClassifier()
```

```
y_pred = knnreg.predict(x_test)
```

```
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X ha
  f"X has feature names, but {self.__class__.__name__} was fitted without"
```

```
Y_pred = knncla.predict(X_test)
```

```
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X ha
  f"X has feature names, but {self.__class__.__name__} was fitted without"
```

```
from sklearn.metrics import mean_absolute_error, mean_absolute_percentage_error
```

```
from sklearn.metrics import classification_report, confusion_matrix
```

```
mean_absolute_error(y_test,y_pred)
```

```
7.4596491228070185
```

```
mean_absolute_percentage_error(y_test,y_pred)
```

```
0.2993812726776956
```

```
confusion_matrix(Y_test,Y_pred)
```

```
array([[ 0,  0, 14],
```

```
        [ 0,  0,  9],
        [ 0,  0, 22]])
```

```
print(classification_report(Y_test,Y_pred))
```

```
                 precision    recall  f1-score   support

    Iris-setosa       0.00      0.00      0.00        14
Iris-versicolor       0.00      0.00      0.00         9
 Iris-virginica       0.49      1.00      0.66        22

       accuracy                           0.49        45
      macro avg       0.16      0.33      0.22        45
   weighted avg       0.24      0.49      0.32        45

/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:131
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:131
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:131
  _warn_prf(average, modifier, msg_start, len(result))
```

```
error_rate = []

for i in range(1,40):
  knn = KNeighborsRegressor(n_neighbors=i)
  knn.fit(x_train,y_train)
  pred_i = knn.predict(x_test)
  error_rate.append(mean_absolute_error(y_test,pred_i))
```

```
  f"X has feature names, but {self.__class__.__name__} was fitted without"
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
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/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
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/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
```

```
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/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
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/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
```

```
Error_rate = []

for i in range(1,40):
  knn = KNeighborsClassifier(n_neighbors=i)
  knn.fit(X_train,Y_train)
  pred_i = knn.predict(X_test)
  Error_rate.append(classification_report(Y_test,pred_i))
```

```
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:1
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
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  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:1
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:1
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/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:1
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:1
  _warn_prf(average, modifier, msg_start, len(result))
```

```
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:13
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:13
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:13
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  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:13
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.7/dist-packages/sklearn/base.py:444: UserWarning: X h
  f"X has feature names, but {self.__class__.__name__} was fitted without"
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:13
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/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:13
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.7/dist-packages/sklearn/metrics/_classification.py:13
```

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error_rate
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Error_rate
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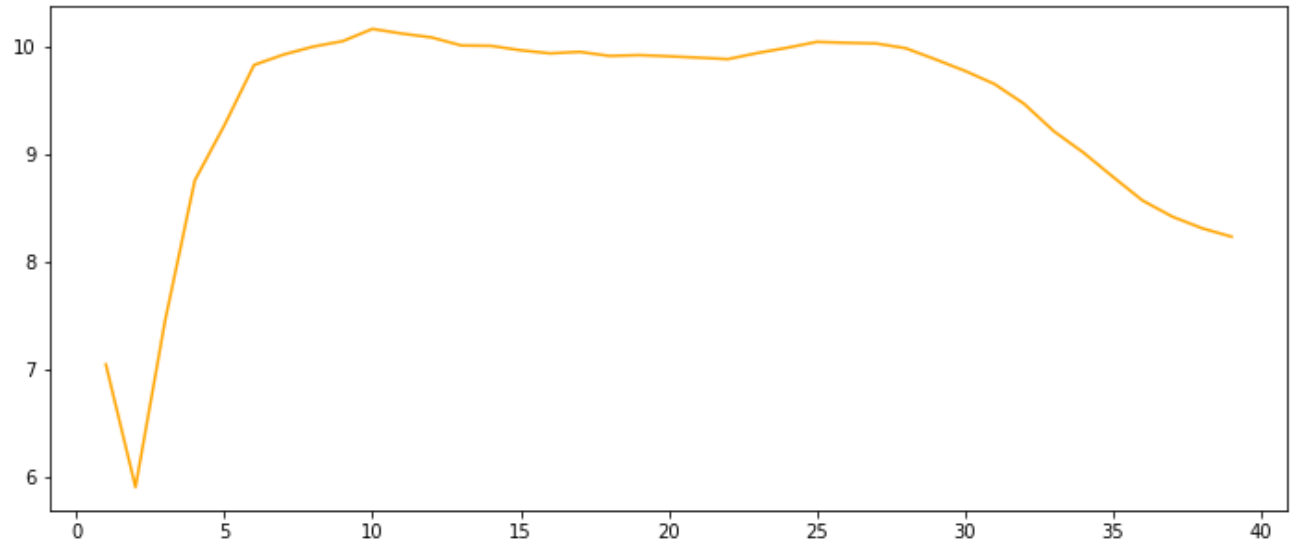
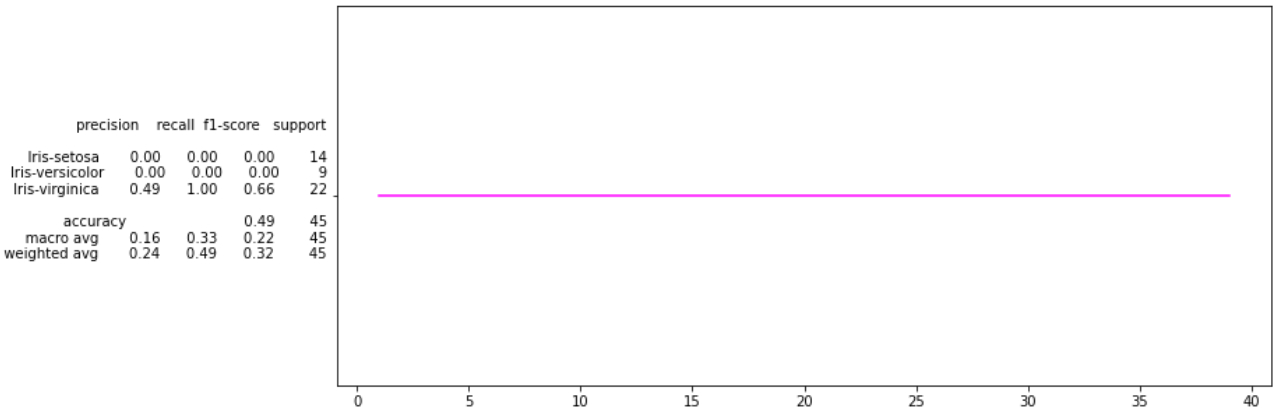
'                precision    recall  f1-score   support\n\n    Iris-setosa
'                precision    recall  f1-score   support\n\n    Iris-setosa
```

```
fig, ax = plt.subplots(figsize = (12,5))
ax.plot(range(1,40), error_rate, color= 'orange')
plt.show()
```




```
fig, ax = plt.subplots(figsize = (12,5))
ax.plot(range(1,40), Error_rate, color= 'magenta')
plt.show()
```



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