```
from sklearn.datasets import make_classification
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
import numpy
from tqdm import tqdm
import numpy as np
from sklearn.metrics.pairwise import euclidean_distances

x,y = make_classification(n_samples=10000, n_features=2, n_informative=2, n_redunda
X_train, X_test, y_train, y_test = train_test_split(x,y,stratify=y,random_state=42)


def split(x_train, folds):
  #Dividing index values of x_train into parts with integer value="folds"
    list_of_indices=np.array_split(range(len(x_train)),folds)
    return list_of_indices



def RandomSearchCV(x_train,y_train,classifier, param_range, folds):
    trainscores = []
    testscores  = []
    indices=split(x_train,folds)  # Storing list of splitted indecis
    for k in tqdm(params):
        trainscores_folds = []
        testscores_folds  = []
        for i in range(folds):   #for each value of folds we have one part of x_tra
          test_indices=list(indices[i])
          train_indices=list(set(range(len(x_train))).difference(set(indices[i])))

          # selecting the data points based on the train_indices and test_indices
          X_train = x_train[train_indices]
          Y_train = y_train[train_indices]
          X_test  = x_train[test_indices]
          Y_test  = y_train[test_indices]

          classifier.n_neighbors = k
          classifier.fit(X_train,Y_train)
          Y_predicted = classifier.predict(X_test)
          testscores_folds.append(accuracy_score(Y_test, Y_predicted))

          Y_predicted = classifier.predict(X_train)
          trainscores_folds.append(accuracy_score(Y_train, Y_predicted))

        trainscores.append(np.mean(np.array(trainscores_folds)))
        testscores.append(np.mean(np.array(testscores_folds)))
    return trainscores,testscores
```

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```
neigh = KNeighborsClassifier()

params = sorted(random.sample(range(3,30,2), 10))   # Generating 10  odd unique val
folds = 3

trainscores,testscores = RandomSearchCV(X_train, y_train, neigh, params, folds)


plt.plot(params,trainscores, label='train cruve')
plt.plot(params,testscores, label='test cruve')
plt.title('Hyper-parameter VS accuracy plot')
plt.legend()
plt.show()
```

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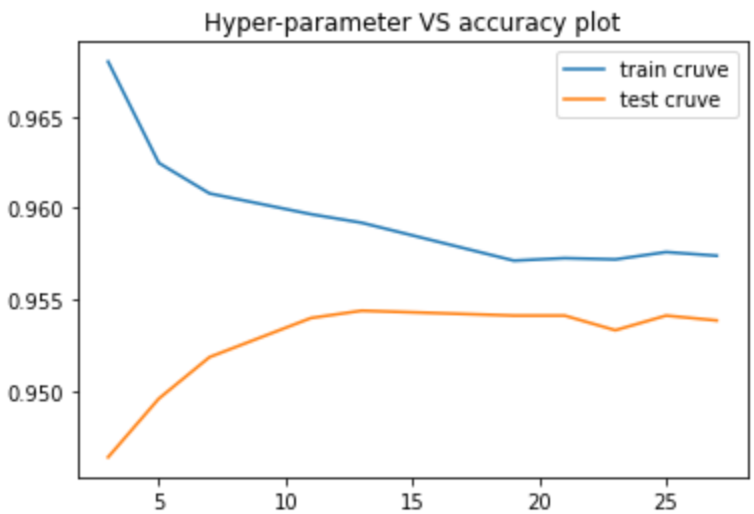
```



In above plot we can see at k=19 test and train curves are closest and accuracy is maximum so we are selecting hyperparamete value(k) = 19

```
def plot_decision_boundary(X1, X2, y, clf):
        # Create color maps
    cmap_light = ListedColormap(['#FFAAAA', '#AAFFAA', '#AAAAFF'])
    cmap_bold = ListedColormap(['#FF0000', '#00FF00', '#0000FF'])

    x_min, x_max = X1.min() - 1, X1.max() + 1
    y_min, y_max = X2.min() - 1, X2.max() + 1
```

```
    plt.show()
```

```
from matplotlib.colors import ListedColormap
neigh = KNeighborsClassifier(n_neighbors = 19)
neigh.fit(X_train, y_train)
plot_decision_boundary(X_train[:, 0], X_train[:, 1], y_train, neigh)
```