# Assignment_4_Instructions

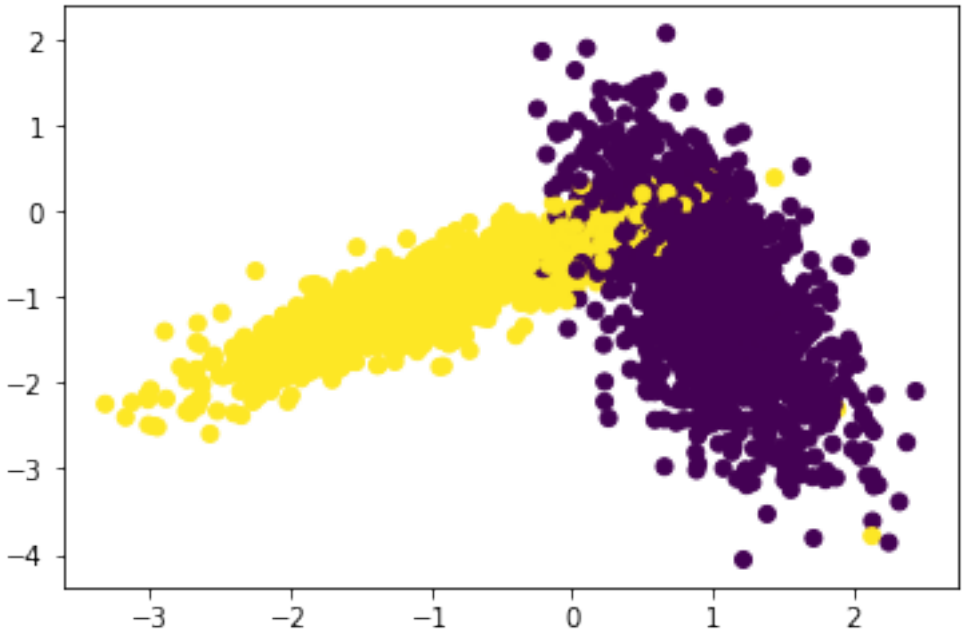
December 31, 2019

In [1]:
```
from sklearn.datasets import make_classification
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from itertools import combinations
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_redundant=
X_train, X_test, y_train, y_test = train_test_split(x,y,stratify=y,random_state=42)

# del X_train,X_test
```

In [2]:
```
%matplotlib inline
import matplotlib.pyplot as plt
colors = {0:'red', 1:'blue'}
plt.scatter(X_test[:,0], X_test[:,1],c=y_test)
plt.show()
```




# 1 Implementing Custom RandomSearchCV

In [3]:
```
# Generate n random value between a and b
def get_n_unique_random_value(a,b,n):
    return random.sample(range(a,b),n)
```

In [4]:
```
# it will take classifier and set of values for hyper prameter in dict type dict({hype
# we are implementing this only for KNN, the hyper parameter should n_neighbors
from sklearn.metrics import accuracy_score

def RandomSearchCV(x_train,y_train,classifier, neighbors, folds):
    trainscores = []
    testscores  = []
#     Storing folds+1 equidistant index for train data
    folds_value = [int(i) for i in np.linspace(0,len(x_train)-1,folds+1)]
    group = []
#     Storing indexes of train data
    indices = [i for i in range(0,folds)]
#     Storing combinations of groups index of train data
    group_idx = list(combinations(indices, folds-1))
#     Storing index of train data for each group on which training needs to be done
    for i in range(0, folds):
        if i==0:
            idx = list(range(folds_value[i],folds_value[i+1]+1))
        else:
```

```
                    idx = list(range(folds_value[i]+1,folds_value[i+1]+1))
                group.append(idx)
            for k in tqdm(neighbors):
                trainscores_folds = []
                testscores_folds  = []
                for j in range(0, folds):
                    train_idx = []
                    for i in group_idx[j]:
                        [train_idx.append(value) for value in group[i]]
                    test_idx = list(set(indices)-set(group_idx[j]))

                    X_train = x_train[train_idx]
                    Y_train = y_train[train_idx]

                    X_test = x_train[group[test_idx[0]]]
                    Y_test = y_train[group[test_idx[0]]]

            #                 print(X_train.shape)
            #                 print(Y_train.shape)
                    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

In [5]: from sklearn.metrics import accuracy_score
        from sklearn.neighbors import KNeighborsClassifier
        import matplotlib.pyplot as plt
        import random
        import warnings
        warnings.filterwarnings("ignore")


        neigh = KNeighborsClassifier()

        params = {'n_neighbors':[1,50]}
        neighbors = get_n_unique_random_value(params['n_neighbors'][0],params['n_neighbors'][1]
        neighbors.sort()
        folds = 3

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

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

```
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```

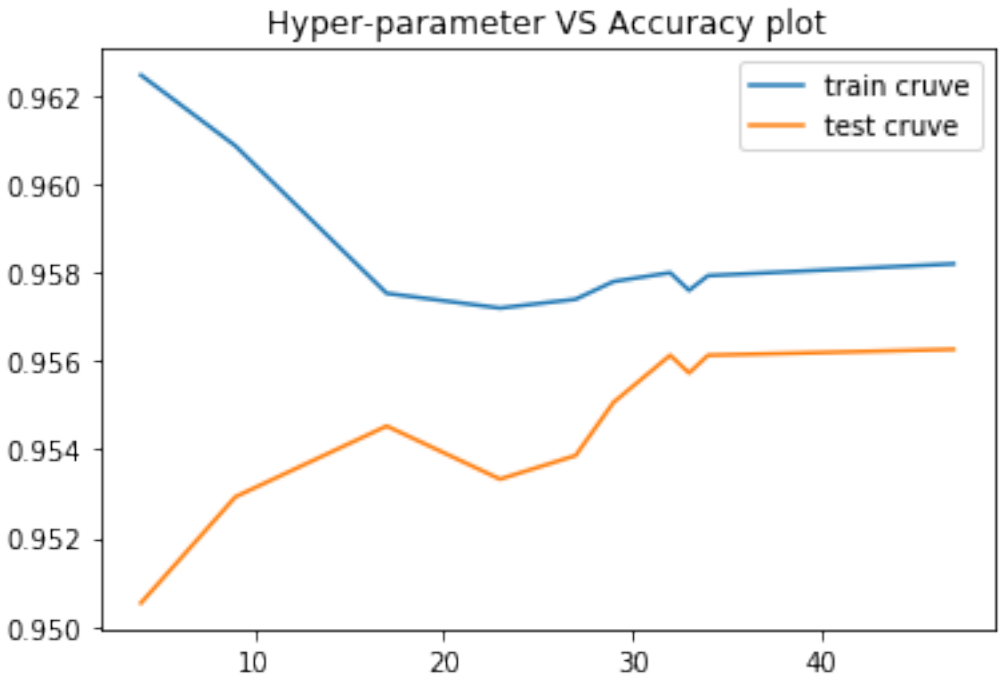


In [6]:
```
        # len(trainscores)
        # print(trainscores)
        # print(testscores)
        # neighbors.sort()
        # print(neighbors)
```