

Faculty of Computing



[Artificial intelligence]

LAB#10

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Batch: BSCS-6

Task 1:

Implement KNN classifier with Iris dataset.

```
import numpy as np
from collections import Counter
from math import sqrt
from sklearn.datasets import load_iris

iris = load_iris()
X = iris.data
y = iris.target
target_names = iris.target_names

def train_test_split(X, y, test_size=0.2):
    indices = np.arange(len(X))
    np.random.shuffle(indices)
    split_idx = int(len(X) * (1 - test_size))
    train_idx, test_idx = indices[:split_idx], indices[split_idx:]
    return X[train_idx], X[test_idx], y[train_idx], y[test_idx]

X_train, X_test, y_train, y_test = train_test_split(X, y)

def euclidean_distance(x1, x2):
    return sqrt(np.sum((x1 - x2) ** 2))

class KNN:
    def __init__(self, k=3):
        self.k = k

    def fit(self, X, y):
        self.X_train = X
        self.y_train = y

    def predict(self, X):
        return np.array([self._predict(x) for x in X])

    def _predict(self, x):
        distances = [euclidean_distance(x, x_train) for x_train in
self.X_train]
        k_indices = np.argsort(distances)[:self.k]
        k_labels = [self.y_train[i] for i in k_indices]
        most_common = Counter(k_labels).most_common(1)
        return most_common[0][0]

knn = KNN(k=3)
knn.fit(X_train, y_train)
predictions = knn.predict(X_test)

# Accuracy
accuracy = np.sum(predictions == y_test) / len(y_test)
print(f"\n Accuracy: {accuracy * 100:.2f}%")
print("\n Prediction Results:")
print("Index | Predicted | Actual      | Result")

for i in range(len(predictions)):
    pred = predictions[i]
    actual = y_test[i]
    result = " Correct" if pred == actual else " Wrong"
```

```
print(f"{i:5d} | {target_names[pred]:9s} | {target_names[actual]:9s} |  
{result}")
```

Accuracy: 96.67%

Prediction Results:

Index	Predicted	Actual	Result
0	setosa	setosa	Correct
1	setosa	setosa	Correct
2	versicolor	versicolor	Correct
3	setosa	setosa	Correct
4	virginica	virginica	Correct
5	setosa	setosa	Correct
6	setosa	setosa	Correct
7	virginica	virginica	Correct
8	versicolor	versicolor	Correct
9	virginica	virginica	Correct
10	virginica	virginica	Correct
11	virginica	virginica	Correct
12	versicolor	versicolor	Correct
13	setosa	setosa	Correct
14	virginica	virginica	Correct
15	setosa	setosa	Correct