

## Lab 8

### School of Computer Science Engineering and Technology

Course: B. Tech.	Type: Core
Course Code: CSET301	Course Name: Artificial Intelligence and Machine Learning
Year: 2025	Semester: Odd
Date: [Insert Date]	Batch: 2023-2027

#### CO-Mapping

	CO1	CO2	CO3	CO4	CO5
Lab		√	√		

#### AIML Lab 8 – Decision Tree Classification with K-Fold Cross-Validation on Iris Dataset

##### Objective:

**Total Marks:- 1.0**

To implement Decision Tree classification on the Iris dataset and evaluate using K-Fold cross-validation. Students will learn to compute performance metrics and visualize the results for each fold.

##### Problem Statement:

- Use the Iris multiclass dataset from scikit-learn.
- Implement a Decision Tree classifier.
- Use KFold cross-validation (5 folds) to evaluate model performance.
- For each fold, compute accuracy, precision, recall, and F1-score.
- Visualize confusion matrices and class distribution per fold.
- Optionally explore learning curves.

##### Explanation:

- Step 1: Load the Iris dataset from scikit-learn, with features X and labels y.
- Step 2: Initialize a Decision Tree classifier with a fixed random state for reproducibility.
- Step 3: Use K-Fold cross-validation with 5 splits, enabling shuffling with a random seed.
- Step 4: For each fold, split the data into training and test sets, train the model, predict, and compute key metrics (accuracy, precision, recall, F1-score). We also track class distributions in test folds.
- Step 5: Print out the average performance over all folds.

- Step 6 & 7: Visualize confusion matrices for each fold, labelling axes with class names.
- Step 8: Visualize the class distribution in each fold's test set to understand the data split.

### **Helpful links**

- 1) Scikit Documentation for KFold Cross Validation  
[https://scikit-learn.org/stable/modules/generated/sklearn.model\\_selection.KFold.html](https://scikit-learn.org/stable/modules/generated/sklearn.model_selection.KFold.html)
- 2) Scikit Documentation for Multiclass Classification  
<https://scikit-learn.org/stable/modules/multiclass.html>
- 3) Scikit Documentation for Multiclass Classification  
<https://scikit-learn.org/stable/modules/tree.html>