**Assignment 8, CS2672 - AIML-Lab, Spring 2025**

**Lab Assignment Questions:**

* + 1. Implement a Multilayer Perceptron (MLP) from scratch using NumPy or using a deep learning library such as TensorFlow/Keras or PyTorch. Train the model on the Derm Dataset for classification.
    2. Modify the MLP to Use ReLU in the Hidden Layer. What happens if you replace Sigmoid with ReLU in the output layer? Compare the loss convergence rate between Sigmoid and ReLU.
    3. Implement MLP with Tanh Activation. Compare the decision boundaries of Tanh vs. ReLU.
    4. Visualize Decision Boundaries for Different Activation functions.
    5. Implement MLP with Softmax Output for Multi-Class Classification. Modify the MLP to classify a 3-class dataset using Softmax activation in the output layer. Train and analyze the results.

Assignment 1

1. Implement an MLP model to predict the **compressive strength of concrete** based on its mix proportions (cement, water, aggregates, etc.).
2. Use the **Concrete Compressive Strength Dataset** from the UCI Machine Learning Repository.
3. Train the model using **mean squared error (MSE)** as the loss function and evaluate its performance.

Assignment -2

1. Develop an MLP-based classifier to categorize **soil types** based on properties such as moisture content, density, and shear strength.
2. Train the model on a dataset containing soil test results and evaluate its accuracy.

Assignment -3

1. Use MLP to predict **water quality index (WQI)** based on chemical and physical parameters like pH, turbidity, dissolved oxygen, and heavy metals concentration
2. Train and test the model on an environmental dataset.