

# **National University of Computer and Emerging Sciences**



## **Lab Manual 09 - AI2002-Artificial Intelligence**

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1. Part 1: MLP
2. Part 2: Matplotlib

## Part 1:

### Handwritten Digit Classification Using Multi-Layer Perceptron (MLP) on MNIST (12)

- Load the MNIST dataset
  - Import the dataset from **TensorFlow/Keras**.
  - Normalize pixel values to the range **[0,1]**.
  - Convert labels to one-hot encoding.
- Build an MLP model
  - Input layer: **784 neurons** (since each image is 28×28 pixels).
  - Hidden layer: **128 neurons**, activation function **ReLU**.
  - Output layer: **10 neurons**, activation function **Softmax**.
- Train the MLP
  - Use **Categorical Cross-Entropy** as the loss function.
  - Use **Adam optimizer**.
  - Train for **25 epochs**.
- Evaluate the model
  - Compute **accuracy on the test set**.
  - Visualize the **loss and accuracy curves**.
  - Predict a few test images and display their actual vs predicted labels.

You can Get help here: <https://www.geeksforgeeks.org/multi-layer-perceptron-learning-in-tensorflow/>.

## Part 2:

### Visualizing the Iris Dataset using Matplotlib (8 marks)

#### Task 1:

- Load the Iris dataset using `sklearn.datasets.load_iris()`.
- Display the first 5 rows of feature data and target labels.

#### Task 2:

- Plot a scatter plot of **sepal length vs sepal width**, colored by class (species).
- Use different colors for each species.
- Add appropriate axis labels, title, and legend.

#### Task 3:

Create a 2x2 subplot layout, and plot histograms for:

- Sepal length
- Sepal width
- Petal length
- Petal width

Each subplot should be labeled clearly.

#### Task 4:

- Make a Box plot comparing **petal width** across different species.