

National University of Computer and Emerging Sciences



Lab Manual 09 - AI2002-Artificial Intelligence

Lab Instructor: Mariam Nasim

Department of Data Science
FAST- NU, Lahore, Pakistan

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.