

National University of Computer and Emerging Sciences



Lab Manual 12 - AI2002-Artificial Intelligence **Lab Instructor: Mariam Nasim**

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CL461: Artificial Intelligence Lab

Task

Handwritten Digit Recognition using CNN (MNIST Dataset) (10)

➤ Dataset Loading

- Use the tensorflow.keras.datasets module to load the MNIST dataset.
- Normalize the image pixel values to fall between 0 and 1.

➤ Model Architecture

- Build a CNN (you can use tensorflow/keras)
 - a. Add Convolutional Layers — Building blocks of ConvNets and what do the heavy computation
 - b. Add Pooling Layers — Steps along image — reduces params and decreases likelihood of overfitting
 - c. Add Batch Normalization Layer — Scales down outliers, and forces NN to not relying too much on a Particular Weight
 - d. Add Flatten Layer — Flattens the input as a 1D vector
 - e. Add Output Layer — Units equals number of classes. Sigmoid for Binary Classification, Softmax in case of Multi-Class Classification.
 - f. Add Dense Layer — Fully connected layer which performs a linear operation on the layer's input

➤ Model Compilation

- Use the following:
 - a. Loss: categorical_crossentropy
 - b. Optimizer: adam
 - c. Metrics: accuracy

➤ Model Training

- Train the model for 50 epochs with a batch size of 32.
- Split the training data into training and validation sets.

➤ Evaluation

- Evaluate the model on the test set.
- Display the accuracy and confusion matrix.