National University of Computer and Emerging Sciences

Lab Manual 12 - Al2002-Artificial Intelligence

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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_crossentroy
  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.