

# School of Computer Science Engineering and Technology

Course-B. Tech	Type- General Elective
Course Code- CSET-335	Course Name- Deep Learning
Year- 2024	Semester- Even
Date- 12/02/2024	Batch- 2023-2024

## CO-Mapping

	CO1	CO2	CO3
Q1-Q7	√		

## Objectives

CO1: To explain the fundamentals of deep learning, Convolution neural network.

CO2: To articulate different problem of classification, detection, segmentation, generation and understand existing solutions/ deep learning architectures.

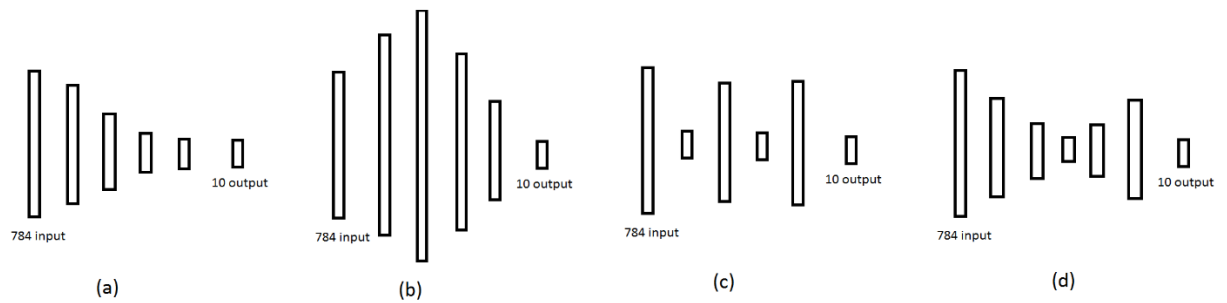
CO3: To implement a solution for the given problem and improve it using various methods transfer learning, hyperparameter optimization.

## Assignment-3

**Goal: Exploring different Neural Network design choices for Digit classification using MNIST dataset with the help of Keras library.**

1. **Number of Nodes:** Run neural network with single hidden layer, 128 nodes (with any activation function and any optimizer) for 10 epochs. Change number of nodes as 4, 32, 64, 512, 2056. What are the training and testing accuracies? Print the number of parameters of the model and training time for each of these configurations.
2. **Number of Layers:** Run neural network with 5 hidden layers, 64 nodes each (with any activation function and any optimizer) for 10 epochs. Change the number of layers to 4, 6, 8, 16. What are the training and testing accuracies? Print the number of parameters of the model and training time for each of these configurations. Run the same models for 30 epochs. Any changes?
3. **Layer-node combinations:** Run different models mimicking the following structures. Which one gives best accuracy? Print the number of parameters of the model and training time for each of these configurations. Here, large sized bar means a layer with larger number of neurons in it. You can choose the number of neurons such as 256, 128, 64, 32 etc.
4. **Input Size:** Run neural network with 4 hidden layers, 256 nodes each (with any optimizer) with ReLU activation function for all layers, for 10 epochs. Print accuracies change?

# School of Computer Science Engineering and Technology



5. **Dataset Split:** Instead of 60k images for training and 10k images for testing, run different models with different training and testing sizes, and see the changes in the accuracies.
6. **Activation function:** Run neural network with 4 hidden layers, 64 nodes each (with any optimizer) with sigmoid activation function for all layers, for 10 epochs. Change only the activation function as tanh, relu (for all 4 layers) etc. What are the training and testing accuracies? Run the same models for 30 epochs. Any changes?
7. **Activation function combinations:** For the three layers use different combinations of activation functions such as layer 1: sigmoid, layer 2: relu, layer 3: tanh. There can be lot of combinations like this. Which one is the best for 3 layers each with 32 node architectures?