

### **Lab Exercise:**

1. Follow the steps for a simple deep learning model
  - i. Load a small dataset of any application of your choice.
  - ii. Split the dataset with 80% training and 20% testing sets.
  - iii. Visualize some samples from the dataset with their corresponding labels.
  - iv. Implement the LeNet neural network architecture by initializing the weights and biases.
  - v. Use a cross-entropy loss function suitable for classification tasks.
  - vi. Select an optimizer like SGD or Adam to train the model.
  - vii. Train the model on the training set.
  - viii. Monitor the training loss and accuracy after each epoch.
  - ix. Evaluate the model on the test set.
  - x. Report the accuracy and loss on the test data.
2. Repeat the above steps by experimenting with different learning rates, batch sizes, and the number of neurons in the hidden layer. Observe how these changes affect the model's performance.
3. Implement techniques like dropout or L2 regularization to prevent overfitting. Compare the performance with and without regularization.
4. Plot the training and validation accuracy/loss over epochs and visualize the confusion matrix of the test results.