Sardar Vallabhbhai National Institute of Technology
Surat-395007
Department of Artificial Intelligence
Deep Learning (AI302)

Lab Practical– 3

Problem Statement: Comparative Analysis of Different CNN Architectures

Part:1
Your goal is to implement, train, and evaluate following landmark Convolutional Neural Network (CNN) architectures—LetNet-5 and AlexNet, VGGNet, ResNet-50, ResNet-100, efficientNet, InceptionV3 ,MobileNet —across any one of the three benchmark datasets (MNIST, Fashion-MNIST, and CIFAR-10) to analyze the impact of network depth and dataset complexity on classification accuracy and computational efficiency.

You must experiment with different configurations.

Part:2
To Study how specific Loss Functions and Optimization strategies impact the convergence and final accuracy of Different CNN Models on MNIST (balanced/simple) vs. CIFAR-10 (complex/noisy).

- Comparison of Advanced Loss Functions :
  - Binary Cross-Entropy (BCE)
  - Focal Loss
  - ArcFace

Model	Optimizer	Epochs	Loss Function	Training Accuracy	Testing Accuracy
VGGNet	Adam	10	BCE	?	?
AlexNet	SGD	20	Focal Loss	?	?
ResNet	Adam	15	ArcFace	?	?

Part: 3
To plot the Decision Boundaries or use t-SNE to visualize how different loss functions (like BCE vs. ArcFace) cluster the features of CIFAR-10.