Comparison Between FNN and CNN on MNIST Dataset

Objective

To compare the performance of a Feedforward Neural Network (FNN) and a Convolutional Neural Network (CNN) for classifying handwritten digits using the MNIST dataset.

FNN Overview

The FNN model used a fully connected architecture. Each 28x28 image was flattened into a 1D vector and passed through dense layers. While simple and fast to train, this model does not retain the spatial structure of the images and treats all pixels independently. As a result, it lacks the ability to capture local patterns like edges or shapes.

CNN Overview

The CNN model included convolutional and pooling layers that maintained the 2D spatial structure of the input images. These layers helped in automatically extracting key features such as edges, curves, and textures, enabling the model to understand visual patterns more effectively.

Results

Both models were trained on the MNIST dataset. The CNN outperformed the FNN in terms of accuracy and generalization. It handled variations in digit shapes more effectively and used fewer parameters due to weight sharing in convolutional layers.

Conclusion

The experiment highlights that CNNs are better suited for image classification tasks compared to FNNs. Their ability to learn and preserve spatial relationships makes them a powerful choice for computer vision applications.