Comparative Analysis of Denoising Autoencoder and Convolutional Neural Networks for MNIST Classification.

Presented by,
Bharath Muthuswamy Paran.

Context

- A Denoising Autoencoder (DAE) is a type of artificial neural network designed for unsupervised learning and feature extraction.
- A Convolutional Neural Network (CNN) is a specialized type of neural network architecture designed for image-based tasks, including image recognition and classification.
- The MNIST dataset is a widely-used collection of 70,000 grayscale images of handwritten digits (0-9). his dataset serves as a benchmark for developing and evaluating machine learning models, particularly in the domain of digit recognition.

Complication: Dealing with Noisy Data

- Real-world scenarios often involve imperfect or noisy data, necessitating the exploration of models capable of handling such challenges.
- This complication motivates the need for a comparative analysis between Denoising Autoencoder (DAE) and Convolutional Neural Network (CNN), two architectures renowned for their distinct capabilities.

Question: How Good Are Our Models with Messy Data?

- The central question guiding this study revolves around deciphering how DAE and CNN architectures influence MNIST classification under varying levels of noise.
- Specifically, we aim to understand their impact on classification accuracy, interpretability of learned representations, and resilience to noisy input data.
- This inquiry seeks to provide nuanced insights into the strengths and limitations of each architecture for MNIST digit classification tasks.

Hypothesis

- Building on the distinct capabilities of DAE and CNN, we hypothesize that the unsupervised learning and feature extraction strengths of DAE will excel in handling noisy data, while CNN's specialized architecture tailored for image-based tasks will exhibit superior performance in pristine conditions.
- By systematically exploring and fine-tuning the meta-parameters of both models, we anticipate gaining a comprehensive understanding of their applicability in noise-affected MNIST classification scenarios.

Thank you