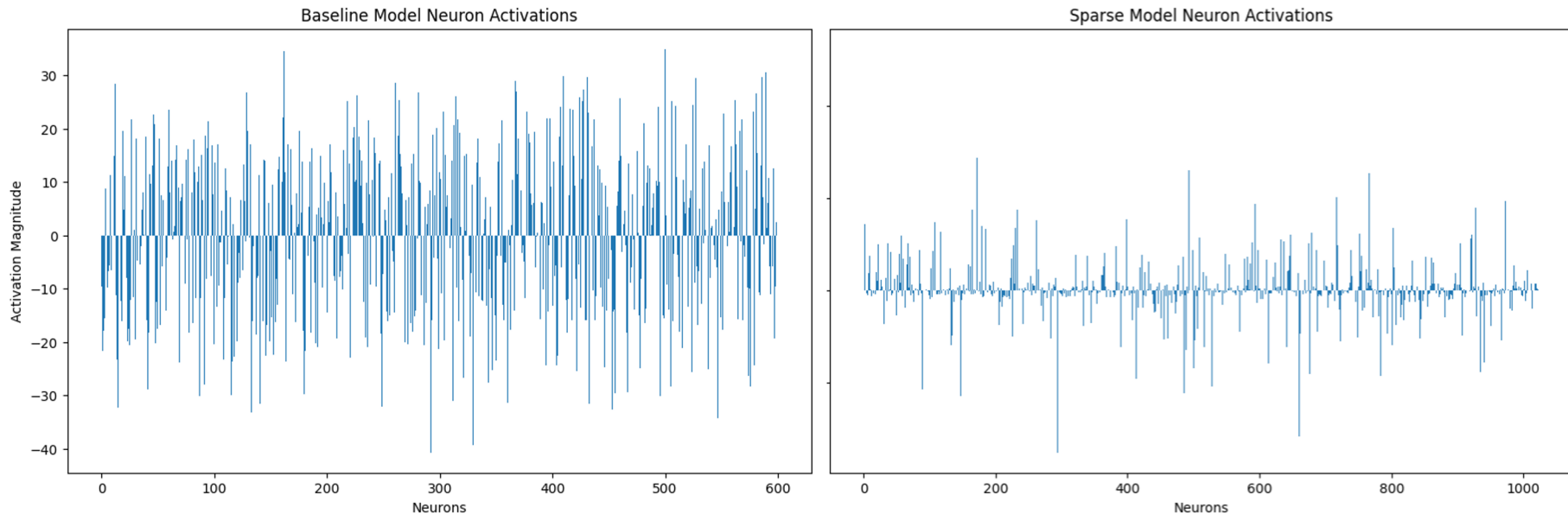# Sparse Coding in Vision

Ariba Khan

Sparse Overcomplete Representation

Overcomplete neural networks (more hidden neurons than input features) can represent data in diverse ways, but when constrained by sparsity, only a few neurons are actively used, highlighting the system's tendency to optimize resource usage.
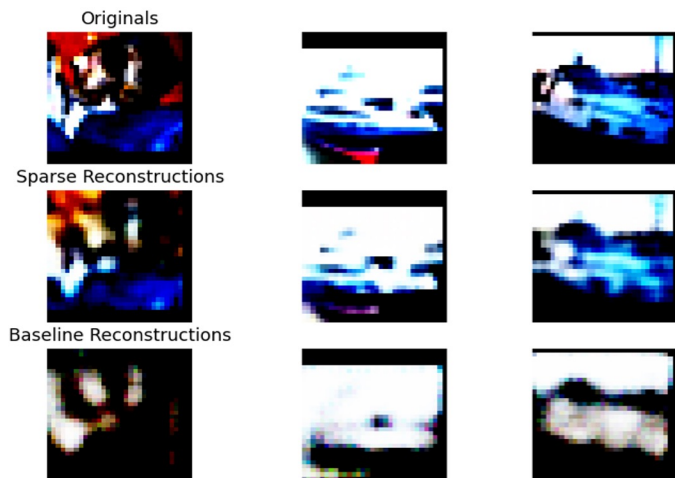
Results

Reconstruction Quality:

- Sparse Autoencoder: PSNR is 18.0751, SSIM is 0.7992
- Baseline Autoencoder: PSNR is 13.1642, SSIM is 0.5852

Evaluation:

- Sparse Autoencoder: Test Loss is 0.5491
- Baseline Autoencoder: Test Loss is 0.7102

Reconstructions using Autoencoders

Noisy Input Loss vs. Noise Factor