Week 2 Documentation: Baseline Model Design and Rationale

Model Choice

A lightweight EDSR-based convolutional model was selected as the baseline. The architecture follows the core principles of Enhanced Deep Super-Resolution (EDSR): residual blocks without batch normalization, shallow feature extraction, and PixelShuffle upsampling. This design offers stable training, low memory usage, and effective performance for 2× super-resolution tasks.

Architecture Overview

The model consists of:
- Initial 3×3 convolution for shallow feature extraction.
- A sequence of residual blocks (Conv → ReLU → Conv + skip) with 32 feature channels.
- PixelShuffle-based upsampling to scale spatial resolution by a factor of 2.
- Final 3×3 convolution to reconstruct RGB output.

This compact layout enables efficient inference while maintaining structural similarity to standard EDSR frameworks.

Baseline Training Results

Training was executed on LR/HR patch pairs (64×64 → 128×128). L1 loss was minimized using Adam optimizer. Across 5 epochs, the model demonstrated consistent improvement:
Epoch 1: PSNR ≈ 21.03 dB
Epoch 2: PSNR ≈ 23.00 dB
Epoch 3: PSNR ≈ 24.33 dB
Epoch 4: PSNR ≈ 25.43 dB
Epoch 5: PSNR ≈ 26.05 dB
These results establish the baseline performance for subsequent optimization work in Week 3.