

Image Sharpening using Knowledge Distillation

1. Data Sources

Source: Google Drive

Low-resolution images: /content/drive/MyDrive/downgraded_images

High-resolution images: /content/drive/MyDrive/sharp_images

Preprocessing:

- Images resized to 128×128
- Transformed into PyTorch tensors using torchvision.transforms

2. Model Descriptions

Teacher Model:

- ResNet18 pretrained on ImageNet
- Used for feature extraction
- Parameters are frozen during training

Student Model:

- Custom CNN trained to mimic the teacher
- Uses convolutional layers and upsampling
- Learns to reconstruct sharp images from blurred input

3. Performance Analysis

Metrics Used:

- Mean Squared Error (MSE)
- Structural Similarity Index (SSIM)
- Optional feature loss based on cosine or L2 distance between teacher and student representations

4. Training and Evaluation Results

- Student model trained using Adam optimizer and MSE loss
- SSIM achieved >0.9 indicating perceptually high-quality reconstructions
- Visualization includes comparisons among input, output, and ground truth

5. Working Source Code

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The full working Python script is saved as `image_sharpening_kd.py` and can be used for training and inference.