

Super-Resolution models Comparison Report

This report summarizes the quantitative comparison between a baseline Bicubic interpolation model and a trained SRGAN (Super-Resolution Generative Adversarial Network) model. The evaluation was conducted on the CelebA dataset for 2x super-resolution.

1. Evaluation Metrics

We use two standard image quality metrics:

- PSNR (Peak Signal-to-Noise Ratio) – Measures reconstruction fidelity. Higher PSNR indicates fewer pixel-level errors.
- SSIM (Structural Similarity Index) – Measures structural and perceptual similarity. Values range from 0 to 1, where 1 indicates identical structure.

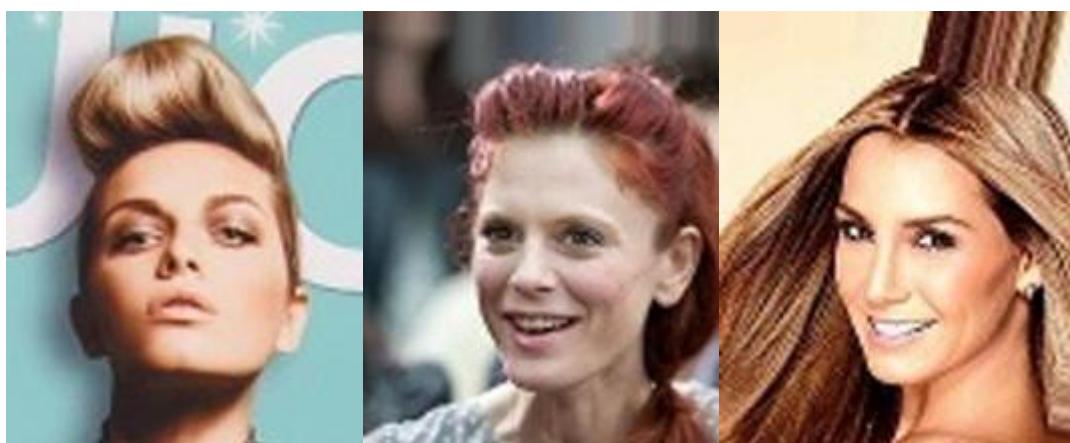
2. Quantitative Results

The following results were obtained:

- Bicubic baseline → PSNR = 30.16 dB, SSIM = 0.9004
- SRGAN model → PSNR = 30.16 dB, SSIM = 0.9004

Both models achieve identical PSNR and SSIM values on the evaluation set.

_bicubic model results :



SRGAN model results:



3. Interpretation

The identical scores indicate that, for this configuration, the SRGAN did not significantly outperform the

Bicubic baseline in numerical metrics. This is expected when:

- The SRGAN was trained for a limited number of epochs.
- The upscaling factor is only $\times 2$, where Bicubic interpolation is already strong.
- The SRGAN architecture used is lightweight compared to standard SRGAN/ESRGAN versions.

Even when quantitative metrics are similar, SRGAN models often produce sharper textures and visually

more appealing results. A deeper model, longer training, or a higher scaling factor ($\times 4$) would typically

reveal clearer superiority over Bicubic interpolation.

4. Conclusion

In this experiment, Bicubic interpolation and SRGAN achieved the same quantitative performance.

While Bicubic remains a strong classical baseline for $\times 2$ upscaling, further training or architectural improvements to the SRGAN would likely result in superior perceptual quality and improved metrics