Joint Face Super-Resolution and Deblurring

Using Generative Adversarial Network

ABSTRACT

Facial image super-resolution plays a crucial role in facial analysis, impacting tasks such as face alignment, face recognition, and image-based 3D reconstruction. While recent convolutional neural network (CNN) models have made significant strides by learning mapping relations from pairs of low-resolution (LR) and high-resolution (HR) facial images, they often prioritize increasing metrics like PSNR and SSIM, leading to potentially blurry and visually unsatisfactory reconstructed HR images. This study aims to overcome this limitation by introducing an adversarial framework designed to reconstruct HR facial images with improved perceptual quality while simultaneously eliminating blur. The approach utilizes a five-layer CNN to extract feature maps from LR facial images, and these features are then employed by two-branch encoder-decoder networks to generate HR facial images with and without blur. The incorporation of both local and global discriminators focuses on reconstructing HR facial structures. Both qualitative and quantitative results affirm the efficacy of the proposed method in generating realistic HR facial images from various LR inputs. Furthermore, a practical use case demonstrates that the proposed approach can enhance face recognition applications compared to existing methods.

Key Words: General Adversarial Networks (GANs), Super Resolution, peak signal-to-noise ratio (PSNR)

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