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A STUDY OF IMAGE QUALITY WITH PERCEPTUAL SEGMENTATION FOR QUALITY IMPROVEMENT

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ABSTRACT

Computational representation of perceived image quality is a fundamental problem in computer vision and image processing, which has assumed increased importance with the growing role of images and video in human-computer interaction. It is well-known that the commonly used Peak Signal-to-noise ratio (PSNR), although analysis-friendly, falls far short of this need. We propose a perceptual image quality measure (IQM) in terms of an image's region structure. Given a reference image and its "distorted" version, we propose a "full-reference" IQM, called segmentation-based perceptual image quality assessment (SPIQA), which quantifies this quality reduction, while minimizing the disparity between human judgment and automated prediction of image quality. One novel feature of SPIQA is that it enables the use of inter- and intra- region attributes in a way that closely resembles how the human visual system (HVS) perceives distortion. Experimental results over a number of images and distortion types demonstrate SPIQA's performance benefits.

Keywords: Image Quality, Perceptual Segmentation, Quality Improvement