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No-Reference Image Quality Assessment with Local Features and High-Order Derivatives

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Abstract

The perceptual quality of images is often affected by applied image processing techniques. Their evaluation requires tests which involve human subjects. However, in most cases, image quality assessment (IQA) should be automatic and reproducible. Therefore, in this paper, a novel no-reference IQA method is proposed. The method uses high-order derivatives to extract detailed structure deformation present in distorted images. Furthermore, it employs local features, considering that only some regions of an image carry interesting information. Then, statistics of local features are used by a support vector regression technique to provide an objective quality score. To improve the quality prediction, luminance and chrominance channels of the image are processed. Experimental results on six large-scale public IQA image datasets show that the proposed method outperforms the state-of-the-art hand-crafted and deep-learning techniques in terms of the visual quality prediction accuracy. Furthermore, the method is better than popular full-reference approaches (i.e., SSIM and PSNR).

Keywords: Image quality assessment, No-reference, Local features, Support Vector Regression

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