Abstract

Color images reveal more meaningful information to the human observers rather than grayscale ones. Regardless of the advantages of the existing well-known objective image quality measures, one of the common and major limitations of these measures is that they evaluate the quality of grayscale images only and don’t make use of color information. In this paper we propose an improved method for image quality assessment that adds a color comparison to the criteria of the well-known Multiscale Structural Similarity index (MSSIM). We evaluated the new color image quality measure through human subjective experiments. Our human subjective evaluation data contains 25 reference images and 875 test images produced by five popular color quantization algorithms. Each of the quantized images was evaluated by twenty two subjects and more than 19200 individual human quality judgments were carried out to obtain the final mean opinion scores. We also tested the proposed method on TID2008 image database to further verify our results. These results indicate that adding color comparison improves MSSIM for many distortions in TID2008 and for assessing quantized images in our database.

References


\[ \text{SSIM} = \frac{2\mu_1\mu_2 + c_1}{\mu_1^2 + \mu_2^2 + c_1} \cdot \frac{2\sigma_{12} + c_2}{\sigma_1^2 + \sigma_2^2 + c_2} \]

\[ c_1 = (K_1 L)^2 \]

\[ c_2 = (K_2 L)^2 \]

where \( \mu_1, \mu_2 \) are the means, \( \sigma_{12} \) is the covariance, \( \sigma_1^2, \sigma_2^2 \) are the variances, \( L \) is the dynamic range, and \( K_1, K_2 \) are small constants to avoid division by zero.

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Index Terms

Computer Science Image Processing

Keywords

Image Quality Assessment Structural Similarity Index Color Quantization