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Analysis of Probability Density Functions in Existing No-Reference Image Quality Assessment Algorithm for Contrast-Distorted Images

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Abstract:

Amongst all distortion types, contrast change is very crucial for visual perception of image quality. Contrast distortion may be caused by poor lighting condition and poor quality image acquisition device. Contrast-distorted image (CDI) is defined as image with low dynamic range of brightness. Most of existing image quality assessment algorithms (IQAs) have been developed during the past decade. However, most of them are designed for images distorted by compression, noise and blurring. There are very few IQAs designed specifically for CDI, e.g. Reduced-reference Image Quality Metric for Contrast-changed images (RIQMC) and No Reference-Image Quality Assessment (NR-IQA) for Contrast-Distorted Images (NR-IQA-CDI). The five features used in NR-IQA-CDI are the global spatial statistics of an image including the mean, standard deviation, entropy, kurtosis and skewness. The statistical model or the Probability Density Function (PDF) for each of the given moment features were estimated using a public image database with large number of natural scene images. Because of poor performance in two out of three image databases, where the Pearson Correlation Coefficient (PLCC) were only 0.5739 and 0.7623 in TID2013 and CSIQ database, thus motivate us to further investigated to detect the gaps in existing NR-IQA-CDI. The paper can address the problem of existing NR-IQA-CDI which the bell-curve like probability density function (pdf) of the contrast related features like standard deviation and entropy does not correlate

well with the monotonic relation between the contrast features and the perceived contrast level.

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