Chromaticness-adaptive RGB-to-RGBW Conversion

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This paper proposes chromaticness-adaptive RGB-to-RGBW conversion that preserves the human color perception within a predetermined level of color distortion for RGBW displays. The proposed method mainly consists of two stages. In the first stage, the input data is firstly linearly scaled by the de-gamma processing and adjusted to the standard sRGB color space according to the display panel parameters; then, the white spectra i s extracted from the square of the minimum or half of the maximum value of the square of the RGB primary components; at last, the maximum intensity level involving no color distortion from the common components of the RGB primary colors is searched and all the pixels are uniformly amplified by a global gain. In the second stage, an additional gain is added to each pixel based on its chromaticness and the color distortion is con trolled with a predetermined level. After the above two stages, the final output image is obtained by the gamma correction.

Experimental results testified that the proposed method was more effective than state-of-the-art retinex-based method[1] in terms of color preservation and intensity increment. Both the input RGB image and output RGBW image were converted to the CIELab color space[3] to measure the performance of intensity increment and color preservation. For Kodak test images, the proposed method increased the average intensity by 16.54% with an average color distortion level of 3.61 compared to reference RGB displays, whereas the retinex-based method[1] increased the average intensity only by 5.65% with an average color distortion level of 8.83. Fig.1 showed the detailed performance data for each test image.

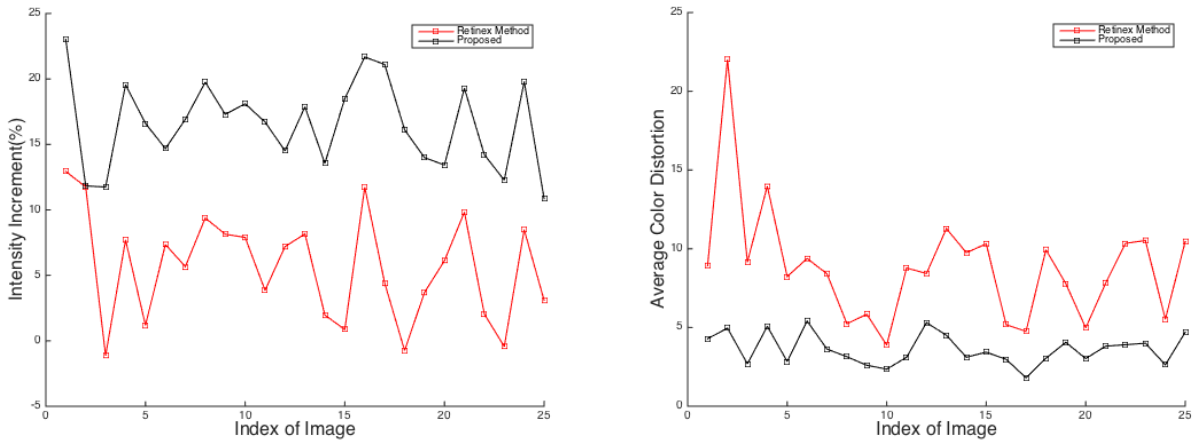

Fig. 1. Intensity Increment and Color distortion results of retinex-based method and our method for Kodak test images [2]

Acknowledgment

References

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