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Using suprathreshold color-difference ellipsoids to estimate any perceptual color-difference

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Abstract

Relating instrumentally measured to visually perceived colour-differences is one of the challenges of advanced colorimetry. Lately, the use of color difference formulas is becoming more important in the computer vision field as it is a key tool in advancing towards perceptual image processing and understanding. In the last decades, the study of contours of equal color-differences around certain color centers has been of special interest. In particular, the contour of threshold level difference that determines the just noticeable differences (JND) has been deeply studied and, as a result, a set of 19 different ellipsoids of suprathreshold color-difference is available in the literature. In this paper we study whether this set of ellipsoids could be used to compute any color difference in any region of the color space. To do so, we develop a fuzzy multi-ellipsoid model using the ellipsoids information along with two different metrics. We see that the performance of the two metrics vary significantly for very small, small, medium and large color differences. Therefore, we also study how to adapt two metric parameters to optimize performance. The obtained results outperform the currently CIE-recommended color-difference formula CIEDE2000.

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