

Physics-Based Spectral Sharpening through Filter-Chart Calibration

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Abstract

The spectral overlap of color-sampling filters increases errors when using a diagonal Matrix Transform, (MT), for color correction and reduces color distinction. Spectral sharpening is a transformation of colors that was introduced to reduce color-constancy errors when the colors are collected through spectrally overlapping filters. The earlier color constancy methods improved color precision when the illuminant color is changed, but they overlooked the color distinction. In this paper, we introduce a new spectral sharpening technique that has a good compromise of color precision and distinction, based on real physical constraints. The spectral overlap is measured through observing a gray reference chart with a set of real and spectrally disjoint filters selected by the user. The new sharpening method enables to sharpen colors obtained by a sensor without knowing the camera response functions.

Experiments with real images showed that the colors sharpened by the new method have good levels of color precision and distinction as well. The color-constancy performance is compared with the data-based sharpening method in terms of both precision and distinction.

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