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Spectral estimation of tunable LED light source using digital camera based on matrix factorization

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Abstract

Due to the high flexibility of the spectral shape generated by a spectrally tunable multichannel LED light source, the traditional spectral estimation by a digital camera has difficulty in the training procedure and cannot reach a satisfactory accuracy. Considering the characteristics of the linear system for both lighting and imaging equipment, a method based on matrix factorization was proposed by capturing a standard color chart with its known reflectance illuminated under the individual channels of the multichannel LED light source. The experimental results indicate that the proposed method outperforms the traditional one, in terms of spectral accuracy and colorimetric difference, with the upper bound performance being higher than 0.999 goodness of fit coefficient (GFC) and less than 1.0

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