

Color Image Coding using Optimal Color Components Transforms at Subband Level

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Abstract

Most image compression techniques are based on de-correlating the three color primaries and encoding the de-correlated components. Recently, however, a new approach to color image compression based on exploiting the correlations between the color primaries has been introduced. This method outperforms the common de-correlation approach. In this work we introduce a new correlation/de-correlation method that generalizes both approaches and derive its Rate-Distortion model. We introduce a new compression algorithm based on this model optimization. The optimization provides new insight into the optimal selection of the color components transform for the compression. We show that the best choice of the color transform is the local Karhunen Loeve Transform in each subband. We compare the new algorithm to presently available methods, considering quantitative measures, visual results and run-time. We conclude that the new method provides the best results and is significantly superior to existing compression methods, including JPEG2000, with respect to all distortion measures and visual quality, while keeping the complexity comparable with these algorithms.

Key words: Color image coding, De-correlation based approach, Correlation based approach, Rate-Distortion model, Optimal color components transform, Optimal rates allocation

1 Introduction

The De-correlation Based Approach (DBA) to image coding is widely used for color images. It consists of applying a color components transform (CCT) to

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