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Palette-based image decomposition, harmonization, and color transfer

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(Submitted on 4 Apr 2018 (v1), last revised 20 Jun 2018 (this version, v3))

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We present a palette-based framework for color composition for visual applications. Color composition is a critical aspect of visual applications in art, design, and visualization. The color wheel is often used to explain pleasing color combinations in geometric terms, and, in digital design, to provide a user interface to visualize and manipulate colors. We abstract relationships between palette colors as a compact set of axes describing harmonic templates over perceptually uniform color wheels. Our framework provides a basis for a variety of color-aware image operations, such as color harmonization and color transfer, and can be applied to videos. To enable our approach, we introduce an extremely scalable and efficient yet simple palette-based image decomposition algorithm. Our approach is based on the geometry of images in RGBXY-space. This new geometric approach is orders of magnitude more efficient than previous work

and requires no numerical optimization. We demonstrate a real-time layer decomposition tool. After preprocessing, our algorithm can decompose 6 MP images into layers in 20 milliseconds. We also conducted three large-scale, wide-ranging perceptual studies on the perception of harmonic colors and harmonization algorithms.

Comments: 17 pages, 25 figures

Subjects: **Graphics (cs.GR)**

Cite as: **arXiv:1804.01225 [cs.GR]**
(or **arXiv:1804.01225v3 [cs.GR]** for this version)

Submission history

From: Jianchao Tan [[view email](#)]

[v1] Wed, 4 Apr 2018 03:22:49 GMT (5151kb,D)

[v2] Tue, 19 Jun 2018 03:51:26 GMT (6734kb,D)

[v3] Wed, 20 Jun 2018 22:34:31 GMT (6734kb,D)

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