Contrast Enhancement Based on Intrinsic Image Decomposition

Abstract:

In this paper, we propose to introduce intrinsic image decomposition priors into decomposition models for contrast enhancement. Since image decomposition is a highly ill-posed problem, we introduce constraints on both reflectance and illumination layers to yield a highly reliable solution. We regularize the reflectance layer to be piecewise constant by introducing a weighted ℓ1 norm constraint on neighboring pixels according to the color similarity, so that the decomposed reflectance would not be affected much by the illumination information. The illumination layer is regularized by a piecewise smoothness constraint. The proposed model is effectively solved by the Split Bregman algorithm. Then, by adjusting the illumination layer, we obtain the enhancement result. To avoid potential color artifacts introduced by illumination adjusting and reduce computing complexity, the proposed decomposition model is performed on the value channel in HSV space. Experiment results demonstrate that the proposed method performs well for a wide variety of images, and achieves better or comparable subjective and objective quality compared with the state-of-the-art methods.