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Abstract

The paper describes reflectance analysis of real images taken in an outdoor environment. This is one of the first attempts for analyzing reflection in outdoor images. In the past, the fundamental difficulties involved in analyzing outdoor images have prevented the use of traditional techniques for reflectance analysis such as shape from shading and photometric stereo. Those difficulties include: 1. multiple reflection components due to two light sources of different spectral and spatial distributions, namely the sunlight and the skylight, 2. ambiguity in surface normal determination caused by the sun's restricted motion on the ecliptic, and 3. non-uniform surface albedo of object surfaces. In order to overcome those difficulties, we developed a reflectance model under solar illumination. Based on this model, we proposed solutions for each of these problems. We have successfully tested our algorithms using real color images taken both in a laboratory setup simulating sunlight, and in an outdoor environment under solar illumination.

Keywords: Computer vision, color image analysis, reflectance analysis, outdoor image.

Reflectance analysis under solar illumination

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