Intrinsic Properties of an Image with Highlights

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Shading and reflectance images, which are commonly called intrinsic images, are useful in many applications of computer vision. A number of methods have been proposed to extract those images. Unfortunately, all of these methods assume diffuse only reflections and deem highlights as outliers. To overcome the presence of highlights, usually reflection components separation is applied before recovering intrinsic images. However, it is well known that reflection components separation itself is an intractable task that could pose more problems. In this paper, we present a method that not only extract the intrinsic images from an image with highlights but also decompose the image reflection components, in a single integrated framework. By considering reflection components as part of image intrinsic properties, then using our method we can extract four type properties: shading image, reflectance image, diffuse reflection component and specular reflection component. The method only requires a single image, without knowing the 3D geometrical data of the objects. The basic idea of the method is based on specular-free image, a pseudo of diffuse component that has geometrical profile exactly identical to the diffuse component of the input image, and can be generated using a local (pixel-based) operation. The method is effective even if the input image has textured surfaces.
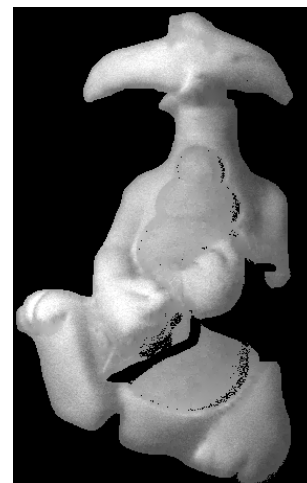
Publications

[1] Robby T. Tan, Katsushi Ikeuchi, "Intrinsic Properties of an Image with Highlights", on submission to the Conference of Meeting on Image Recognition and Understanding (MIRU 2004)
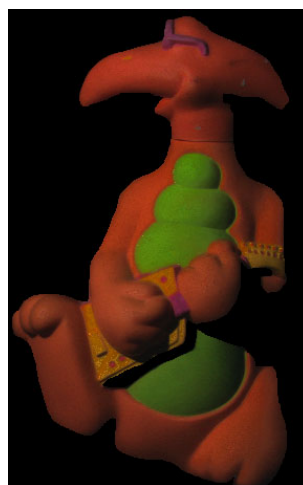
a. input image
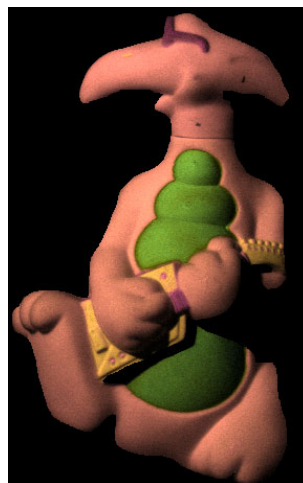
b. specular free image

c. shading image

d. reflectance image

e. diffuse image

f. specular image