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# Realistic Image Reproduction by Computer Vision

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**Abstract**

We describe a method of measuring an art painting by using a simple computer vision system, and reproducing the painting as computer graphics images under any conditions of illumination and viewing. The surface shape of a painting is considered as the rough plane with paints on a flat canvas. The surface material is an inhomogeneous dielectric with the dichromatic reflection property that is described in terms of the diffuse reflection component and specular reflection component. First, the surface normal is estimated from the diffuse component, based on a photometric stereo. Next, the surface-spectral reflectance is estimated from the image data for the diffuse component. The specular function of the Torrance-Sparrow model is fitted to the observed specular reflection data for estimating reflection parameters. Finally, an experiment using an oil painting demonstrates the realistic images rendered under different illumination and viewing conditions.

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