ShadingNet: Fine-Grained Shading Decomposition for Improved Intrinsics
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Abstract

Intrinsic image decomposition is a widely researched problem in the field of Computer Vision. Given an image, intrinsic decomposition is the process of recovering the corresponding reflectance and the shading images. Most works in this field assume a Diffuse reflection model. In this model, the environment is assumed to be lit by a single source of light. These works also assume the light directly interacts with the object to obtain the corresponding shading. Mathematically, this interaction is modelled as the dot product of the surface normals of the object with the light direction vector. Thus, these models do not take into account the shadows or indirect irradiance (i.e. photometric effects) that are caused by occlusion of light or light bouncing of other objects in the scene. Most previous works, thus suffers in performance in the presence of strong photometric effects. In order to recover from this pitfall, we propose to sub-divide the problem. First, we propose to separate out the shading into the direct shading and the photometric effects. This, we term as a fine-grained shading decomposition. Secondly, we also constrain the direct shading with the normals of the object, thus breaking up the shading into a finer function of both the lighting and the geometry. We thus propose a mathematical model, to support this decomposition, along with training an end-to-end Convolutional Neural Network (CNN), ShadingNet, to exploit the proposed decomposition. The results obtained with this network is shown to outperform the state-of-the-art models.