UNIVERSITY OF CENTRAL FLORIDA

CENTER FOR RESEARCH IN COMPUTER VISION

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"A Novel Framework for Illuminant-Color Estimation and its Forensic Application"

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ABSTRACT

In computer vision, a number of color-constancy algorithms have been proposed that attempt to neutralize the effect of the color of illumination on the imaged object color. The majority of these algorithms assume uniform illumination across the entire scene. However, in real-world settings, this is rarely the case. Thus, we propose a novel methodology for estimating the colors of multiple illuminants and their spatial distribution in the scene. We frame this problem as an energy-minimization task within a Conditional Random Field (CRF) over a grid of local illuminant estimates. This CRF scheme provides a natural way for: a) combining various color constancy approaches into a unified illumination estimate and b) incorporating spatial information. To quantitatively evaluate our method, we created a unique dataset of two-dominant-illuminants images comprised of laboratory, indoor and outdoor scenes. Unlike prior work, our database includes accurate pixel-level ground truth illuminant information. Experimental results show that our framework clearly outperforms single illuminant estimators and a recently proposed multi-illuminant estimation approach [Gijsenij et al., TIP 2011].

BIOGRAPHY

Elli Angelopoulou received her Ph.D. in Computer Science from the Johns Hopkins University in 1997. She did her postdoc at the General Robotics, Automation, Sensing and Perception (GRASP) Laboratory at the University of Pennsylvania. She then became an assistant professor at Stevens Institute of Technology. She is currently an associate research professor at the University of Erlangen-Nuremberg. Her research focuses on illumination estimation, image forensics, multispectral imaging, skin color modeling, medical imaging, computational color analysis, 3D reconstruction and reflectance analysis of natural scenes. She has over 50 publications, multiple patents and has received numerous grants, including an NSF CAREER award. Angelopoulou has served on the program committees of ICCV, CVPR and ECCV and is an associate editor of Machine Vision and Applications (MVA) and the Journal of Intelligent Service Robotics (JISR).