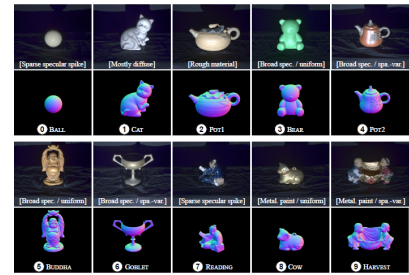# Data-driven Photometric 3D Modeling for Complex Reflectances

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Modern 3D computer vision methods, represented by multi-view stereo and structure-from-motion, have achieved faithful 3D reconstruction from a set of images. Despite requiring more controlled setups than multi-view stereo, photometric approaches have proven to be invaluable tools in applications such as Hollywood movies, industrial quality inspection, and so on, since they can reconstruct fine surface details at superior quality. This talk will mainly cover photometric stereo techniques that take as input a set of images observed under different illumination conditions from a fixed viewpoint to compute the shape in the form of surface normals with the same high resolution as the 2D image. While conventional photometric stereo methods make various assumptions over reflectance and illumination, they are being relaxed in modern methods by powerful machine learning approaches so as to be practical in diverse scenarios, such as objects with complex reflectances. In addition, newly rendered datasets and captured real world datasets have been proposed for training and testing data-driven approaches for photometric stereo, which shows superior performance.

Reference:

[1] Boxin Shi, Zhipeng Mo, Zhe Wu, Dinglong Duan, Sai-Kit Yeung, and Ping Tan,"A benchmark dataset and evaluation for non-Lambertian and uncalibrated photometric stereo", TAPMI, 2019

[2] Lixiong Chen, Yinqiang Zheng, Boxin Shi, Art Subpa-Asa, and Imari Sato, "A micro-facet based model for photometric stereo with general isotropic reflectance", TPAMI, 2019

[3] Qian Zheng, Yiming Jia, Boxin Shi, Xudong Jiang, Ling-Yu Duan, and Alex C. Kot, "SPLINE-Net: Sparse photometric stereo through lighting interpolation and normal estimation networks", ICCV, 2019

[4] Guanying Chen, Kai Han, Boxin Shi, Yasuyuki Matsushita, and Kwan-Yee K. Wong, "Self-calibrating deep photometric stereo networks", CVPR, 2019

Biography:

Boxin Shi received the BE degree from the Beijing University of Posts and Telecommunications, the ME degree from Peking University, and the PhD degree from the University of Tokyo, in 2007, 2010, and 2013. He is currently a Boya Young Fellow Assistant Professor and Research Professor at Peking University, where he leads the Camera Intelligence Group. Before joining PKU, he did postdoctoral research with MIT Media Lab, Singapore University of Technology and Design, Nanyang Technological University from 2013 to 2016, and worked as a researcher in the National Institute of Advanced Industrial Science and Technology from 2016 to 2017. He won the Best Paper Runner-up award at International Conference on Computational Photography 2015. He served as an Area Chair for ACCV 2018, BMVC 2019, and 3DV 2019.

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