Zhuo Hui (Harry)

Personal Information

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Education

PhD, *Carnegie Mellon Univeristy (CMU)*, **2014–2019**
Electrical and Computer Engineering.
GPA: 4.00/4.00

MSc, *Carnegie Mellon Univeristy (CMU)*, **2011–2013**
Electrical and Computer Engineering.
GPA: 3.83/4.00

BEng, *The Hong Kong Polytechnic University*, **2006–2011**
Electronics and Information Engineering.
GPA: 3.75/4.00

Working Experience

Sensetime US Research (2019 - Now) San Jose, CA
Research Scientist
Mobile imaging enhancement, Image denoising, Image super-resolution, HDR imaging

Adobe Research (May 2016 - Aug 2016) San Jose, CA
Research Intern, Procedural Imaging Group (Mentor: Kalyan Sunkavalli, Joon-Young Lee, Sunil Hadap)
Intern project: Material capture in the wild

Adobe Research (Jun 2015 - Sep 2015) San Jose, CA
Research Intern, Procedural Imaging Group (Mentor: Kalyan Sunkavalli, Sunil Hadap)
Intern project: Image editing using flash photography

Programing Skills

C/C++, Python, MATLAB

Selected Publications

Journal Paper

- **Zhuo Hui**, and Aswin Sankaranarayanan. Shape and Spatially-Varying Reflectance Estimation From Virtual Exemplars. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, vol. 39 (10), pp. 2060-2073, 2017.
- **Zhuo Hui**, Wenbo Liu, and Kin-Man Lam. A Novel Correspondence-based Face-hallucination Method. *Image and Vision Computing (IVC)*, vol. 60, pp. 171-184, 2017.
- **Zhuo Hui** and Kin-Man Lam. Eigentranformation-based Face Super Resolution in the Wavelet Domain. *Pattern Recognition Letters* (PRL), vol. 33, pp. 718-727, 2012.

Conference Paper

- **Zhuo Hui**, Ayan Chakrabarti, Kalyan Sunkavalli and Aswin Sankaranarayanan. Learning to Separate Multiple Illuminants in a Single Image. *IEEE Conference on Computer Vision and Pattern Recognition* (CVPR 2019)
- **Zhuo Hui**, Kalyan Sunkavalli, Sunil Hadap and Aswin Sankaranarayanan. Illuminant Spectra-based Source Separation Using Flash Photography. *IEEE Conference on Computer Vision and Pattern Recognition* (CVPR 2018) **Oral**
- **Zhuo Hui**, Kalyan Sunkavalli, Joon-Young Lee, Sunil Hadap, Jian Wang and Aswin Sankaranarayanan. Reflectance Capture using Univariate Sampling of BRDFs. *IEEE International Conference on Computer Vision* (ICCV 2017)
- **Zhuo Hui**, Aswin Sankaranarayanan, Kalyan Sunkavalli and Sunil Hadap. White Balance under Mixed Illumination using Flash Photography. *IEEE International Conference on Computational Photography* (ICCP 2016)
- **Zhuo Hui**, and Aswin Sankaranarayanan. A Dictionary-based Approach for Estimating Shape and Spatially-Varying Reflectance. *IEEE International Conference on Computational Photography* (ICCP 2015)

- Zhiding Yu, Weiyang Liu, Wenbo Liu, Xi Peng, **Zhuo Hui**, and B.V.K. Vijaya Kumar. Generalized Transitive Distance with Minimum Spanning Random Forest. *International Joint Conference on Artificial Intelligence* (IJCAI 2015)
- Zhiding Yu, Chunjing Xu, Deyuan Meng, **Zhuo Hui**, Fanyi Xiao. Transitive Distance Clustering with K-Means Duality *IEEE Conference on Computer Vision and Pattern Recognition* (CVPR 2014)

Research Projects

Material Capture in the Wild Adobe Research

- Aim to develop the algorithm suited for the commodity and light-weight setup to reconstruct surface normals and spatially-varying BRDFs of near-planar material samples.
- Provide a comprehensive theoretical and empirical analysis of the identifiability of BRDFs given sparse samples from a collocated setup.
- Propose a robust optimization scheme to recover per-pixel normals and BRDFs of near-planar real-world materials from images captured with a collocated setup.

Image Editing Using Flash Photography Adobe Research

- Aim to white balance the images captured in a complex spatially varying combination of multiple illuminants by leveraging flash photography.
- Leverage the flash photograph to derive a closed-form solution for the perpixel white balancing kernel. The tehcnique is completely automatic and makes no assumptions about the number or nature of the illuminants makes no assumptions about the number or nature of the illuminants.
- Propose an extension of our scheme to handle practical challenges such as shadows, specularities, as well as the camera and scene motion.
- Showcase the accuracy of the proposed white balancing technique on a wide range of scenes.

Shape and Reflectance Estimation for Visual Complex Objects CMU

- Aim to address the problem of estimating the shape of objects that exhibit spatially-varying reflectance under a fixed view-point and varying illumination, i.e., the setting of photometric stereo.
- Propose the use of a dictionary of BRDFs to regularize the surface normal and SV-BRDF estimation. The BRDF at each pixel of an object is assumed to lie in the non-negative span of the dictionary atoms.
- Show that the surface normal at each pixel can be efficiently estimated using a coarse-tofine search and further refined using a gradient descentbased algorithm.
- Showcase the proposed SV-BRDF estimation technique on a wide range of simulated and real scenes and demonstrate that the proposed technique outperforms state-of-the-art methods.

Honors and Awards

Graduation with First honors
Awarded to the top 5% of Seniors in The Hong Kong Polytechnic University
Technical Excellence Award in Honor Project
Awarded to the top 3 Students in Final Year Project Competition in The Hong Kong Polytechnic University
Best GPA award 2006 - 2011
Awarded to the top 3 Students with highest cumulative GPA
Dean's List 2006 - 2011
Awarded to the Students with semester GPA larger than 3.5
First Prize in Liaoning Province in National Mathematics Olympiads
Awarded to the top 20 high school students on the Mathematics Competition in the whole province

Courses and Teaching

Courses Taken:
Artificial Intelligence, Computer Vision, Computer Graphics, Machine Learning, Pattern Recognition
Nonlinear Optimization, Digital Signal Processing, Compressive Sensing, Linear Systems, Intermediate Statistics

Teaching Assistant:
Image and Video Processing, *CMU 18793*, **Fall 2017**
Instructor: Prof. Aswin Sankaranarayanan.

Signal and Systems, *CMU 18290*, **Fall 2015**
Instructor: Prof. Byron Yu and Prof. Pulkit Grover.

Nonlinear Optimization, *CMU 18799-B*, **Spring 2013**
Instructor: Prof. Joao Paulo Costeira and Prof. João Xavier.

References

Prof. Aswin Sankaranarayanan *saswin@andrew.cmu.edu*
Dr. Kalyan Sunkavalli *sunkaval@adobe.com*
Prof. Kin-Man Lam *enkmlam@polyu.edu.hk*