SATOSHI IKEHATA, PhD.

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INTERESTS   Computer Vision (Especially about the 3-D computer vision), Image Processing, Machine Learning, Human Cognition and Perception

EDUCATION   Postdoctoral Research in Computer Science and Engineering, Washington University in St. Louis. May 2014 - present
Concentrations: 3D Indoor Modeling
Supervisor: Dr. Yasutaka Furukawa
Indoor Modeling

- Indoor scene understanding and reconstruction has been an active research topic in computer vision. However, existing work has focused on small-scale indoor scenes such as a single room or a corner of a single room. We establish a computational framework and algorithms for reconstructing a building-scale indoor model from panorama RGBD images. A scene geometry is represented as a graph, where nodes correspond to structural elements such as rooms, walls, and objects.

Ph.D in Information Science and Technology, University of Tokyo. April 2011 - May 17 2014
Thesis: "Photometric Stereo Using Constrained Regression"
Concentrations: Photometric Stereo, Depth-Map Upsampling
Supervisor: Dr. Kiyoharu Aizawa
Key Projects:
Photometric Stereo

- Photometric stereo is an inverse problem of recovering surface normals of a scene from images captured under different lightings. When the reflectance of a scene obeys a Lambertian assumption, there is a simple algorithm capable of recovering the surface normals and albedos of the scene. However, the image formation process of the real world scene involves more complex interactions among shape, reflectance and illumination, making the problem more difficult. The goal of this project is to solve the photometric stereo problem in the presence of various non-Lambertian effects such as shadows, specular highlights, and sensor noises.

Depth-Map Upsampling

- Active depth video sensors such as Time-of-Flight (ToF) cameras and Kinect sensor have recently become a popular option to acquire 3-D depth maps, which are practically used for image-based rendering, scene segmentation, motion tracking and so on. However, those sensors provide a low-resolution depth map, which is also often contaminated by missing pixels and sensor noise. The goal of this project is to improve the quality and detail of a depth map using a high-resolution color image for leveraging the correlation of geometry and appearance to improve the resolution.

M.S., Interdisciplinary Information Science, University of Tokyo.
March, 2011
Concentrations: Multi-view Stereo, Camera Calibration
Thesis: "3D reconstruction with multiple hand-held cameras: a hand-held camera calibration technique using the metric background structure and confidence based multiple wide-baseline stereo" (*excellent master thesis award*)
Supervisor: Dr. Kiyoharu Aizawa
Key Project:
- Reconstructing the accurate 3D structure of moving objects with multiple hand-held cameras. It includes developing a new camera calibration method optimized to hand-held cameras and realized accurate dense depth map estimation by using a new technique. This project is designed towards developing a novel application for 3D TVs.

B.A., Psychology, University of Tokyo. March, 2009
Concentrations: Low-level Vision, Stereopsis, Psychophysics
Thesis: "The effect of temporal frequency on the stereoscopic depth perception with dynamic random-dot stereograms"
Supervisor: Dr. Takao Sato

AWARD
Excellent Master Thesis Award. March, 2011
Dr. Hiroshi Harashima Young Researcher's Award. June, 2011

EXPERIENCE
Research Fellow (DC2) - Japan Society for the Promotion of Science.
April 2012 - March 2014: This fellowship program is granted to doctoral course students who will play an important role in future scientific research activities in Japan.

Research Internship at Microsoft Research Asia. 25, July - 26, October 2011
Advisor: Dr. Yasuyuki Matsushita (Visual Computing Group)
Research Topic: Photometric Stereo

ACM SIGGRAPH Asia 2009 Student Volunteer. 15-18, December 2009
Work: Operation assistance of "Art Gallery" and "Emerging Technology".

QUALIFICATIONS AND LANGUAGES
Languages:
- Japanese: native
- English: conversational
- Chinese: novice

Software Design & Development Engineer. IPA, Japan, 2007
CG Engineer Examination 2nd grade(Expert). CG-ARTS, Japan, 2007

RESEARCH SKILLS
- Extensive knowledge of SAS and SPSS statistical programs
- Extensive knowledge of OpenCV and OpenGL programs
- 5+ years of experience with MATLAB and Octave
- 10+ Years of experience with C and C++
- 6+ Years of experience with java and HTML

PUBLICATIONS (international journal)
- S. Ikehata, D. Wipf, Y. Matsushita and K. Aizawa, "Photometric Stereo using Sparse Bayesian Regression for General Diffuse Surfaces", *IEEE*

Transactions on Pattern Analysis and Machine Intelligence, 39(9), 1816 - 1831, 2014.

PUBLICATIONS (international conferences)

- S. Ikehata, Hang Yang and Yasutaka Furukawa. Structured Indoor Modeling. *IEEE International Conference on Computer Vision (ICCV)*, December, 2015. **(oral presentation)**

- R. Furuta, S. Ikehata, T. Yamasaki and K. Aizawa, Coarse-to-Fine Strategy for Efficient Cost-Volume Filtering. IEEE International Conference on Image Processing (ICIP), September, 2014. **(Top 10% paper)**

- S. Ikehata and K. Aizawa. Photometric Stereo using Constrained Bivariate Regression for General Isotropic Surfaces. *IEEE Computer Vision and Pattern Recognition (CVPR)*, June, 2014. **(oral presentation, 5.76%)**

- S. Ikehata, J. Cho and K. Aizawa, "Depth Map Inpainting and Super-resolution Based on Internal Statistics of Geometry and Appearance", *In Proc. of IEEE International Conference on Image Processing (ICIP)*, 2013.

- J. Cho, S. Ikehata, H. Yoo, M. Gelautz and K. Aizawa, "Depth Map Upsampling using Cost-Volume Filtering", *In Proc. of IEEE IVMSP Workshop: 3D Image/Video Technologies and Applications*, 2013.

- S. Ikehata and K. Aizawa, "Confidence-based Refinement of Corrupted Depth Maps", *In Proc. of Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC)*, 2012.

- S. Ikehata, D. Wipf, Y. Matsushita and K. Aizawa. Robust Photometric Stereo using Sparse Regression. *IEEE Computer Vision and Pattern Recognition (CVPR)*, June, 2012.

PUBLICATIONS (domestic conferences)

- S. Ikehata, T. Yamasaki and K. Aizawa. Estimation and Fusion of Refined Depth maps based on Confidence Metrics. *Meeting on Image Recognition and Understanding(MIRU)*. IS4-19, 2011.

- S. Ikehata, T. Yamasaki and K. Aizawa. Dense Depth Map Estimation of Multiple Wide-baseline Images with Confidence Based Bundle Optimization. *IEICE general conference.* 2011.

- S. Ikehata and K. Aizawa. The Shadow Man -Interactive Media Artwork of Shadow-. *IEICE Technical group on Multimedia and Virtual Environment(MVE)*, pp. 119-124, 2010.

- S. Ikehata, T. Yamasaki and K. Aizawa. The New Method for Calibrating Multi Hand-held Cameras Using Images of the Scene for 3D Reconstruction of Non-rigid Objects. *Meeting on Image Recognition and Understanding(MIRU)*. IS3-50, 2010.

EXHIBITION

- S. Ikehata. The Shadow Man. *iii Exhibition 11*, in University of Tokyo, 3-8, December, 2009.