

Won-Dong Jang

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**RESEARCH
INTERESTS** Segmentation
Machine Learning
Biomedical Imaging

PROFESSIONAL EXPERIENCE **Postdoctoral Fellow** Mar. 2018 –
School of Engineering and Applied Science
Harvard University, Cambridge, MA
• Advisor: Prof. Hanspeter Pfister

EDUCATION **Ph.D.**, Electrical Engineering Mar. 2011 – Feb. 2018
• Korea University, Seoul, Korea
• Advisor: Prof. Chang-Su Kim
B.S., Electrical Engineering Feb. 2011
• Korea University, Seoul, Korea

PREPRINT [1] **Won-Dong Jang**, Donglai Wei, Zhe Sun, Brian Leahy, Helen Yang, Dalit Ben-Yosef, James Tompkin, Daniel Needleman, and Hanspeter Pfister, “Vector quantized shape learning for amodal instance segmentation,” arXiv, 2020.
[2] Clarence Yapp, Edward Novikov, **Won-Dong Jang**, Yu-An Chen, Marcelo Cicconet, Zoltan Maliga, Connor A. Jacobson, Donglai Wei, Sandro Santagata, Hanspeter Pfister, Peter K. Sorger, “UnMICST: Deep learning with real augmentation for robust segmentation of highly multiplexed images of human tissues,” bioRxiv, 2021.

JOURNAL PUBLICATIONS [1] Seho Lee, **Won-Dong Jang**, Chang-Su Kim, “Superpixels for image and video processing based on proximity-weighted patch matching,” *Multimedia Tools and Applications*, vol. 79, pp. 13811–13839, Feb. 2020.
[2] Robert Kruger, Johanna Beyer, **Won-Dong Jang**, Nam Wook Kim, Artem Sokolov, Peter Sorger, and Hanspeter Pfister “Facetto: Combining Unsupervised and Supervised Learning for Hierarchical Phenotype Analysis in Multi-Channel Image Data,” in *IEEE Transactions on Visualization and Computer Graphics*, vol. 26, issue 1, pp. 227–237, Jan. 2020.
[3] Seho Lee, **Won-Dong Jang**, Chang-Su Kim, “Tracking-by-segmentation using superpixel-wise neural network,” *IEEE Access*, vol. 6, pp. 54982–54993, Sep. 2018.
[4] **Won-Dong Jang**, Tae-Young Chung, Jae-Young Sim, and Chang-Su Kim, “FDQM: Fast quality metric for depth maps without view synthesis,” *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 25, no. 7, pp. 1099–1112, Jul. 2015.
[5] Jin-Hwan Kim, **Won-Dong Jang**, Jae-Young Sim, and Chang-Su Kim, “Optimized contrast enhancement for real-time image and video dehazing,” *Journal of Visual Communication and Image Representation*, vol. 24, no. 3, pp. 410–425, Apr. 2013.

CONFERENCE PUBLICATIONS [1] Zudi Lin, Donglai Wei, **Won-Dong Jang**, Siyan Zhou, Xupeng Chen, Xueying Wang, Richard L. Schalek, Daniel R. Berger, Brian Matejek, Lee D. Kamentsky, Adi Peleg, Daniel Haehn, Thouis R. Jones, Toufiq Parag, Jeff Lichtman, and Hanspeter Pfister “Two-Stream Active Query Suggestion for Large-Scale Object Detection in Connectomics,” in *Proc. European Conference on Computer Vision (ECCV)*, Virtual, Aug. 2020.

- [2] Salma A. Magid, **Won-Dong Jang**, Denis Schapiro, Donglai Wei, James Tompkin, Peter Sorger, and Hanspeter Pfister, “Channel Embedding for Informative Protein Identification from Highly Multiplexed Images,” in *Proc. Medical Image Computing and Computer Assisted Interventions (MICCAI)*, Virtual, Oct. 2020.
- [3] Brian Leahy*, **Won-Dong Jang***, Helen Yang*, Robbert Struyven, Donglai Wei, Zhe Sun, Kylie R. Lee, Charlotte Royston, Liz Cam, Yael Kalma, Foad Azem, Dalit Ben-Yosef, Hanspeter Pfister, and Daniel Needleman, “Automated Measurements of Key Morphological Features of Human Embryos for IVF,” in *Proc. Medical Image Computing and Computer Assisted Interventions (MICCAI)*, Virtual, Oct. 2020.
*equal contributions
- [4] Donglai Wei, Zudi Lin, Daniel Franco-Barranco, Nils Wendt, Xingyu Liu, Wenjie Yin, Xin Huang, Aarush Gupta, **Won-Dong Jang**, Xueying Wang, Ignacio Arganda-Carreras, Jeff W. Lichtman, and Hanspeter Pfister, “MitoEM Dataset: Large-scale 3D Mitochondria Instance Segmentation from EM Images,” in *Proc. Medical Image Computing and Computer Assisted Interventions (MICCAI)*, Virtual, Oct. 2020.
- [5] Abhimanyu Talwar, Zudi Lin, Donglai Wei, Yuesong Wu, Bowen Zheng, Jinglin Zhao, Won-Dong Jang, Xueying Wang, Jeff Lichtman, and Hanspeter Pfister, “A Topological Nomenclature for 3D Shape Analysis in Connectomics,” in *Proc. IEEE International Conference on Computer Vision and Pattern Recognition Workshop (CVPRW)*, Virtual, Oct. 2020.
- [6] **Won-Dong Jang** and Chang-Su Kim, “Interactive Image Segmentation via Backpropagating Refinement Scheme,” in *Proc. IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)*, Long beach, CA, June. 2019.
- [7] Se-Ho Lee, **Won-Dong Jang**, and Chang-Su Kim, “Temporal superpixels based on proximity-weighted patch matching,” in *Proc. IEEE International Conference on Computer Vision (ICCV)*, Venice, Italy, Oct. 2017.
- [8] Juhyeok Mun, **Won-Dong Jang**, Deuk Jae Sung, and Chang-Su Kim, “Comparison of objective functions in CNN-based prostate magnetic resonance image segmentation,” in *Proc. IEEE International Conference on Image Processing (ICIP)*, Beijing, China, Sep. 2017.
- [9] Kyungsun Lim, **Won-Dong Jang**, and Chang-Su Kim, “Background Subtraction Using Encoder-Decoder Structured Convolutional Neural Network,” in *Proc. IEEE International Conference on Advanced Video and Signal based Surveillance (AVSS)*, Lecce, Italy, Aug. 2017.
- [10] **Won-Dong Jang** and Chang-Su Kim, “Online video object segmentation via convolutional trident network,” in *Proc. IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)*, Honolulu, HI, Jul. 2017.
- [11] Se-Ho Lee, **Won-Dong Jang**, and Chang-Su Kim, “Contour-constrained superpixels for image and video processing,” in *Proc. IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)*, Honolulu, HI, Jul. 2017.
- [12] **Won-Dong Jang** and Chang-Su Kim, “Semi-supervised video object segmentation using multiple random walkers,” in *Proc. British Machine Vision Conference (BMVC)*, York, UK, Sep. 2016.
- [13] Minhyeok Heo, **Won-Dong Jang**, and Chang-Su Kim, “Video object segmentation using multiple random walkers with GMM restart rule,” in *Proc. Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC)*, Jeju, Korea, Dec. 2016.
- [14] **Won-Dong Jang** and Chang-Su Kim, “Streaming video segmentation via short-term hierarchical segmentation and frame-by-frame Markov random field optimization,” in *Proc. European Conference on Computer Vision (ECCV)*, Amsterdam, Netherlands, Oct. 2016.

- [15] Se-Ho Lee, **Won-Dong Jang**, Byung Kwan Park, and Chang-Su Kim, “RGB-D image segmentation based on multiple random walkers,” in *Proc. IEEE International Conference on Image Processing (ICIP)*, Phoenix, AZ, Sep. 2016.
- [16] **Won-Dong Jang**, Chulwoo Lee, Chang-Su Kim, “Primary object segmentation in videos via alternate convex optimization of foreground and background distributions,” in *Proc. IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)*, Las Vegas, NV, Jun. 2016.
- [17] Yeong Jun Koh, **Won-Dong Jang**, Chang-Su Kim, “POD: Discovering primary objects in videos based on evolutionary refinement of object recurrence, background, and primary object models,” in *Proc. IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)*, Las Vegas, NV, Jun. 2016.
- [18] Jun-Tae Lee, Kyung-Rae Kim, **Won-Dong Jang**, and Chang-Su Kim, “Near-duplicate video clustering using multiple complementary video signatures,” in *Proc. Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (AP-SIPA ASC)*, Hong Kong, China, Dec. 2015.
- [19] Kyung-Rae Kim, **Won-Dong Jang**, and Chang-Su Kim, “Frame-level matching of near duplicate videos based on ternary frame descriptor and iterative refinement,” in *Proc. IEEE International Conference on Image Processing (ICIP)*, Quebec, Canada, Sep. 2015.
- [20] Chulwoo Lee, **Won-Dong Jang**, Jae-Young Sim, Chang-Su Kim, “Multiple random walkers and their application to image cosegmentation,” in *Proc. IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)*, Boston, MA, Jun. 2015.
- [21] **Won-Dong Jang**, Chulwoo Lee, Jae-Young Sim, and Chang-Su Kim, “Automatic video genre classification using multiple SVM votes,” in *Proc. IEEE International Conference on Pattern Recognition (ICPR)*, Stockholm, Sweden, Aug. 2014.
- [22] **Won-Dong Jang**, Jae-Young Sim, and Chang-Su Kim, “GEQM: A quality metric for gray-level edge maps based on structural matching,” in *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Florence, Italy, May 2014.
- [23] Tae-Young Chung, **Won-Dong Jang**, and Chang-Su Kim, “Efficient depth video coding based on view synthesis distortion estimation,” in *Proc. IEEE Visual Communications and Image Processing (VCIP)*, San Diego, CA, Nov. 2012.
- [24] **Won-Dong Jang** and Chang-Su Kim, “SEQM: Edge quality assessment based on structural pixel matching,” in *Proc. IEEE Visual Communications and Image Processing (VCIP)*, San Diego, CA, Nov. 2012.
- [25] Jin-Hwan Kim, **Won-Dong Jang**, Yongsup Park, Dong-Hahk Lee, Jae-Young Sim, and Chang-Su Kim, “Temporally coherent real-time video dehazing,” in *Proc. IEEE International Conference on Image Processing (ICIP)*, Orlando, FL, Sep. 2012.

PATENTS

- [1] Young-Jin Kwak, Kyung-Rae Kim, Chang-Su Kim, **Won-Dong Jang**, Jun-Tae Lee, “Method and device for determining similarity between sequences,” US9886650 B2, Feb. 2018.
- [2] Yongsup Park, Donghahk Lee, Changsu Kim, Jinhwan Kim, **Wondong Jang**, “Image processing apparatus for removing haze contained in still image and method thereof,” US9336577 B2, May 2016.
- [3] Yongsup Park, Donghahk Lee, Changsu Kim, Jinhwan Kim, **Wondong Jang**, “Image-processing apparatus for removing haze contained in video, and method thereof,” US9275443 B2, Mar. 2016.

PROFESSIONAL Reviewer for journals

ACTIVITIES

- IEEE TRANSACTIONS ON IMAGE PROCESSING
- IEEE TRANSACTIONS ON MULTIMEDIA
- IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY
- JOURNAL OF VISUAL COMMUNICATION AND IMAGE REPRESENTATION
- ACM TRANSACTIONS ON MULTIMEDIA COMPUTING COMMUNICATIONS AND APPLICATIONS

Reviewer for conferences

- IEEE CONFERENCE ON COMPUTER VISION AND PATTERN RECOGNITION (CVPR) 2018
- IEEE CONFERENCE ON COMPUTER VISION AND PATTERN RECOGNITION (CVPR) 2019
- IEEE CONFERENCE ON COMPUTER VISION AND PATTERN RECOGNITION (CVPR) 2020
- IEEE INTERNATIONAL CONFERENCE ON COMPUTER VISION (ICCV) 2019
- EUROPEAN CONFERENCE ON COMPUTER VISION (ECCV) 2020
- ASIAN CONFERENCE ON COMPUTER VISION 2018
- MEDICAL IMAGE COMPUTING AND COMPUTER ASSISTED INTERVENTIONS (MICCAI) 2020
- EUROVIS 2020
- ASIA-PACIFIC SIGNAL AND INFORMATION PROCESSING ASSOCIATION ANNUAL SUMMIT AND CONFERENCE 2018

HONORS AND AWARDS

- Brain Korea (BK) 21 Graduate Student Fellowship, National Research Foundation of Korea (2011 – 2016)

COMPUTER SKILLS

Languages

- Python, MATLAB, C/C++

Deep Learning

- Tensorflow, PyTorch, Caffe

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