Won Hwa Kim

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RESEARCH INTERESTS

My research interests lie in *multi-resolution analysis* of data for various applications in **Brain Imaging, Machine Learning and Computer Vision**. On the application side, I am particularly interested in developing novel methods to facilitate the analysis of neurodegenerative brain disorders such as Alzheimer's disease (AD) towards mechanisms for diagnosis, discovering new treatments, and design of new studies. On the technical side, my interests deal with applied harmonic analysis and statistical image analysis.

RESEARCH / WORK EXPERIENCE

Assistant Professor, Computer Science and Engineering, University of Texas, Arlington, U.S.A. 2018 - present

Researcher, Data Science Team, NEC Labs, America, U.S.A. 2017 - 2018

Research Assistant, Computer Sciences, University of Wisconsin - Madison, U.S.A. 2011 - 2017

Research Engineer, Environmental Tech Center, Hyundai Motors Company, S. Korea 2010 - 2011

Researcher, Interaction, Intelligence and Integration Robot Research Center, S. Korea 2008 - 2010

Administrator/Information Management Officer, Headquarter, 2003 - 2005
the 8th U.S. Army Division, S. Korea

EDUCATION

University of Wisconsin, Madison, Wisconsin, U.S.A. 2011 - 2017
Ph.D, Computer Sciences / Minor in Statistics
• Thesis: A Multi-resolution Framework for Statistical Analysis of Neuroimaging Data
• Advisor: Vikas Singh

KAIST, Daejon, South Korea 2008 - 2010
M.S., Robotics Program
• Thesis: Diversified Emotions with Mood for Human-like Behaviors of Robots
• Advisor: Myungjin Chung

Sungkyunkwan University, Seoul, South Korea 2001 - 2008
B.S., Information and Communication Engineering (*Early graduation in 7 semesters*)
• Thesis : Investigation on Energy Transmittance of a Single Unit Solar Cell
with Micro Square Structure by Ray Tracing
• Advisor: Bongsik Song

TEACHING EXPERIENCE

Teaching Assistant, Computer Sciences, University of Wisconsin - Madison, U.S.A.
• CS767: Computational Methods in Medical Image Analysis Fall, 2016
• CS767: Computational Methods in Medical Image Analysis Spring, 2015
• CS638: Statistical Methods for Medical Image Analysis Spring, 2014
- Led discussions / Assisted in the design of homework and project

Teaching Assistant, Robotics Program, KAIST, S. Korea.
• RE510: Intelligent Robot Design Lab. Fall, 2009
- Designed homework and projects / Led discussions

HONORS and AWARDS

- STARs Award, University of Texas System 2017
- Doctoral Consortium Travel Award, IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2016
- Student Travel Award, International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) 2013
- Machine Learning Summer School (MLSS) Scholarship, University of California, Santa Cruz 2012
- National Fellowship, S. Korea 2008 - 2010
- Finalist for the Best Paper in Biomimetics, IEEE International Conference on Robotics and Biomimetics 2009
- Merit Based Scholarship, Sungkyunkwan University 2002, 2003, 2005
- 3rd Place in 12th Grade, Utah Math Contest 2001

PUBLICATIONS

Won Hwa Kim, "A Multi-resolution Framework for Statistical Analysis of Neuroimaging Data", *Doctoral Thesis*, 2017.

Won Hwa Kim, Seong Jae Hwang, Nagesh Adluru, Stering C. Johnson, Vikas Singh, "Graph Completion: a generalization of Netflix prize problem to design cost-effective neuroimaging trials in preclinical AD", *Alzheimer's Association International Conference (AAIC)*, 2017.

Annie M. Racine, Andrew P. Merluzzi, Nagesh Adluru, Derek Norton, Rebecca L. Koscik, Lindsay R. Clark, Sara E. Berman, Christopher R. Nicholas, Sanjay Asthana, Andrew L. Alexander, Kaj Blennow, Henrik Zetterberg, **Won Hwa Kim**, Vikas Singh, Cynthia M. Carlsson, Barbara B. Bendlin, Sterling C. Johnson "Association of longitudinal white matter degeneration and cerebrospinal fluid biomarkers of neurodegeneration, inflammation and Alzheimer's disease in late-middle-aged adults", *Brain Imaging and Behavior*, 2017. [5yr impact factor: 4.16]

Won Hwa Kim, Mona Jalal, Seong Jae Hwang, Sterling C. Johnson, Vikas Singh, "Online Graph Completion: Multivariate Signal Recovery in Computer Vision", *Computer Vision and Pattern Recognition (CVPR)*, 2017. [acceptance rate: 29.9%]

Won Hwa Kim, Seong Jae Hwang, Nagesh Adluru, Sterling C. Johnson, Vikas Singh, "Adaptive Signal Recovery on Graphs via Harmonic Analysis for Experimental Design in Neuroimaging", *European Conference on Computer Vision (ECCV)*, 2016. [acceptance rate: 26.6%]

Seong Jae Hwang, **Won Hwa Kim**, Barbara B. Bendlin, Nagesh Adluru, Vikas Singh, "Multi-Resolution Analysis of DTI-Derived Brain Connectivity and the Influence of PET-Derived Alzheimer's Disease Pathology in a Preclinical Cohort", *Alzheimer's Association International Conference (AAIC)*, 2016.

Won Hwa Kim*, Hyunwoo J. Kim*, Nagesh Adluru, Vikas Singh, "Latent Variable Graphical Model Selection using Harmonic Analysis: Applications to the Human Connectome Project (HCP)", *Computer Vision and Pattern Recognition (CVPR)*, 2016. [**SPOTLIGHT**, acceptance rate: 9.7%]
(*: First authorship shared)

Won Hwa Kim, Sathya Ravi, Sterling C. Johnson, Ozioma C. Okonkwo, Vikas Singh, "On Statistical Analysis of Neuroimages with Imperfect Registration", *International Conference on Computer Vision (ICCV)*, 2015. [acceptance rate: 30.9%]

Won Hwa Kim, Nagesh Adluru, Moo K. Chung, Ozioma C. Okonkwo, Sterling C. Johnson, Barbara B. Bendlin, Vikas Singh, "Multi-resolution Statistical Analysis of Brain Connectivity Graphs in Preclinical Alzheimer's Disease", *NeuroImage*, 118:103-117, 2015. [5yr impact factor: 6.94]

Won Hwa Kim, Nagesh Adluru, Moo K. Chung, Ozioma C. Okonkwo, Sterling C. Johnson, Barbara B. Bendlin, Vikas Singh, "A Framework for Performing Multi-Resolution Statistical Analysis of Brain Connectivity Graphs for Preclinical Alzheimers Disease", *Alzheimer's Association International Conference (AAIC)*, 2015

Won Hwa Kim, Barbara B. Bendlin, Moo K. Chung, Sterling C. Johnson, Vikas Singh, "Statistical Inference Models for Image Datasets with Systematic Variations", *Computer Vision and Pattern Recognition (CVPR)*, 2015. [acceptance rate: 28%]

Won Hwa Kim, Vikas Singh, Moo K. Chung, Nagesh Adluru, Barbara B. Bendlin, Sterling C. Johnson, "Multi-resolution Statistical Analysis on Graph Structured Data in Neuroimaging", *International Symposium on Biomedical Imaging (ISBI)*, 2015. [Invited paper/Oral presentation]

Won Hwa Kim, Vikas Singh, Moo K. Chung, Chris Hinrichs, Deepti Pachauri, Ozioma C. Okonkwo, Sterling C. Johnson, "Multi-resolutional Shape Features via non-Euclidean Wavelets: Applications to Statistical Analysis of Cortical thickness", *NeuroImage*, 93:107-123, 2014. [5yr impact factor: 6.94]

A. Pasha Hosseinbor, **Won Hwa Kim**, Nagesh Adluru, Amit Acharya, Houri K. Vorperian, Moo K. Chung, "The 4D Hyperspherical Diffusion Wavelet: a New Method for the Detection of Localized Anatomical Variation", *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2014. [acceptance rate: 30%]

Won Hwa Kim, Nagesh Adluru, Moo K. Chung, Sylvia Charchut, Johnson J. GadElkarim, Lori Altshuler, Teena Moody, Anand Kumar, Vikas Singh, and Alex D. Leow, "Multi-resolutional Brain Network Filtering and Analysis via Wavelets on Non-Euclidean Space", *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2013. [acceptance rate: 33%]

Won Hwa Kim, Moo K. Chung, Vikas Singh, "Multi-resolution Shape Analysis via Non-Euclidean Wavelets: Applications to Mesh Segmentation and Surface Alignment Problems", *Computer Vision and Pattern Recognition (CVPR)*, 2013. [acceptance rate: 25.2%]

Won Hwa Kim, Deepti Pachauri, Charles Hatt, Moo K. Chung, Sterling C. Johnson, Vikas Singh, "Wavelet Based Multi-scale Shape Features on Arbitrary Surfaces for Cortical Thickness Discrimination", *Advances in Neural Information Processing Systems (NIPS)*, 2012. [acceptance rate: 25.2%]

Won Hwa Kim, Jeong Woo Park, Woo Hyun Kim, Won Hyong Lee, Myung Jin Chung, "Proposal of 2D Mood Model for Human-like Behaviors of Robot", *The Journal of Korea Robotics Society*, 5:224-230, 2010.

Won Hwa Kim, Jeong Woo Park, Won Hyong Lee, Woo Hyun Kim, Myung Jin Chung, "Stochastic Approach on a Simplified OCC Model for Uncertainty and Believability", *International Conference on Computational Intelligence in Robotics and Automation (CIRA)*, 2009.

Jeongwoo Park, **Won Hwa Kim**, Won Hyong Lee, Myung Jin Chung, "A Robot Simulator 'FRESi' for Dynamic Facial Expression", *International Conference on Ubiquitous Robots and Ambient Intelligence (URAI)*, 2009.

Jeongwoo Park, Woo Hyun Kim, Won Hyong Lee, **Won Hwa Kim**, Myung Jin Chung, "Lifelike Facial Expression of Mascot-type Robot based on Emotional Boundaries", *International Conference on Robotics and Biomimetics (ROBIO)*, 2009

Woo Hyun Kim, Jeongwoo Park, Won Hyong Lee, **Won Hwa Kim**, Myung Jin Chung, "Synchronized Multimodal Expression Generation using Editing Toolkit for a Human-friendly robot", *International Conference on Robotics and Biomimetics (ROBIO)*, 2009

INVITED TALKS

Online Graph Completion: Multivariate Signal Recovery in Computer Vision
1) Computer Vision Seminar (EE), Sungkyunkwan Univ. Jul. 6, 2017
2) Data Science Seminar (Math), Sungkyunkwan Univ. Jul. 6, 2017

Multi-resolution Analysis for Inverse Covariance Matrix Estimation Feb. 12, 2016
Operator Theory Seminar, Seoul National Univ.

Statistical Analysis of Neuroimages with Imperfect Registration Jan. 26, 2016
IBS Seminar, Sungkyunkwan Univ.

Multi-resolution Statistical Analysis on Graph Structured Data in NeuroImaging — Jun. 30, 2015
Medical Image Analysis Seminar, Sungkyunkwan Univ.

Multi-scale Representation of Cortical Thickness using Wavelet for Group Analysis — Mar. 13, 2013
Brain Food, Waisman Center and W-ADRC Imaging Core

Wavelet Based Multi-scale Shape Descriptors on Arbitrary Surfaces
1) Power Electronics Seminar, Sungkyunkwan University — Jan. 15, 2013
2) Artificial Intelligence Seminar (AISEM), UW-Madison — Oct. 18, 2012

SERVICES

Reviewer, Computer Vision and Pattern Recognition (CVPR) — 2018
Reviewer, NeuroImage — 2017, 2018
Reviewer, International Conference on Machine Learning (ICML) — 2017
Reviewer, European Conference on Computer Vision (ECCV) — 2012, 2016
Reviewer, Medical Image Computing and Computer Assisted Intervention (MICCAI) — 2014, 2016
Reviewer, IEEE Transactions on Medical Imaging (TMI) — 2014
Reviewer, Multimedia SYSTEMS — 2014

OPEN SOURCE SOFTWARE

• Cortical Thickness Analysis (CTA) Toolbox
(`https://www.nitrc.org/projects/cta_toolbox`)
• Multi-resolution Brain Connectivity Analysis (MBCA) Toolbox
(`http://pages.cs.wisc.edu/~wonhwa/mbca_toolbox.html`)

EXTRA ACTIVITIES

Student Representative, Robotics Program, KAIST, S. Korea — 2009
Volunteer, International Federation of Automatic Control (IFAC), COEX, S. Korea — 2008
Volunteer, International Workshop on Operator Theory and Applications (IWOTA), — 2006
Seoul National University, S. Korea

PERSONAL REFERENCES

Available upon request.