Seong Jae Hwang

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EDUCATION

University of Wisconsin - Madison — Starting Date: Aug. 2014
Doctor of Philosophy - Computer Sciences (In Progress) — Madison, WI
Advisor: Professor Vikas Singh
Fully funded by CIBM NIH Predoctoral Fellowship — Jul. 2015 - Jun. 2018

University of Pennsylvania — Aug. 2011 - Dec. 2013
Master of Science in Engineering - Robotics — Philadelphia, PA
Thesis Advisor: Professor Camillo J. Taylor
Thesis Title: *Quadratic Integer Programming approach for MRF-based labeling problems*

University of Illinois at Urbana-Champaign — Aug. 2007 - May 2011
Bachelor of Science - Computer Science — Champaign, IL

RESEARCH INTEREST

My research is focused on developing *statistical machine learning* and *deep neural network* methods for analyzing sequential data in *machine learning*, *computer vision* and *medical imaging*. On the technical side, I develop algorithms for sequential data from small to large scales with statistical machine learning and sequential deep learning models. On the application side, my interests range from neuroscientific discoveries to machine learning/computer vision applications.

PUBLICATIONS

Published or Accepted

1. **Seong Jae Hwang**, Zirui Tao, Won Hwa Kim, Vikas Singh, "Conditional Recurrent Flow: Conditional Generation of Longitudinal Samples with Applications to Neuroimaging", *International Conference on Computer Vision (ICCV)*, 2019.
2. **Seong Jae Hwang**, Ronak R. Mehta, Hyunwoo J. Kim, Vikas Singh, "Sampling-free Uncertainty Estimation in Gated Recurrent Units with Applications to Normative Modeling in Neuroimaging", *Conference on Uncertainty in Artificial Intelligence (UAI)*, 2019.
3. **Seong Jae Hwang**, Joonseok Lee, Balakrishnan Varadarajan, Zheng Xu, Ariel Gordon and Apostol (Paul) Natsev, "Large-Scale Training Framework for Video Annotation", *Conference on Knowledge Discovery and Data Mining (KDD)*, 2019. [oral presentation]
4. Courtney A. Miller, **Seong Jae Hwang**, Meghan M. Cotter, Houri K. Vorperian, "Cervical vertebral growth and emergence of sexual dimorphism: A developmental study using computed tomography", *Journal of Anatomy*, 2019.
5. Won Hwa Kim, Annie M. Racine, Nagesh Adluru, **Seong Jae Hwang**, Kaj Blennow, Henrik Zetterberg, Cyhthia M. Carlsson, Sanjay Asthana, Rebecca L. Koscik, Sterling C. Johnson, Barbara B. Bendlin, Vikas Singh, "Cerebrospinal fluid biomarkers of neurofibrillary tangles and synaptic dysfunction are associated with longitudinal decline in white matter connectivity: a Multi-resolution graph analysis", *NeuroImage: Clinical*, 2018.

6. **Seong Jae Hwang**, Nagesh Adluru, Won Hwa Kim, Sterling C. Johnson, Barbara B. Bendlin, Vikas Singh, "Associations between PET Amyloid Pathology and DTI Brain Connectivity in Preclinical Alzheimer's Disease", *Brain Connectivity*, 2018.

7. **Seong Jae Hwang**, Sathya N. Ravi, Zirui Tao, Hyunwoo J. Kim, Maxwell D. Collins, Vikas Singh, "Tensorize, Factorize and Regularize: Robust Visual Relationship Learning", *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018.

8. Won Hwa Kim, Mona Jalal, **Seong Jae Hwang**, Sterling C. Johnson, Vikas Singh, "Online Graph Completion: Multivariate Signal Recovery in Computer Vision", *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2017.

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.

10. **Seong Jae Hwang**, Nagesh Adluru, Maxwell D. Collins, Sathya N. Ravi, Barbara B. Bendlin, Sterling C. Johnson, Vikas Singh, "Coupled Harmonic Bases for Longitudinal Characterization of Brain Networks", *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2016.

11. **Seong Jae Hwang**, Maxwell D. Collins, Sathya N. Ravi, Vamsi K. Ithapu, Nagesh Adluru, Sterling C. Johnson, Vikas Singh, "A Projection Free Method for Generalized Eigenvalue Problems with a Nonsmooth Regularizer", *International Conference on Computer Vision (ICCV)*, 2015.

Conference Abstracts

1. **Seong Jae Hwang**, Rebecca L. Koscik, Tobey J. Betthauser, Zirui Tao, Won Hwa Kim, Sterling C. Johnson, Vikas Singh, "Predicting amyloid accumulation trajectories in a risk-enriched Alzheimer's disease cohort with Deep Conditional Neural Networks", *Alzheimer's Association International Conference (AAIC)*, 2019.

2. Zirui Tao, Ronak R. Mehta, **Seong Jae Hwang**, Rebecca L. Koscik, Erin Jonaitis, Sterling C. Johnson, Vikas Singh, "A Normative Modeling Based Analysis of Amyloid, Cognition, and Tau in Preclinical Alzheimer's Disease", *Alzheimer's Association International Conference (AAIC)*, 2019.

3. Xingjian Zhen, Rudrasis Chakraborty, Nocholas Vogt, **Seong Jae Hwang**, Sterling C. Johnson, Barbara B. Bendlin, Vikas Singh, "Sequential Deep Learning Algorithms show structural connectivity differences by amyloid status", *Alzheimer's Association International Conference (AAIC)*, 2019.

4. Courtney A. Miller, **Seong Jae Hwang**, Meghan M. Cotter, Houri K. Vorperian, "Sex-specific cervical vertebral growth in height & depth: A study using computed tomography", *American Association of Physical Anthropologists*, 2019.

5. **Seong Jae Hwang**, Sathya N. Ravi, Nagesh Adluru, Barbara B. Bendlin, Sterling C. Johnson, Vikas Singh, "Data-Driven Propagation Modeling of PET-Derived Alzheimer's Disease Pathology in a Preclinical Cohort", *Alzheimer's Association International Conference (AAIC)*, 2018.

6. Won Hwa Kim, **Seong Jae Hwang**, Nagesh Adluru, Sterling C. Johson, Vikas Singh, "Graph Completion: A Generalization of Netflix Prize Problem to Designing Cost Effective Neuroimaging Trials in Preclinical AD", *Alzheimer's Association International Conference (AAIC)*, 2017.

7. **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. [oral presentation]

Patents

1. Won Hwa Kim, **Seong Jae Hwang**, Nagesh Adluru, Sterling C. Johnson, Vikas Singh, "Computerized System for Efficient Augmentation of Data Sets", 2018, US20180113990A1.
2. Zheng Han, Xiaowei Dai, **Seong Jae Hwang**, Jason Fass, "Fast object tracking framework for sports video recognition", 2016, US9449230B2.

WORK EXPERIENCE

Research Intern Apr. 2019 - Jul. 2019
Google Research / Google AI Mountain View, CA

- Automated a video annotation training pipeline using TensorFlow Extended (TFX)
- Implemented an active learning component to the TFX pipeline

Research Intern Jun. 2018 - Aug. 2018
Google Research / Google AI Mountain View, CA

- Focused on the large-scale video annotation task with a scalable framework
- Achieved the state-of-the-art performance on the largest video dataset (YouTube-8M) using the frame-pooling neural network model

Computer Vision Scientist Intern Jun. 2014 - Aug. 2014
Zepp Labs, Inc. Los Gatos, CA

- Collected and processed video data for training an object tracking framework for sports videos using OpenCV and LIBLINEAR in C++ and MATLAB

Software Development Intern May 2011 - Aug. 2011
Yahoo! Champaign, IL

- Tested and analyzed the compression/decompression of YZip using IPP-Zlib on Hadoop

Android Software Development Intern May 2010 - Aug. 2010
Motorola Libertyville, IL

- Developed an aggregated video player Android application using hash table and multi-threading

RESEARCH EXPERIENCE

Graduate Research Assistant Mar. 2015 - Present
University of Wisconsin - Madison Madison, WI

- Analyze various brain imaging modalities from Alzheimer's disease data using computer vision, machine learning and optimization techniques

Graduate Project Assistant Sept. 2014 - Present
The Vocal Tract Development Lab - The Waisman Center Madison, WI

- Performing statistical analyses on cervical spine CT/MRI images
- Analyzing structural differences between sedation groups using various shape models
- Estimating cervical spine development growth models with different regression models

Graduate Research Assistant Jul. 2013 - Mar. 2014
University of Pennsylvania Philadelphia, PA

- Conducted extensive analyses of state-of-the-art optimization and inference methods on Markov Random Field based low-level vision problems using OpenGM framework
- Completed Masters Thesis on quadratic integer programming with global smoothing and its approach on graphical models

PROFESSIONAL SERVICES

Conference Reviewer

Medical Image Computing and Computer Assisted Intervention (MICCAI)	2017, 2018, 2019
Advances in Neural Information Processing Systems (NIPS)	2018, 2019
International Conference on Machine Learning (ICML)	2018, 2019
International Conference on Learning Representation (ICLR)	2019
Conference on Computer Vision and Pattern Recognition (CVPR)	2019
International Conference on Computer Vision (ICCV)	2019
Conference on Uncertainty in Artificial Intelligence (UAI)	2019

Journal Reviewer

Brain Connectivity	2018, 2019
NeuroImage	2019
Transactions on Image Processing (TIP)	2019

HONORS AND AWARDS

National Institutes of Health Predoctoral Fellowship

Computation and Informatics in Biology and Medicine (CIBM)	Jul. 2015 - Jun. 2018
University of Wisconsin - Madison	Madison, WI