Hyunwoo J. Kim Last update: February 8, 2019

Contact Information	905 11th Ave. Sunnyvale, CA, USA, 95134	hwkim@cs.wisc.edu

Research Interests	Machine learning and computer vision Manifold statistics and medical imaging Large scale numerical optimization

Positions

Applied Scientist, Amazon Lab126 2017 - 2019
Intern, Amazon in CS-Machine Learning Analytics Team Jun 2013 - Aug 2013
Scientist, Music and Audio Research Group, PI Kyogu Lee, Ph.D Mar 2010 - Jul 2011

Education

PhD., **Computer Sciences**, University of Wisconsin-Madison, Sep 2011 - Oct 2017
Advisor: Vikas Singh, PhD minor: **Statistics**.
M.S., Computer Sciences, University of Wisconsin-Madison, WI, USA May 2013
M.S., Computer science and engineering, Seoul National University, Korea Aug 2010
Thesis: *Hypernetworks for Learning to Generate Music from a Music Corpus*
Advisor: B.-T. Zhang, PhD
B.S., Computer science, Korea University, Seoul, Korea Aug 2008
Graduation project: *Music Genre Classification*, Advisor: Jaewoo Kang, PhD

Publications

1. Seong Jae Hwang, Ronak Mehta, **Hyunwoo J. Kim**, Vikas Singh, Sampling-free Uncertainty Estimation in Gated Recurrent Units with Exponential Families, *Arxiv*, 2018.

2. Ronak Mehta, **Hyunwoo J. Kim**, Shulei Wang, Sterling C. Johnson, Ming Yuan and Vikas Singh, Localizing differentially evolving covariance structures via scan statistics, *Quarterly of Applied Mathematics*, 2018.

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

4. Zihang Meng, Nagesh Adluru, **Hyunwoo J. Kim**, Glenn Fung, and Vikas Singh, Efficient Relative Attribute Learning using Graph Neural Networks, *European Conference on Computer Vision* **(ECCV)**, 2018

5. Jinseok Nam, Eneldo Loza Mencía, **Hyunwoo J. Kim**, Johannes Fürnkranz, "Multi-label Text Classification with Recurrent Neural Networks", In *Advances in Neural Information Processing Systems* **(NIPS)**, Dec 2017, **(Spotlight presentation)**.[4.69% acceptance rate]

6. **Hyunwoo J. Kim**, Nagesh Adluru, Heemanshu Suri, Baba C. Vemuri, Sterling C. Johnson, Vikas Singh, "Riemannian Nonlinear Mixed Effects Models: Analyzing Longitudinal Deformation-based Neuroimaging", In *Computer Vision and Pattern Recognition* **(CVPR)**, Jul 2017. [29% acceptance rate]

7. Ligang Zheng, **Hyunwoo J. Kim**, Nagesh Adluru, Michael A. Newton, Vikas Singh, Riemannian Variance Filtering: An Independent Filtering Scheme for Statistical Tests on Manifold-valued Data , In *The International Workshop on DIFFerential geometry in Computer Vision and Machine Learning (DIFF-CVML) at CVPR* **(CVPRW)**, Jul 2017 **(Oral presentation)**.

8. Hoon Heo, **Hyunwoo J. Kim**, Wan Soo Kim, Kyogu Lee, "Cover Song Identification with Metric Learning Using Distance as a Feature", In *The International Society of Music Information Retrieval* **(ISMIR)**, Oct 2017.

9. **Hyunwoo J. Kim**†, Brandon M. Smith†, Nagesh Adluru, Charles R. Dyer, Sterling C. Johnson, Vikas Singh, "Abundant Inverse Regression using Sufficient Reduction and its Applications" , In *European Conference on Computer Vision* **(ECCV)**, Oct 2016. † **are joint first authors.** [26.6% acceptance rate]

10. 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)", In *Computer Vision and Pattern Recognition* **(CVPR)**, Jun 2016. **(Spotlight presentation)**. † **are joint first authors.** [9.7% acceptance rate]

11. **Hyunwoo J. Kim**, Nagesh Adluru, Monami Banerjee, Baba C. Vemuri, Vikas Singh, "Interpolation on the Manifold of k Component Gaussian Mixture Models", In *International Conference on Computer Vision* **(ICCV)**, Dec 2015. [30.92% acceptance rate]

12. **Hyunwoo J. Kim**, Nagesh Adluru, Barbara B. Bendlin, Sterling C. Johnson, Baba C. Vemuri, Vikas Singh, "Canonical Correlation Analysis on SPD(n) Manifolds", *Riemannian Computing and Statistical Inferences in Computer Vision* **(Springer)**, 2015 (Book chapter).

13. **Hyunwoo J. Kim**, Jia Xu, Baba C. Vemuri, Vikas Singh, "Manifold-valued Dirichlet Processes", In *International Conference on Machine Learning* **(ICML)**, Jul 2015 **(Oral presentation)**. [26% acceptance rate]

14. Jinseok Nam, Eneldo Loza Mencía, **Hyunwoo J. Kim**, and Johannes Fürnkranz, "Predicting Unseen Labels using Label Hierarchies in Large-Scale Multi-label Learning", In *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases* **(ECML/PKDD)**, Sep 2015. [23.8% acceptance rate]

15. **Hyunwoo J. Kim**, Nagesh Adluru, Barbara B. Bendlin, Sterling C. Johnson, Baba C. Vemuri, Vikas Singh, "Canonical Correlation Analysis on Riemannian Manifolds and its Applications", In *European Conference on Computer Vision* **(ECCV)**, Sep 2014. [25.1% acceptance rate]

16. **Hyunwoo J. Kim**, Nagesh Adluru, Maxwell D. Collins, Moo K. Chung, Barbara B. Bendlin, Sterling C. Johnson, Richard J. Davidson, Vikas Singh, "Multivariate General Linear Models (MGLMs) on Riemannian Manifolds with Applications to Statistical Analysis of Diffusion Weighted Images", In *IEEE Computer Society Conference on Computer Vision and Pattern Recognition* **(CVPR)**, Jun 2014 **(Oral presentation)**. [5.8% acceptance rate]

Before UW-Madison

12 **H.-W. Kim**, B.-H. Kim, and B.-T. Zhang, "Evolutionary hypernetworks for learning to generate music from examples", In *IEEE International Conference on Fuzzy Systems* **(Fuzz IEEE)**, Aug 2009.

13 J.-W. Ha, B.-H. Kim, **H.-W. Kim**, W.C. Yoon, J.-H. Eom, and B.-T. Zhang, "Text-to-image cross-modal retrieval of magazine articles based on higher-order pattern recall by hypernetworks", In *International Symposium on Advanced Intelligent Systems* **(ISIS)**, Aug 2009 **(Best paper award)**.

Abstracts

1. **Hyunwoo J. Kim**, Nagesh Adluru, Heemanshu Suri, Baba C. Vemuri, Sterling C. Johnson, Vikas Singh, "Longitudinal Analysis of Structural MRI in Alzheimer's Disease using Riemannian Mixed Effects Models", In *Alzheimer's Association International Conference* **(AAIC)**, July 2017.
2. Nagesh Adluru, **Hyunwoo J. Kim**, Richard J. Davidson, Andrew L. Alexander, Sterling C. Johnson, and Vikas Singh, "Manifold valued statistical models for longitudinal analysis of MRI data", **ISMRM**, Apr 2017.
3. **Hyunwoo J. Kim**, Nagesh Adluru, Sterling C. Johnson, Vikas Singh, "Manifold-Valued Statistical Models for Longitudinal Morphometric Analysis in Preclinical Alzheimer's Disease", In *Alzheimer's Association International Conference* **(AAIC)**, July 2016.
4. Byeong-jun Han, **Hyunwoo Kim**, Ziwon Hyung, Kyogu Lee, Sheayun Lee,"A content-based music similarity retrieval scheme by using BoW representation and LSH-based retrieval", **MIREX** 2011: Audio and Music Similarity and Retrieval task, 2011.

Presentations or Talks

1. "Statistical Machine Learning on Manifolds for Structured Data (without the pain)",
   Deepmind, UK 2017
   Samsung Research America, Richardson, TX 2017
   University of Arizona, Tucson, AZ, USA 2017
   Washington University in St. Louis, St. Louis, MO, USA 2017
2. "Geometrically inspired statistical learning algorithms for manifold-valued data and applications to computer vision and neuroimaging"
   Electronics and Telecomm. Research Institute (ETRI), Daejeon, Korea 2016
   Seoul National University, Seoul, Korea 2016
   Korea University, Seoul, Korea 2016
3. "Manifold-Valued Statistical Models for Longitudinal Morphometric Analysis in Preclinical Alzheimer's Disease", AAIC, Toronto, Canada 2016
4. "Latent Variable Graphical Model Selection using Harmonic Analysis: Applications to the Human Connectome Project (HCP)", CVPR, Las Vegas, USA 2016
5. "Manifold-valued Dirichlet Processes", ICML, Lille, France 2015
6. "Multivariate General Linear Models on Riemannian Manifolds with Applications to Statistical Analysis of Diffusion Weighted Images", CVPR, Columbus, US 2014

Patent

"Goods Recommendation System and Method Considering Price of Goods", Inventors: Byoung-Tak Zhang, Kwon-il Kim, Won-Jin Shin, **Hyunwoo J. Kim**, Donghwan Oh, Jaeho Lee, Jeehyun Kim, Jooyoung Kim, Original assignee: SNU R&DB Foundation.

Software

1. Latent Variable Graphical Model Selection using Harmonic Analysis and demo.
2. Interpolation on the manifold of k component GMMs and demo.
3. Riemannian Canonical Correlation Analysis and demo.
4. Matlab toolbox of customized functions for CSV files, timestamp, and comments.
5. Minimal Matlab code for MMGLMs on SPD manifolds and Unit sphere.
6. Python Scripts for MMGLMs on Amazon Web Services.
7. Optimized C++ code and Matlab scripts for running MMGLMs on HTCondor.

Services (reviews)	Asian Conference on Machine Learning (ACML), Program Committee	2017
	Int'l Joint Conferences on Artificial Intelligence (IJCAI), Program commitee	2015
	Journal of the Royal Statistical Society (JRSS)	2015,2018
	Computer Vision and Pattern Recognition (CVPR)	2015-2019
	International Conference on Machine Learning (ICML)	2016-2019
	Advances in Neural Information Processing Systems (NIPS)	2015-2018
	IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)	2015-2017
	IEEE Transactions on Knowledge and Data Engineering (TKDE)	2014
	Transactions on Medical Imaging (TMI)	2014
	IEEE Transactions on Multimedia (MM)	2017

Awards and Honors	Nominated for the Microsoft Research Fellowship by the UW-Madison CS dept.	2015
	International Conference on Machine Learning (ICML) Travel Scholarship	2015
	European Conference on Computer Vision (ECCV) Travel Award	2014
	International Symposium on Advanced Intelligent Systems Best Paper Award	2009
	Scholarship of Academic Achievement from Korea University	2007
	Inchon Foundation Scholarship	2007

Extra curricular activities	Military service in Republic of Korea Army,	May 2004 - May 2006
	Member of Linuxer (Korea Univ. Linux club)	2006-2008
	BI Lab system administrator (for Linux servers)	2008-2010
	Multiple open source software projects on NITRC/Github	2014-present

Relevant Courses at UW-Madison

Optimization (8): Linear Programming Methods, Tools and Environment for optimization, Stochastic Programming, Integer Programming, Nonlinear Optimization I, Nonlinear Optimization II, Convex Analysis, Computational Methods for Large Sparse System.
Statistics (5): Introduction to Probability and Mathematical Statistics II, Introduction to Computational Statistics, Methods for Medical Image Analysis, Statistical Model Building and Learning, Probabilistic Graphical Models.
Mathematics (3): Differential Geometry, Differentiable Manifolds, Analysis I.
Artificial intelligence (3): Machine learning, Advanced Machine Learning, Computational Methods for Medical Image Analysis.
Others (2): Information Security, Human-Computer Interaction.