

JAESIK CHOI – Curriculum Vitae



Ulsan National Institute of Science and Technology (UNIST)
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Education

- **University of Illinois at Urbana-Champaign**, Ph.D. in Computer Science, May 2012.
Thesis title: *Lifted Inference for Relational Hybrid Models*.
Advisor: Eyal Amir
- **Seoul National University**, B.S. in Computer Engineering, *magna cum laude*, August 2004.

Research Interests

Statistical Inference and Machine Learning for Large-Scale Artificial Intelligence Problems. My technical work is divided among four areas:

- scaling up probabilistic inference for large-scale dynamical systems,
- various machine learning algorithms for analyzing and predicting time series data,
- a novel combination of discrete, deterministic planning and robot motion planning and
- predictive diagnosis of large-scale manufacturing.

My research work spans several applications of intelligent systems such as filtering dynamic systems, learning statistical relational models, motion planning, robot control, environmental modeling, multimedia retrieval, and smart manufacturing.

Positions

- **Director.** UNIST Industrial Artificial Intelligence Center. November 2017 - present.
- **Director.** UNIST Explainable Artificial Intelligence Center, established by Ministry of Science and ICT. July 2017 - present.
- **Associate Professor.** UNIST. School of Electrical and Computer Engineering. September 2017 - present.
- **Assistant Professor.** UNIST. School of Electrical and Computer Engineering. July 2013 - August 2017.
- **Research Affiliate.** Lawrence Berkeley National Laboratory. July 2013 - present.
- **Postdoctoral Fellow.** Lawrence Berkeley National Laboratory. January 2013 - July 2013.
- **Postdoctoral Research Associate.** University of Illinois at Urbana-Champaign. May 2012 - January 2013.

Representative Papers

- K. Lee, S. Kim, **J. Choi** and S.-H. Lee, *Deep Reinforcement Learning in Continuous Action Spaces: a Case Study in the Game of Simulated Curling*, in International Conference on Machine Learning (ICML), 2018.
- Y. Hwang, A. Tong, and **J. Choi**, *The Automatic Statistician: A Relational Perspective*, in International Conference on Machine Learning (ICML), 2016.
- **J. Choi**, E. Amir, T. Xu, and A. Valocchi. *Learning Relational Kalman Filtering*, in AAAI Conference on Artificial Intelligence (AAAI), 2015.
- **J. Choi**, Z. Wang, S.-C. Lee, and W. Jeon, *A Spatio-Temporal Pyramid Matching for Video Retrieval*, in Computer Vision and Image Understanding (CVIU), 117(6), 2013, 660-669.
- **J. Choi**, A. Guzman-Rivera, and E. Amir, *Lifted Relational Kalman Filtering*, in International Joint Conference on Artificial Intelligence (IJCAI), 2011.
- **J. Choi**, D. J. Hill, and E. Amir, *Lifted Inference for Relational Continuous Models*, in Conference on Uncertainty in Artificial Intelligence (UAI), 2010.

Awards and Honors

- **Rising Star Distinguished Professor**. UNIST. September 2018 - present.
- **POSCO Smart Innovation Award**, POSCO, 2018.
- **Steel Fellow Professor**. POSCO. July 2017 - present.
- **Winner (the 1st place)**, UEC-cup Digital Curling Competition, Game AI Tournament, 2018.
- **Winner (the 1st place)**, Digital Curling Competition, Game Playing Workshop, 2017.
- **The Appreciation Award**, Deep Learning based Estimation of Hot Metal Temperature of Blast Furnace, POSCO, 2017.
- **The Best Paper Award**, International Conference on Big Data Intelligence and Computing (DataCom), IEEE Computing Society, 2015.
- **Cognitive Science/Artificial Intelligence Award**, Beckman Institute, University of Illinois, 2009.
- **Graduate Research Fellowship** for overseas study, Korea Research Foundation (KRF) - the Korean NSF, 2005-2007.

Publications (at UNIST)

Journal Papers

- [1] T. Kim, **J. Choi**, D. Lee, A. Sim, C. Anna Spurlack, A. Todd and K. Wu, *Predicting baseline for analysis of electricity pricing* in International Journal of Big Data Intelligence, 5, 2018.
- [2] R. Patel, K. Roy, **J. Choi** and K. J. Han, *Generative Design of Electromagnetic Structures Through Bayesian Learning* in IEEE Transactions on Magnetics, 54(3), 2017.
- [3] D. Lee, **J. Choi**^{**1}, and H. Shin, *A Scalable and Flexible Repository for Big Sensor Data* in IEEE Sensors Journal (**Sensors**), 15(12), 2015, 7284-7294.
- [4] K. Jeong, **J. Choi**, and G.-J. Jang^{**}, *Semi-Local Structure Patterns for Robust Face Detection*, in IEEE Signal Processing Letter (**SPL**), 2015.
- [5] D. Lee, **J. Choi**^{*2}, and H. Shin, *Low-complexity compressive sensing with downsampling*, in IEICE Electronic Express, 11(3), 2014, 20130947.

^{1**} corresponding author and advisor of the first student author.

^{2*} corresponding author

Patents

- [6] **J. Choi**, and S. Kang, *Method and apparatus for removing haze*, **Korean Patent**,10-1746712, June 7th, 2017.
- [7] **J. Choi**, and A. Sim, *Data reduction methods, systems, and devices*, **U.S. Application**, US20150149495A1, May 28th, 2015.

Proceedings of Conferences

- [8] K. Lee[†], S.-A. Kim[†], **J. Choi**** and S.-W. Lee, *Deep Reinforcement Learning in Continuous Action Spaces: a Case Study in the Game of Simulated Curling*, in the International Conference on Machine Learning (**ICML**), 2018. ([†] contributed equally). [**L1**, CORE A*, CCF A]
- [9] M.K. Yoon, S. Mohan, **J. Choi**, M. Christodorescu and L. Sha**, *Learning Execution Contexts from System Call Distribution for Anomaly Detection in Smart Embedded System*, in the ACM/IEEE International Conference on Internet-of-Things Design and Implementation (**IoTDI**), 2017.
- [10] V. Nekrasov, J. Ju and **J. Choi****, *Global Deconvolutional Networks for Semantic Segmentation*, in British Machine Vision Conference (**BMVC**), 2016. [L2, CCF C]
- [11] D. Lee, A. Sim, **J. Choi**** and J. Wu*, *Novel Data Reduction Based on Statistical Similarity*, in the International Conference on Scientific and Statistical Database Management (**SSDBM**), 2016. [L3, CORE A, CCF B]
- [12] D. Lee, R. de Lima and **J. Choi****, *Learning Imprecise Compressive Sensing Models*, in Conference on Uncertainty in Artificial Intelligence (**UAI**), 2016. [L2, CORE A*, CCF B]
- [13] Y. Hwang, A. Tong and **J. Choi****, *The Automatic Statistician: A Relational Perspective*, in the International Conference on Machine Learning (**ICML**), 2016. [**L1**, CORE A*, CCF A]
- [14] T. Kim, D. Lee, **J. Choi****, A. Spurlock, A. Sim, A. Todd and K. Wu*. *Extracting Baseline Electricity Usage Using Gradient Tree Boosting*, in the International Conference on Big Data Intelligence and Computing (**DataCom 2015**), 2015 (**Best Paper Award**).
- [15] T. Kim and **J. Choi****. *Reading Documents for Bayesian Online Change Point Detection*, in Conference on Empirical Methods on Natural Language Processing (**EMNLP**), 2015. [L2, CORE A, CCF B]
- [16] W. Pu, **J. Choi**, Y. Hwang and E. Amir**. *A Deterministic Partition Function Approximation for Exponential Random Graph Models*, in the International Joint Conference on Artificial Intelligence (**IJCAI**), 2015. [**L1**, CORE A*, CCF A]
- [17] M.K. Yoon, S. Mohan, **J. Choi**, and L. Sha**. *Memory Heat Map: Anomaly Detection in Real-Time Embedded Systems Using Memory Behavior*, in the ACM/IEEE Design Automation Conference (**DAC**), 2015. [**L1**, CORE A, CCF B]
- [18] D. Lee and **J. Choi****. *Learning Dynamic Compressive Sensing Models for Big Data*, in the SIAM International Conference on Data Mining (**SDM**), 2015. [L3, CORE A, CCF B]
- [19] **J. Choi**, E. Amir**, T. Xu, and A. Valocchi. *Learning Relational Kalman Filtering*, in the AAAI Conference on Artificial Intelligence (**AAAI**), 2015. [**L1**, CORE A*, CCF A]
- [20] D. Lee and **J. Choi****. *Low Complexity Sensing for Big Spatio-Temporal Data*, in the IEEE International Conference on Big Data (**IEEE BigData**), 2014.

Workshop Papers

- [21] W. Yoon, S.-A. Kim, **J. Choi****, *An End-to-End Robot Architecture to Manipulate Non-Physical State Changes of Objects*, in the International Workshop on Cognitive Robotics (CogRob), 2016.

- [22] A. Tong, **J. Choi****, *Automatic Generation of Probabilistic Programming from Time Series Data*, in the International Workshop on Statistical Relational AI (StarAI), 2016.

Preprints

- [23] S. Yi, J. Ju, M.-K. Yoon, and **J. Choi****, *Grouped Convolutional Neural Networks for Multivariate Time Series*, in arXiv 1703.09938, 2017.
- [24] A. Tong and **J. Choi****, *A Nonparametric Bayesian Clustering to Discover Latent Covariance Structure of Multiple Time Series*, in arXiv 1703.09528, 2017.
- [25] R. Lima and **J. Choi****, *Automatic Decomposition of Self-Triggering Kernels of Hawkes Processes*, in arXiv 1703.09068, 2017.

Descriptions of Top Tier Conference Lists

List	Description
UNIST	A list of top tier conferences prepared by the UNIST CSE track faculty members. This list is based on the list made by the Korean Institute of Information Scientists and Engineers (KIISE), 'A List of Top Tier Conferences in Computer Science'. Venues are divided into 4 ranks, L1 (highest), L2, L3 and L4.
CORE2017	A list of top tier conferences made by the Computing Research and Education Association of Australasia (CORE) in March 2017. CORE is an association of university departments of computer science in Australia and New Zealand. ^a A* - flagship conference, a leading venue in a discipline area A - excellent conference, and highly respected in a discipline area ^a http://www.core.edu.au/conference-portal
CCF Ranking	A list of top tier conferences and journals made by the Chinese Computing Federation (CCF) in 2015. ^a ^a http://history.ccf.org.cn/sites/paiming/2015ccfmulu.pdf

Publications before joining UNIST

Thesis

- [26] **J. Choi**, *Lifted Inference for Relational Hybrid Models*, Ph.D. Thesis, University of Illinois at Urbana-Champaign, Department of Computer Science, 2012.

Journal Papers

- [27] T. Xu, A.J. Valocchi**, **J. Choi**, and E. Amir, *Application of Machine Learning Methods to Reduce Predictive Bias of Groundwater Models*, in *Groundwater*, 52(3), 2014, 448-460. [L3]
- [28] **J. Choi**, Z. Wang, S.-C. Lee*, and W. Jeon*, *A Spatio-Temporal Pyramid Matching for Video Retrieval*, in *Computer Vision and Image Understanding (CVIU)*, 117(6), 2013, 660-669. [L3]
- [29] W. Chung, S. Kim, M. Choi, **J. Choi**, H. Kim, C. Moon, and J.-B. Song*, *Safe Navigation of a Mobile Robot Considering Visibility of Environment*, *IEEE Transactions on Industrial Electronics (TIE)*, Vol 56(10), pp. 3941–3950, 2009. [L1]

Patents

- [30] **J. Choi**, K. Wei, and V. Ramarao, *Filter For Blocking Image-Based Spam*, **U.S. Patent 8055078**, 2011.
- [31] **J. Choi**, J. Pujara, V. Ramarao, and K. Wei, *Identifying IP Addresses For Spammers*, **U.S. Patent 7849146**, 2010.

Proceedings of Conferences

- [32] M.-K. Yoon, S. Mohan, **J. Choi**, J.-E. Kim and L. Sha**, *SecureCore: A Multicore based Intrusion Detection Architecture for Real-time Embedded Systems*, in the *IEEE Real Time Technology and Applications Symposium (RTAS)*, 2013. [L2, CORE A, CCF B]
- [33] **J. Choi** and E. Amir**, *Lifted Relational Variational Inferences*, in the *Conference on Uncertainty in Artificial Intelligence (UAI)*, 2012. [L2, CORE A*, CCF B]
- [34] T. Xu, A. J. Valocchi**, **J. Choi** and E. Amir *Improving Groundwater Flow Model Prediction Using Complementary Data-Driven Models*, in the *International Conference on Computational Methods in Water Resources (CMWR)*, 2012.
- [35] **J. Choi**, R. de Salvo Braz*, and H. Bui, *Efficient Methods for Lifted Inference with Aggregate Factors*, in the *AAAI Conference on Artificial Intelligence (AAAI)*, 2011. [L1, CORE A*, CCF A]
- [36] **J. Choi**, A. Guzman-Rivera, and E. Amir**, *Lifted Relational Kalman Filtering*, in the *International Joint Conference on Artificial Intelligence (IJCAI)*, 2011. [L1, CORE A*, CCF A]
- [37] **J. Choi**, D. J. Hill, and E. Amir**, *Lifted Inference for Relational Continuous Models*, in the *Conference on Uncertainty in Artificial Intelligence (UAI)*, 2010. [L2, CORE A*, CCF B]
- [38] H. Hajishirzi, A. Shirzi, **J. Choi**, and E. Amir**, *Greedy Algorithms for Sequential Sensing Decisions*, in the *International Joint Conference on Artificial Intelligence (IJCAI)*, 2009. [L1, CORE A*, CCF A]
- [39] **J. Choi** and E. Amir**, *Combining Planning and Motion Planning*, in *IEEE International Conference on Robotics and Automation (ICRA)*, 2009. [L2, CORE B, CCF B]
- [40] **J. Choi**, W. Jeon*, and S.-C. Lee*, *Spatio-Temporal Pyramid Matching for Sports Videos*, in the *ACM International Conference on Multimedia Information Retrieval (MIR)*, 2008.

- [41] **J. Choi** and E. Amir**, *Factor-Guided Motion Planning for a Robot Arm*, in the IEEE International Conference on Intelligent Robots and Systems (**IROS**), 2007. [**L3**, CORE A, CCF C]
- [42] **J. Choi**, W. Chung*, and J.-B. Song*, *Efficient navigation of mobile robot based on the robot's experience in human co-existing environment*, in the International Conference on Control, Automation and Systems (**ICCAS**), 2005.

Workshop Papers

- [43] W. Gu, **J. Choi**, M. Gu, H. Simon and K. Wu, *Fast Change Point Detection for Electricity Market Analysis*, in IEEE Big Data Workshop on Scalable Machine Learning: Theory and Applications, 2013.
- [44] W. Pu, **J. Choi** and E. Amir, *Lifted Inference On Transitive Relation*, in International Workshop on Statistical Relational AI (StaRAI), 2013.
- [45] **J. Choi** and E. Amir, *Nonparametric Relational Hybrid Models*, in AAI Workshop on Statistical Relational AI (StaRAI), 2012.
- [46] **J. Choi** and E. Amir, *Combining Planning and Motion Planning: An Extended Abstract*, in ICAPS Workshop on Combining Action and Motion Planning (CAMP), 2010. (**Invited paper**)
- [47] **J. Choi** and E. Amir, *Combining Planning and Motion Planning with an Action Formalism*, in Symposium on the Logical Formalizations of Commonsense Reasoning (Commonsense 2009), 2009.
- [48] **J. Choi** and E. Amir, *Factored Planning for Controlling a Robotic Arm: Theory*, in International Cognitive Robotics Workshop (CogRob), 2006.
- [49] Y. Liu, D. Hill, T. Abdelzaher, J. Heo, **J. Choi**, B. Minsker, and D. Fazio, *Virtual Sensor-Powered Spatiotemporal Aggregation and Transformation: A Case Study Analyzing Near-Real-Time NEXRAD and Precipitation Gage Data in a Digital Watershed*, in Environmental Information Management, 2008.
- [50] W. Chung, S. Kim, and **J. Choi**, *High speed navigation of a mobile robot based on experiences*, in JSME Annual Conference on Robotics and Mechatronics, 2006.
- [51] Sanheon Lee, **Jaesik Choi**, and Hyukjae Lee, *A review of detecting and preventing the propagation of worm in early phase*, in technical report, Korean Electronics and Telecommunications Research Institute, March 2004.

Student Advised

Postdoc

- **Donggun Lee**, Postdoc Researcher, UNIST, March 2014 - March 2016.
First job: **Assistant Professor at Texas A&M University - Commerce**

Master student

- **Subin Yi**, M.S. in Computer Engineering, UNIST, 2018.
Thesis title: *An Expectation Maximization Method to Learn the Group Structure of Deep Neural Network.*
- **Thanh Tong Nguyen**, M.S. in Computer Engineering, UNIST, 2018.
Thesis title: *Layer-wise Learning of Stochastic Neural Networks with Information Bottleneck.*
- **Rafael de Lima**, M.S. in Computer Engineering, UNIST, 2017.
Thesis title: *Automatic Decomposition of Self-Triggering Kernels of Hawkes Processes.*
- **Yunseong Hwang**, M.S. in Computer Engineering, UNIST, 2016.
Thesis title: *The Automatic Statistician: a Relational Perspective.*
First position: **Software Engineer at NAVER** (military service)

Undergraduate student

- **Taehoon Kim**, B.S. in Computer Engineering, UNIST, 2016.
Guided **internship at Lawrence Berkeley National Laboratory**, Summer 2014.
(Won the best paper award from IEEE DataCom 2015)
- **Madi Khamitbekov**, B.S. in Computer Engineering, UNIST, 2017.
Guided internship at **Google**, Mountain View, USA, Summer 2016.
Guided internship at **Moloco**, Winter 2016.
- **Sanghun Kang**, B.S. in Computer Engineering, UNIST, 2016.
Guided research, 'Deep Learning Based Fog Removal Algorithms', Korean Patent, UTP16013KR-00.
Now at Hyundai Card Algorithm Team.

Machine Learning Competitions

- **Yunseong Hwang**, Walmart Recruiting - Store Sales Forecasting, Kaggle, May 2014.
Ranked 43 out of 691 teams (**top 6.2%**).
- **Janghoon Ju**, ECML/PKDD 15: Taxi Trip Time Prediction (II), Kaggle, July 2015.
Ranked 25 out of 345 teams (**top 7.2%**).
- **Haebeom Lee** and **Janghoon Ju**, IEEE ISBI 2016: Skin Lesion Analysis Towards Melanoma Detection, Part 3B: Segmented Lesion Classification, April 2017.
Ranked 3 out of 18 teams (**top 16.7%**).
- **Giyong Jeon**, **Doyeon Lim** and **Sehyun Lee**, Two Sigma Financial Modeling Challenge, Kaggle, March 2017.
Ranked 189 out of 2070 teams (**top 9.1%**).

Grants

Overview

Type \ Amount (KRW)	Granted	Planned	Estimated Total
Government	3,851M	2,406M	6,257M
Industry	1,210M	450M	1,660M
Total	5,061M	2,856M	7,917M

Grants from Government Agencies

- PI, *A Machine Learning and Statistical Inference Framework for Explainable Artificial Intelligence*, **3,850M KRW**, July 2017 - December 2018 (1st stage), Award from IITP.
- co-PI, *Development of Artificial Intelligence Curling Robot*, **300M KRW** (my share), April 2017 - December 2018, Award from IITP.
- co-PI, *Research and Development of Digital Companion Framework*, **600M KRW** (my share), April 2017 - December 2020, Award from IITP.
- PI, *Deep Reinforcement Learning for Robust Robotic Manipulation*, **60M KRW**, March 2017 - December 2018, Award from Korea Atomic Energy Research Institute.
- PI, *Relational Automatic Statistician for Multivariate Time Series Analysis*, **145M KRW**, March 2017 - February 2020, Award from Korean NRF (Early Career Award).
- co-PI, *Development of robot intelligence technology for mobility with learning capability toward robust and seamless indoor and outdoor navigation*, **280M KRW** (my share), May 2016 - April 2020, Award from Ministry of Commerce.
- PI, *Deep Learning based Relation Extraction for Factoid Question Answering*, **30M KRW**, April 2016 - November 2016, Award from ETRI.
- PI, *Deep Learning based Surgical Image Semantic Segmentation*, **65M KRW**, July 2015 - November 2016, Award from ETRI.
- co-PI, *A Robust Plant Monitoring System based on Multi-Dimensional Sound Source Localization and Particles Dehaze*, **190M KRW** (my share), January 2015 - December 2016, Award from National IT Industry Promotion Agency, together with Daedo Tech and Ulsan Economic Promotion Agency.
- PI, *Development of Fault-Diagnosis Algorithms for Current and Next-Generation Nuclear Systems*, **523M KRW**, December 2014 - November 2017, Award from Korean NRF.
- PI, *Efficient Feature Extraction Methods for Exascale Computing*, **40M KRW**, August 2013 - February 2015, Award from UNIST.
- PI, *Learning and Inference with Probabilistic Relational Models for Intelligent Software Assistant*, **153M KRW**, May 2014 - April 2017, Award from Korean NRF (Early Career Award).

Grants from Industry

- PI, *Deep Learning based Fault Diagnosis of Equipments in Coal Fired Boilers*, **750M KRW**, October 2017 - March 2019, Award from Korea East-West Power Co.
- PI, *Artificial Intelligence based Smart Blast Factory*, **450M KRW**, April 2018 - March 2021, Award from POSCO.
- PI, *Research and Development of Automatic News Summarization System*, **135M KRW**, May 2017 - April 2018, Award from NAVER.

- PI, *Development of Artificial Intelligence Methods to Diagnose Abnormal Conditions in Blast Furnace Operations*, **110M KRW**, May 2017 - February 2018, Award from POSCO.
- co-PI, *Development of Learning based Diagnosis Algorithm from Rattle Sounds*, **95M KRW** (my share, 40M KRW), September 2016 - September 2017, Award from Samsung Electronics.
- PI, *Artificial Intelligence Research of Time Series Data Analysis on Steel Making Procedure*, **125M KRW**, June 2016 - February 2017, Award from POSCO.
- PI, *Deep Recurrent Neural Network Models for User Pattern Recognition in Sound Signals*, **30M KRW**, November 2015 - April 2016, Award from Hyundai NGV.
- PI, *Confidential*, **20M KRW**, January 2015 - March 2015, Award from Doosan Heavy Industry.

Academic Services

- **Tutorial Chair** for **ACML** Asian Conference on Machine Learning 2017.
- **Program Committee** for
 - **AAAI** National Conference on Artificial Intelligence (**2012, 2013, 2014, 2015, and 2016**).
 - **ICML** International Conference on Machine Learning (**2013 and 2014**).
 - **IJCAI** International Joint Conference on Artificial Intelligence (**2011, 2013, 2015, 2016 and 2017**).
 - **UAI** Uncertainty in Artificial Intelligence (**2015, 2016 and 2017**).
 - **KR** Conferences on Principles of Knowledge Representation and Reasoning (**2016**).
 - **ACML** Asian Conference on Machine Learning (**2015 and 2016**).
- **Reviewer** for Journals:
 - **AIJ** Artificial Intelligence Journal.
 - **JAIR** Journal of Artificial Intelligence Research.
 - Computational Intelligence.
 - Mechatronics.
- **Professional organizations:**
 - **IEEE** member: Institute of Electrical and Electronics Engineers.
 - **ACM** member: Association for Computing Machinery.
 - **AAAI** member: Association for the Advancement of Artificial Intelligence.
 - **KIISE** lifetime member: Korean Institute of Information Scientists and Engineers.

Industrial Services

- Steel Fellow Professor, POSCO, August 2017 - July 2020.
- Technical Advisory Professor, Materials and Components R&D Laboratory, LG Electronics, July 2017 - June 2018.

Research Experience

- **Lawrence Berkeley National Laboratory.** Computer Scientist Postdoctoral Fellows. *Built a Relational Dynamic Bayesian Networks to analyze 100Gbps High-Speed ESnet data* with Arie Shoshani, Alex Sim, John Wu and Ming Gu. 2013.

- **University of Illinois and Argonne National Lab.** Postdoctoral Research Associate. *Designed a real-time diagnostic system for thermo-hydraulic (T-H) processes of power plants* with Yong Park and Richard Vilim. 2012.
- **SRI International.** Summer Intern as Student Associate. *Created efficient inference algorithms for large-scale graphical models* with Rodrigo de Salvo Braz and Hung Bui. Published a paper in **AAAI-11**. 2010.
- **Yahoo! Inc. Labs.** Summer Intern. *Designed and implemented a feature estimation algorithm using matrix factorization for large scale web data*, with Hao Zheng and Jianchang Mao. 2008.
- **Yahoo! Inc. Mail.** Summer Intern. *Invented algorithms to block spam mails using artificial intelligence and Machine Learning techniques* with Hao Zheng, Vish Ramarao and Jitendra Malik (Yahoo! Research Berkeley). Invented **two US Patents, #8055078 and #7849146**. 2007.
- **Korea Institute of Science and Technology (KIST) & Korea University.** Research Programmer. *Designed and implemented an algorithm that controls a mobile robot for safe navigation* with Woojin Chung. Published a paper in IEEE Transactions on Industrial Electronics. 2004–2005.

Invited Talks and Presentations

- **Bloomberg**, Machine Learning Decoded 2017 Conference in Korea, *Explainable Artificial Intelligence for Financial Time Series*, March 2018.
- **Handong University**, Machine Learning Camp, *Deep Learning Methods for Time Series Data*, January 2018.
- **2017 International Conference on Artificial Intelligence**, hosted by Ministry of Science and ICT, *Introduction to Explainable Artificial Intelligence Center*, December 2017.
- **2017 Korea-Canada Science & Technology Innovation Symposium**, hosted by Science and Technology Policy Institute (STEPI), *Explainable Artificial Intelligence: Models and Applications*, December 2017.
- **The Asian Conference on Machine Learning**, *Tutorial: Statistical Relational Artificial Intelligence*, November 2017.
- **The 5th The Korean Academy of Science and Technology (KAST) - Leopoldina Bilateral Symposium** on AI and Machine Learning Technology, Perspective and Applications, *Exploiting Relations among Multiple Time Series Toward Explainable Artificial Intelligence*, October 2017.
- **Smart POSCO Forum 2017**, *Deep Learning based prediction Hot Metal Temperature in a Blast Furnace*, July 2017.
- **Sungkyunkwan University**, Electrical Engineering Department Seminar, *The Automatic Statistician: A Relational Perspective*, May 2017.
- 2017 IEEE International Conference on Big Data and Smart Computing (**BigComp**), *Tutorial: Machine Learning with Time Series Data*, February 2017.
- Software Convergence Symposium 2017(SWCS 2017), *Machine Learning Methods for Time Series Data*, January 2017.
- **Samsung Electronics**, Device Solutions Division, SW Research Center, *Deep Learning Methods for Time Series Data*, January 2017.
- **KAIST**, Electrical Engineering Department Seminar, *The Automatic Statistician: A Relational Perspective*, November 2016.
- **Korea University**, Brain and Cognitive Engineering Department Colloquium, *The Automatic Statis-*

tician: A Relational Perspective, October 2016.

- **Kyung Hee University**, Computer Engineering Department Graduate Seminar, *The Automatic Statistician: A Relational Perspective*, October 2016.
- **Agency for Defense Development**, Confidential, October 2016.
- **International Conference on Control, Automation and Systems**, Tutorial, *Machine Learning with Sequential Data*, October 2016. (with Prof. Moon Jun at UNIST)
- **Seoul National University**, Computer Science Engineering Department Undergraduate Seminar, *The Automatic Statistician: A Relational Perspective*, October 2016.
- **Hyundai Heavy Industries**, Research Institute, *Recent Advances in Artificial Intelligence: Reshaping the Future of Manufacturing*, September 2016.
- **Seoul National University**, Technical Workshop for Precision Medicine Volunteers, *Deep Learning Based Motion Detection*, September 2016.
- **Korea University**, 2016 Pattern Recognition and Machine Learning Summer School, *Bayesian Non-parametric Learning*, August 2016.
- **POSTECH**, 2016 Annual Technical Conference of POSCO, Plenary Talk at ICT Convergence Section, *Recent Advances in Artificial Intelligence: Reshaping the Future of Manufacturing*, August 2016.
- **KOSCOM**, *The Relational Automatic Statistician System for Multiple Time-Series Data Analysis*, August 2016.
- **Jeju ICC**, Korea Computer Congress 2016, Artificial Intelligence Special Section, *The Relational Automatic Statistician System for Multiple Time-Series Data Analysis*, July 2016.
- **SK-T-Tower Supex Hall**, The First Korea-Japan Machine Learning Symposium, *The Relational Automatic Statistician System for Multiple Time-Series Data Analysis*, June 2016.
- **National Weather Research Center**, April 2016.
- **Korea University**, 2016 Pattern Recognition and Machine Learning Winter School, *Learning and Inference for Dynamic Systems*, January 2016.
- **Inha University**, Inha Academy of Convergence Education Monthly Colloquium, *Deep Learning - Theory and Practice*, November 2015.
- **Kyungpook University**, Korean Multimedia conference, *Deep Learning: Models and Applications*, November 2015.
- **KINTEX**, The Korean Institute of Chemical Engineers, *Machine Learning Based Plant Diagnosis*, November 2015.
- **Seoul National University**, Graduate School, *Learning and Inference with Statistical Relational Learning*, February 2015.
- **Yonsei university**, Pattern Recognition and Machine Learning Winter Schools, *Probabilistic Inference*, January 2015.
- **NewDB Workshop**, The 53th Korean New Database Research Workshop, *Machine Learning in Statistical Relational Learning*, September 2014.
- **NAVER Labs**, *Machine Learning and Applications in Large-Scale Graphical Models*, July 2014.
- **Korea Computer Congress 2014**, Invited Tutorial Talk, *Statistical Relational Learning for Big Data Analysis*, June 2014.
- **POSTECH**, Computer Science Department Seminar, *Statistical Inference with Large-Scale Relational Graphical Models*, April 2014.

- **Yonsei university**, Pattern Recognition and Machine Learning Winter Schools, *Statistical inference with graphical models*, February 2013.
- **Seoul National University**, Biointelligence Lab, *Learning and Inference with Large-Scale Graphical Models and Gaussian Processes*, October 2013.
- **Ho Chi Minh City University of Technology**, Faculty of Computer Science, *Learning and Inference with Large-Scale Gaussian Processes*, September 2013.
- **Ho Chi Minh City University of Science**, Faculty of Math and Computer Science, *Learning and Inference with Large-Scale Gaussian Processes*, September 2013.
- **Korea Atomic Energy Research Institute**, *Model Based Diagnosis of Nuclear Power Plants*, August 2013.
- **KAIST**, Computer Science Department Seminar, *Learning and Inference with Relational Hybrid Models*, February 2013.
- **University of California, Berkeley**, Stuart Russell's Research Group, *Learning and Inference for Relational Hybrid Models*, February 2013.
- **Korea University**, Intelligent System and Robotics Laboratory, *Learning and Inference for Large-Scale Graphical Models*, January 2013.
- **Ulsan National Institute for Science and Technology**, Department of Electrical and Computer Engineering, *Learning and Inference with Large Environment and Energy Models*, January 2013.
- **Honda Research Institute**, *Learning and Inference for Large-Scale Graphical Models*, October 2012.
- **Palo Alto Research Center (PARC)**, *Learning and Inference for Large-Scale Graphical Models*, October 2012.
- **Lawrence Berkeley National Laboratory**, *Learning and Inference for Large-Scale Graphical Models*, September 2012.
- **University of Illinois at Urbana-Champaign** on Artificial Intelligence and Information Systems (AIIS) Seminar, *Efficient Lifted Inference with Large-Scale Graphical Models*, March 2012.
- **IJCAI-11 Tutorial** on Lifted Inference in Probabilistic Logical Models, *Lifted Inference with Continuous Variables*, July 2011 (Presented by a coauthor).
- **SRI International**, *Lifted Inference for Relational Continuous Models*, June 2011.
- **ICAPS 2010 Workshop** on Combining Action and Motion Planning, *Combining Planning and Motion Planning*, May 2010 (Presented by a coauthor).