Eric Poe Xing

(412) 268-2559 (Office)
(412) 268-3431 (Fax)
epxing@cs.cmu.edu
http://www.cs.cmu.edu/~epxing

8101 Gates-Hillman Center
School of Computer Science
Carnegie Mellon University
Pittsburgh, PA 15213

Positions

- **President**, *Mohamed bin Zayed University of Artificial Intelligence*. (January, 2021 –)
- **Associate Department Head of Research**, Machine Learning Department, *Carnegie Mellon University*. (July, 2016 –)
- **Founding Director**, Center for Machine Learning and Health, *Carnegie Mellon University & University of Pittsburgh Medical Center*. (March, 2015 – July, 2016)
- **Professor**, Machine Learning Department & Language Technology Institute & Computer Science Department, School of Computer Science, *Carnegie Mellon University*. (June, 2014 –)
- **Associate Professor with tenure**, Machine Learning Department & Language Technology Institute & Computer Science Department, School of Computer Science, *Carnegie Mellon University*. (June, 2011 – June 2014)
- **Visiting Associate Professor**, Department of Statistics, *Stanford University*. (Aug, 2010 – Aug 2011)
- **Visiting Research Professor**, *Facebook Inc.*. (Aug, 2010 – Aug 2011)
- **Associate Professor**, Machine Learning Department & Language Technology Institute & Computer Science Department, School of Computer Science, *Carnegie Mellon University*. (June, 2009 – 2011)
- **Assistant Professor**, Machine Learning Department & Language Technology Institute & Computer Science Department, School of Computer Science, *Carnegie Mellon University*. (September 1, 2004 – June, 2009)

Education

- **University of California, Berkeley**, Ph.D. in Computer Science (1999–2004).
  Research advisors: Profs. Richard Karp, Michael Jordan and Stuart Russell
- **Rutgers University**, Ph.D. in Molecular Biology and Biochemistry (1994–1999).
  Research advisor: Prof. Chung S. Yang
- **Rutgers University**, M.Sc. in Computer Science (1996–1998).
  Research advisor: Prof. Casimir Kulikowski
- **Tsinghua University**, B.Sc. in Physics (1988–1993).
  Research advisor: Prof. Jun Zhao

Awards and Recognitions

- Fellow, Institute of Mathematical Statistics (IMS), 2023. Citation: For pioneering contributions to statistics and machine learning research, entrepreneurship in artificial intelligence, and leadership in AI education.
- Fellow, Association for Computing Machinery (ACM), 2022. Citation: For contributions to algorithms, architectures, and applications in machine learning.
- Fellow, American Statistical Association (ASA), 2022. Citation: For pioneering machine learning research in structured, high-dimensional inference, Bayesian nonparametrics, and probabilistic graphical models, entrepreneurship in scalable AI solutions across a broad range of sectors, and leadership in AI education.

- Amazon Research Award, 2022
- Carnegie Science Award, 2019
- Fellow, Institute of Electrical and Electronics Engineers (IEEE), 2018. Citation: For Contributions to Machine Learning Algorithms and Systems.
- Fellow, Association of Advancement of Artificial Intelligence (AAAI), 2016. Citation: For significant contributions to statistical machine learning, its theoretical analysis, new algorithms for learning probabilistic models, and applications of these to important problems in biology, social network analysis, natural language processing and beyond; and to the development of new architecture, system platform, and theory for distributed machine learning programs on large scale applications.
- Member, Board of the International Machine Learning Society, 2015 - .
- Member of the DARPA Information Science and Technology (ISAT) Advisory Group, 2011-2014.
- IBM Open Collaborative Research Faculty Award, IBM, 2012-2014.
- Young Investigator Award, United States Air Force Office of Scientific Research, 2010-2015.
- Young Investigator Award, United States Office of Naval Research, 2009-2012.
- Alfred P. Sloan Research Fellowship in Computer Science, 2008-2010.
- Career Award, National Science Foundation, 2006-2011.
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- (Advisor of) KDD best Ph.D. Dissertation Award, 2012 (Winner), 2014 (Winner), 2015 (Runner up).
- EuroSys Test-of-Time Award, European Conference on Computer Systems. (EuroSys 2026).
- Runner-up Best Demo Paper Award, The 2024 Conference of the North American Chapter of the Association for Computational Linguistics. (NAACL '24).
- Jay Lepreau Best Paper Award, The 15th USENIX Symposium on Operating Systems Design and Implementation (OSDI), 2021.
- Nomination for the Best Paper Award, Association for Computational Linguistics (ACL), 2019.
- Nvidia Pioneering Research Award, Advances in Neural Information Processing Systems 32. (NeurIPS '18)
- Nvidia Pioneering Research Award, Advances in Neural Information Processing Systems 31. (NeurIPS '17)
- Outstanding Long Paper, Association for Computational Linguistics (ACL), 2016.
- Best Paper Award, ACM Symposium on Cloud Computing (SoCC), 2015.
- Honorable Mentioning, Association for Computational Linguistics (ACL), 2015.
- Runner-up Best Paper Award, Conference on Empirical Methods on Natural Language Processing (EMNLP), 2014.
- Best Paper Award, The 1st IEEE Workshop on Large Scale Visual Commerce, 2013.
- Best Paper Award, International Conference on Intelligence Systems for Molecular Biology (ISMB), 2011.
- Best Paper Award, Association for Computational Linguistics (ACL), 2009.
- Best Paper Award, SIAM International Conference on Data Mining (SDM), 2007.
- John Van Ryzin Award for best paper, International Biometric Society-ENAR Annual Meetings, 2006.
- Runner-up Best Student Paper Award, 18th Conference on Uncertainty in Artificial Intelligence (UAI), 2003.
- Regents Fellowship, UC Berkeley, 1999.
- *Anthony Lu* Best Paper Award, Rutgers University, 1999.

Teaching

- **Instructor**, *Advanced Machine Learning* (10-715).
  This is an advanced course for Ph.D. students in the department of machine learning, focusing on advanced algorithms and theory for statistical machine learning.

- **Instructor**, *Machine Learning* (15-781/10-701).
  This is a core-curriculum course for SCS graduate students, focusing on fundamental algorithms and theory for statistical machine learning, pattern recognition and information retrieval.
- **Co-Instructor**, *Machine Learning* (10-601).
  This is a master-level course for SCS graduate and undergraduate students, focusing on algorithms and practice of statistical machine learning, and popular applications.
- **Co-Instructor**, *Computational Genomics* (10-810) (formally known as Computational Molecular Biology: a Machine Learning Approach).
  This course focuses on modern machine learning methodologies for computational problems in molecular biology and genetics. This is a core-curriculum course for CMU-Pitt computational biology Ph.D. program.
- **Instructor**, *Probabilistic Graphical Models* (10-708).
  This is an advanced machine learning course covering probabilistic graphical models for efficient inference, decision-making and learning in problems with a very large number of attributes, complex stochastic dependencies, and huge datasets.
- **Instructor**, *Advanced Topics in Graphical Models* (10-801).
  CMU, Spring 2007.
  This course covers advanced topics in approximate inference, model selection, Bayesian nonparametrics, and their applications.

Papers and Publications

Noteworthy pre-prints

Bio Foundation Model

[1] Le Song, Eran Segal, and **E. P. Xing**, *Toward AI-Driven Digital Organism: Multiscale Foundation Models for Predicting, Simulating, and Programming Biology at All Levels*.
A position paper, arXiv:2412.06993, 2024.

[2] Shuxian Zou, Tianhua Tao, Sazan Mahbub, Caleb N. Ellington, Robin Algayres, Dian Li, Yonghao Zhuang, Hongyi Wang, Le Song, **E. P. Xing**, *A Large-Scale Foundation Model for RNA Function and Structure Prediction*.
NeurIPS AIDrugX Workshop, Spotlight, 2024. In review at Nature Methods.

[3] Ning Sun, Shuxian Zou, Tianhua Tao, Sazan Mahbub, Xavier Cheng, Yonghao Zhuang, Hongyi Wang, Le Song, **E. P. Xing**, *Mixture of Experts Enable Efficient and Effective Protein Understanding and Design*.
NeurIPS AIDrugX Workshop, Spotlight, 2024. In review at Nature Methods.

[4] Nicholas Ho, Caleb N. Ellington, Jinyu Hou, Sohan Addagudi, Shentong Mo, Tianhua Tao, Dian Li, Yonghao Zhuang, Hongyi Wang, Xingyi Cheng, Le Song, **E. P. Xing**, *Scaling Dense Representations for Single Cell with Transcriptome-Scale Context*.
NeurIPS AIDrugX Workshop, 2024.

[5] Jiayou Zhang, Barthelemey Meynard-Piganeau, James Gong, Xingyi Cheng, Yingtao Luo, Hugo Ly, Le Song, **E. P. Xing**, *Balancing Locality and Reconstruction in Protein Structure Tokenizer*.
NeurIPS Machine Learning in Structural Biology Workshop, 2024.

[6] Peter Lee, Xingyi Chen, Le Song, **E. P. Xing**, *Retrieval Augmented Protein Language Models for Protein Structure Prediction*.
NeurIPS Machine Learning in Structural Biology Workshop, 2024.

World Model

[7] **E. P. Xing**, M. Deng, J. Hou, Z. Hu, *Critiques of World Models*.
arXiv:2507.05169, 2025.

[8] Jiannan Xiang, Guangyi Liu, Yi Gu, ... **E. P. Xing** *PAN: A World Model for General, Interactable, and Long-Horizon World Simulation*.
arXiv:2511.09057, 2025.

Large Language Models

[9] Zhengzhong Liu, Aurick Qiao, Willie Neiswanger, Hongyi Wang, Bowen Tan, Tianhua Tao, Junbo Li, Yuqi Wang, Suqi Sun, Omkar Pangarkar, Richard Fan, Yi Gu, Victor Miller, Yonghao Zhuang, Guowei He, Haonan Li, Fajri Koto, Liping Tang, Nikhil Ranjan, Zhiqiang Shen, Roberto Iriondo, Cun Mu, Zhiting Hu, Mark Schulze, Preslav Nakov, Timothy Baldwin, **E. P. Xing**, *LLM360: Towards Fully Transparent Open-Source LLMs*.
Proceedings of the 1st Conference on Language Modeling, 2024. (CoLM '24). ArXiv:2312.06550.

[10] Hector Liu, ... , and **E. P. Xing**, *K2-V2: A 360-Open, Reasoning-Enhanced LLM*.
arXiv:2512.06201, 2025.

[11] Z. Cheng, ... , and **E. P. Xing**, *K2-Think: A Parameter-Efficient Reasoning System*.
arXiv:2509.07604, 2025.

[12] Hector Liu, ... , and **E. P. Xing**, *LLM360 K2: Building a 65B 360-Open-Source Large Language Model from Scratch*.
arXiv:2501.07124, 2025.

[13] N Sengupta, et al, and **E. P. Xing**, *Jais and jais-chat: Arabic-centric foundation and instruction-tuned open generative large language models*.
arXiv preprint arXiv:2308.16149, 2023.

[14] Wei-Lin Chiang, Zhuohan Li, Zi Lin, Ying Sheng, Zhanghao Wu, Hao Zhang, Lianmin Zheng, Siyuan Zhuang, Yonghao Zhuang, Joseph E Gonzalez, Ion Stoica, **E. P. Xing**, *Vicuna: An open-source chatbot impressing gpt-4 with 90% chatgpt quality*.
URL https://lmsys.org/blog/2023-03-30-vicuna, 2023.

Journal Papers

Published

[15] Li Zhang, Han Guo, Leah Schaffer, Young Su Ko, Digvijay Singh, Hamid Rahmani, Danielle Grotjahn, Elizabeth Villa, Michael Gilson, Wei Wang, Trey Ideker, **E. P. Xing**, Pengtao Xie, *ProteinAligner: A Multi-modal Pretraining Framework for Protein Foundation Models*.
Cell Reports Methods, 2026. (bioRxiv, 2024.10. 06.616870)

[16] Ding Bai, Shentong Mo, Ruiyi Zhang, Yingtao Luo, Jiahao Gao, Jeremy Yang, Qiuyang Wu, Digvijay Singh, Hamidreza Rahmani, Tiffany Amariuta, Danielle Grotjahn, Sheng Zhong, Nathan Lewis, Wei Wang, Trey Ideker, Pengtao Xie, **E. P. Xing**, *scLong: A Billion-Parameter Foundation Model for Capturing Long-Range Gene Context in Single-Cell Transcriptomics*.
Nature Communications, 2026

[17] Guy Lutsker , Gal Sapir , Smadar Shilo , Anastasia Godneva , Jerry Greenfield , Dorit Samocha-Bonet , Shie Mannor , Eli Meirom , Gal Chechik , Hagai Rossman , Jordi Merino , Francisco Gude , Raja Dhir, **E. P. Xing**, Eran Segal. *A Foundation Model for Continuous Glucose Monitoring Data*.
Nature, 2026.

[18] Reza Shahriari, Yichi Yang, Danish Nisar Ahmed Tamboli, Michael Perez, Yuheng Zha, Jinyu Hou, Mingkai Deng, Eric D. Ragan, Jaime Ruiz, Daisy Zhe Wang, Zhitting Hu, **E. P. Xing**, *MuCHEx: A Multimodal Conversational Debugging Tool for Interactive Visual Exploration of Hierarchical Object Classification*.
IEEE Computer Graphics and Applications, 2025.

[19] Caleb Ellington, Benjamin Lengerich, Thomas B.K. Watkins, Jiekun Yang, Abhinav K Adduri, Sazan Mahbub, Hanxi Xiao, Manolis Kellis, **E. P. Xing** *Learning to Estimate Sample-Specific Transcriptional Networks for 7000 Tumors*.
Proc. Natl. Acad. Sci., May 23, 2025, 122 (21) e2411930122.

[20] Lee Reicher, Smadar Shilo1, Anastasia Godneva, Hagai Rossman, Guy Lutsker, Liron Zahavi, Saar Shoer, Zachary Levine, David Krongauz, Rotem Shaulitch, Ayya Keshet, Michal Rein, Sarah Kohn, Tomer Segev, Yishay Schlesinger, Daniel Barak, Matan Elkan, Yeela Talmor-Barkan, Yaron Aviv, Yotam Reisner, Adina Weinberger, Le Song, **E. P. Xing**, Eran Segal. *The Human Phenotype Project: Deep phenotyping of the health-disease continuum*.
Nature Medicine, 2025

[21] Mengdi Wang, Zaixi Zhang, Amrit Singh Bedi, Stephanie Guerra, Sheng Lin-Gibson, Le Cong, Souradip Chakraborty, Yuanhao Qu, Jian Ma, **E. P. Xing**, George Church. *A Call for Built-in Biosecurity Safeguards for Generative AI Tools*.
Nature Biotechnology, 2025

[22] Xi Fu, Shentong Mo, Alejandro Buendia, Anouchka Laurent, Anqi Shao, Maria del Mar Alvarez-Torres, Tianji Yu, Jimin Tan, Jiayu Su, Romella Sagatelian, Adolfo Ferrando, Alberto Ciccia, Yanyan Lan, David Owens, Teresa Palomero, **E. P. Xing**, Raul Rabadan. *GET: A Foundation Model of Transcription Across Human Cell Types*.
Nature, 637, pages 965–973, 2025. https://doi.org/10.1038/s41586-024-08391-z.

[23] Charlotte Bunne, Yusuf Roohani, Yanay Rosen, Ankit Gupta, Xikun Zhang, Marcel Roed, Theo Alexandrov, Mohammed AlQuraishi, Patricia Brennan, Daniel B. Burkhardt, Andrea Califano, Jonah Cool, Abby F. Dernburg, Kirsty Ewing, Emily B. Fox, Matthias Haury, Amy E. Herr, Eric Horvitz, Patrick D. Hsu, Viren Jain, Gregory R. Johnson, Thomas Kalil, David R. Kelley, Shana O. Kelley, Anna Kreshuk, Tim Mitchison, Stephani Otte, Jay Shendure, Nicholas J. Sofroniew, Fabian Theis, Christina V. Theodoris, Srigokul Upadhyayula, Marc Valer, Bo Wang, **E. P. Xing**, Serena Yeung-Levy, Marinka Zitnik, Theofanis Karaletsos, Aviv Regev, Emma Lundberg, Jure Leskovec, Stephen R. Quake. *How to Build the Virtual Cell with Artificial Intelligence: Priorities and Opportunities*.
Cell, Volume 187, Issue 25, p7045-7063, December 12, 2024.

[24] G. Zhang, Z. Luo, J. Huang, S. Lu, **E. P. Xing**, *Semantic-aligned matching for enhanced detr convergence and multi-scale feature fusion*.
International Journal of Computer Vision, 1-20, 2024.

[25] Fangneng Zhan, Yingchen Yu, Rongliang Wu, Jiahui Zhang, Shijian Lu, Lingjie Liu, Adam Kortylewsk, Christian Theobalt, **E. P. Xing**, *Multimodal Image Synthesis and Editing: A Survey and Taxonomy*.
IEEE Transaction on Pattern Analysis and Machine Intelligence, 2023.

[26] Hanlin Zhang, Shuai Lin, Weiyang Liu, Pan Zhou, Jian Tang, Xiaodan Liang, **E. P. Xing**, *Iterative Graph Self-Distillation*.
IEEE Transactions on Knowledge and Data Engineering, 2023, DOI: 10.1109/TKDE.2023.3303885

[27] Yi-Fan Zhang, Hanlin Zhang, Zachary C. Lipton, Li Erran Li, **E. P. Xing**, *Exploring Transformer Backbones for Heterogeneous Treatment Effect Estimation*.
Transactions on Machine Learning Research, 2023.

[28] Z. Hu and **E. P. Xing**, *Towards A "Standard Model" of Machine Learning*.
Harvard Data Science Review, 2022.

[29] Alexander Lavin, Ciarán Gilligan-Lee, Alessya Visnjic, Siddha Ganju, Dava Newman, Sujoy Ganguli, Danny Lange, Atılım Güneş Baydin, Amit Sharma, Stephan Zheng, Adam Gibson, **E. P. Xing**, Chris Mattman, James Parr, and Yarin Gal, *Technology Readiness Levels for Machine Learning Systems*.
Nature Communication, 2022.

[30] N. Dong, M. Kampffmeyer, I. Voiculescu, **E. P. Xing**, *Federated Partially Supervised Learning with Limited Decentralized Medical Images*.
IEEE Transactions on Medical Imaging, 2022.

[31] G. Zhang, Z. Luo, K. Cui, S. Lu, **E. P. Xing**, *Meta-DETR: Image-Level Few-Shot Detection with Inter-Class Correlation Exploitation*.
IEEE Transactions on Pattern Analysis and Machine Intelligence, 2022.

[32] S. Lin, C. Liu, Z. Hu, P. Zhou, S. Wang, R. Zhao, Y. Zheng, L. Lin, **E. P. Xing**, X. Liang, *Prototypical Graph Contrastive Learning*.
IEEE Transactions on Neural Networks and Learning Systems, 2022.

[33] H. Wang, O. Lopez, **E. P. Xing**, and W. Wu *Kernel Mixed Model for Transcriptome Association Study*.
Journal of Computational Biology, 2022.

[34] S. Ge, H. Wang, A. Alavi, **E. P. Xing**, Z. Bar-Joseph *Supervised adversarial alignment of single-cell RNA-seq data*.
Journal of Computational Biology, 28(5):501 - 13, 2021.

[35] Z. Wang, Y. Ni, B. Jing, D. Wang, H. Zhang, **E. P. Xing**, *DNB: A Joint Learning Framework for Deep Bayesian Nonparametric Clustering*.
IEEE Transactions on Neural Networks and Learning Systems, 2021.

[36] K. Tran, W. Neiswanger, K. Broderick, **E. P. Xing**, J Schneider, and Z. Ulissi, *Computational catalyst discovery: Active classification through myopic multiscale sampling*.
The Journal of Chemical Physics, 2021.

[37] H. Wang, F. Pei; M. Vanyukov; I. Bahar, W. Wu, and **E. P. Xing**, *Coupled Mixed Model for Joint Genetic Analysis of Complex Disorders with Two Independently Collected Data Sets*.
BMC Bioinformatics, vol. 21, 2021.

[38] Y Zheng, H Wang, Y Zhang, X Gao, **E. P. Xing**, and M Xu *Poly (A)-DG: A deep-learning-based domain generalization method to identify cross-species Poly (A) signal without prior knowledge from target species*.
PLoS Computational Biology, 16 (11), e1008297, 2020

[39] K. Kandasamy, K. Vysyaraju, W. Neiswanger, B. Paria, C. Collins, J. Schneider, B. Poczos, and **E. P. Xing**, *Tuning Hyperparameters without Grad Students: Scalable and Robust Bayesian Optimisation with Dragonfly*.
Journal of Machine Learning Research, 21 (81), 1-27, 2020.

[40] M. Al-Shedivat, A. Dubey, and **E. P. Xing**, *Contextual Explanation Networks*.
Journal of Machine Learning Research, 21 (194), 1-44, 2020.

[41] K. Tran, W. Neiswanger, J. Yoon, Q. Zhang, **E. P. Xing**, Z. Ulissi *Methods for comparing uncertainty quantifications for material property predictions*.
Machine Learning: Science and Technology, Volume 1, Number 2, 2020.

[42] S. Kadambi, Z. Wang, **E. P. Xing**, Z. Ulissi *WGAN Domain Adaptation for the Joint Optic Disc-and-Cup Segmentation in Fundus Images*.
International Journal of Computer Assisted Radiology and Surgery, Volume 1, Number 2, 2020.

[43] B. Aragam, C. Dan, P. Ravikumar, and **E. P. Xing**, *Identifiability Of Nonparametric Mixture Models And Bayes Optimal Clustering*.
Annals of Statistics, Vol. 48, Issue 4, 2277-2302 2020.

[44] H. Wang, T. Yue, J. Yang, W. Wu, and **E. P. Xing**, *Deep mixed model for marginal epistasis detection and population stratification correction in genome-wide association studies*.
BMC Bioinformatics, vol. 20, Suppl. 23, 2019.

[45] M. Marchetti-Bowick, Y. Yu, W. Wu, and **E. P. Xing**, *A penalized regression model for the joint estimation of eQTL associations and gene network structure*.
Annals of Applied Statistics, Vol. 13, No. 1, 248-270, 2019.

[46] M. Sachan, A. Dubey, E. Hovy, D. Roth, T. Mitchell and **E. P. Xing**, *Discourse in Multimedia: A Case Study in Information Extraction*.
Computational Linguistics Journal, 2019.

[47] M. Kampffmeyer, N. Dong, X. Liang, Y. Zhang, **E. P. Xing**, *ConnNet: A Long-Range Relation-Aware Pixel-Connectivity Network for Salient Segmentation*.
IEEE Transactions on Image Processing, Volume: 28, Issue: 5, May 2019.

[48] P. Xie and **E. P. Xing**, *Diversity-Promoting Bayesian Learning of Latent Variable Models*.
Journal of Machine Learning Research, to appear, 2018.

[49] Y. Zhou, Y. Liang, Y. Yu, W. Dai and **E. P. Xing**, *Distributed Proximal Gradient Algorithm for Partially Asynchronous Computer Clusters*.
Journal of Machine Learning Research, 19(19):1 - 32, 2018.

[50] H. Wang, X. Liu, Y. Xiao, M. Xu and **E. P. Xing** *Multiplex Confounding Factor Correction for Genomic Association Mapping with Squared Sparse Linear Mixed Model*.
Methods, 2018 Aug 1; 145: 33 - 40.

[51] H. Wang, B. Aragam and **E. P. Xing** *Variable selection in heterogeneous datasets: A truncated-rank sparse linear mixed model with applications to genome-wide association studies*.
Methods, 2018 Aug 1; 145: 2 - 9.

[52] H. Wang, B. J. Lengerich, B. Aragam and **E. P. Xing**, *Precision Lasso: Accounting for Correlations and Linear Dependencies in High-Dimensional Genomic Data*.
Bioinformatics, PMID: 30184048 DOI:10.1093/bioinformatics/bty750 , 2018.

[53] S. Lee, N. Gornitz, **E. P. Xing**, D. Heckerman, C. Lippert, *Ensembles of Lasso Screening Rules*.
IEEE Transaction on Pattern Analysis and Machine Intelligence, 2017 (10.1109/TPAMI.2017.2765321)

[54] X Chang, YL Yu, Y Yang and **E. P. Xing**, *Semantic pooling for complex event analysis in untrimmed videos*.
IEEE Transaction on Pattern Analysis and Machine Intelligence, 39 (8), 1617-1632, 2017

[55] S. Lee, H. Wang and **E. P. Xing** *Backward Genotype-Transcript-Phenotype Association Mapping*.
Methods, Volume 129, 1 October 2017, Pages 18-23.

[56] Y. Zhou, K. Yuan, Y. Yu, X. Ni, P. Xie, **E. P. Xing**, S. Xu *Inference of multiple-wave population admixture by modeling decay of linkage disequilibrium with polynomial functions*.
Heredity (Edinb), 118(5):503-510, 2017.

[57] M. Al-Shedivat, A. G. Wilson, Y. Saatchi, Z. Hu and **E. P. Xing**, *Learning Scalable Deep Kernels with Recurrent Structure*.
Journal of Machine Learning Research, 18(82):1-37, 2017.

[58] L. Song, H. Liu, A. Parikh, and **E. P. Xing**, *Nonparametric Latent Tree Graphical Models: Inference, Estimation, and Structure Learning*.
Journal of Machine Learning Research, 12, 663-707, 2017.

[59] **E. P. Xing**, Q. Ho, P. Xie, W. Dai, *Strategies and Principles of Distributed Machine Learning on Big Data*.
Engineering, Volume:2, pp179 - 95, 2016.

[60] M. Marchetti-Bowick, J. Yin, J. Howrylak, and **E. P. Xing**, *A time-varying group sparse additive model for genome-wide association studies of dynamic complex traits*.
Bioinformatics, 32 (19):btw347, 2016.

[61] Q. Ho, J. Yin, and **E. P. Xing**, *Latent Space Inference of Internet-Scale Networks*.
Journal of Machine Learning Research, 17(78):1- 41, 2016.

[62] J. Howrylak, M. Moll, B. Raby, S. Weiss, W. Wu, and **E. P. Xing**, *Gene Expression Profiling of Asthma Phenotypes Demonstrates Molecular Signatures of Atopy and Asthma Control*.
Journal of Allergy and Clinical Immunology, Volume 137, Issue 5, Pages 1390 - 1397, 2016.

[63] S. Lee, A. Lozano, P. Kambadur, and **E. P. Xing**, *An Efficient Nonlinear Regression Approach for Genome-wide Detection of Marginal and Interacting Genetic Variations*.
Journal of Computational Biology, 23(5):372 - 89, 2016.

[64] X. Chang, Y. Yu, Y. Yang, and **E. P. Xing** *Semantic Pooling for Complex Event Analysis in Untrimmed Videos*.
IEEE Transaction on Pattern Analysis and Machine Intelligence, PP(99), 2016

[65] Z. Guo, Z. Zhang, **E. P. Xing**, and C. Faloutsos, *Multimodal Data Mining in a Multimedia Database Based on Structured Max Margin Learning*.
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[66] **E. P. Xing**, Q. Ho, W. Dai, J. Kim, J. Wei, S. Lee, X. Zheng, P. Xie, A. Kumar, and Y. Yu, *Petuum: A new Platform for Distributed Machine Learning on Big Data*.
IEEE Transactions on Big Data, Volume:1 Issue:2, pp49 - 67, 2015.

[67] Bin Zhao and **E. P. Xing**, *Sparse Output Coding for Scalable Visual Recognition*.
International Journal of Computer Vision, 119:60 - 75, 2015.

[68] W. Wang, Y. Liang, Lixin Shen, and **E. P. Xing**, *Nonparametric Decentralized Detection and Sparse Sensor Selection via Weighted Kernel*.
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[69] A. Martins, M. Figueiredo, P. Aguiar, N.A. Smith, and **E. P. Xing**, *AD^3: Alternating Directions Dual Decomposition for MAP Inference in Graphical Models*.
Journal of Machine Learning Research, 16(Mar): 495-545, 2015.

[70] W. Wang, Y. Liang and **E. P. Xing**, *Collective Support Recovery for Multi-Design Multi-Response Linear Regression*.
IEEE Transactions on Information Theory, vol. 61, no. 1, pp.513-534, 2015.

[71] J. Eisenstein, B. O'Connor, N. A. Smith, and **E. P. Xing**, *Diffusion of Lexical Change in Social Media*.
PLoS One, volume 9, Issue 11, e113114, 2014.

[72] **E. P. Xing**, R. Curtis, G. Schoenherr, S. Lee, J. Yin, K. Puniyani, W. Wu, P. Kinnaird, *GWAS in a Box: Statistical and Visual Analytics of Structured Associations via GenAMap*.
PLoS One, Volume 9, Issue 6, e97524, 2014.

[73] A. Parikh, R. Curtis, I. Kuhn, S. Becker, M. Bissell, **E. P. Xing**, and Wei Wu *Network Analysis of Breast Cancer Progression and Reversal Using a Tree-evolving Network Algorithm*.

PLoS Computational Biology, Volume 10, Issue 7, e1003713, 2014.

[74] S. Shringarpure and **E. P. Xing**, *Effects of Sample Selection Bias on the Accuracy of Population Structure and Ancestry Inference*.
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[75] D. Yogatama, C. Wang, B.R. Routledge, N.A. Smith, and **E. P. Xing**, *Dynamic Language Models for Streaming Text*.
Transactions of the Association for Computational Linguistics, 2:181-192, 2014.

[76] M. Kolar, H. Liu and **E. P. Xing**, *Graph Estimation From Multi-attribute Data*.
Journal of Machine Learning Research, 15:1713-1750, 2014.

[77] J. Zhu, N. Chen and **E. P. Xing**, *Bayesian Inference with Posterior Regularization, and applications to Infinite Latent SVMs*.
Journal of Machine Learning Research, 15:1799-1847, 2014.

[78] K. Puniyani and **E. P. Xing**, *GINI : From ISH images to Gene Interaction Networks*.
PLoS Computational Biology, 9(10): e1003227, 2013.

[79] K. Puniyani and **E. P. Xing**, *NP-MuScL: Unsupervised global prediction of interaction networks from multiple data sources*.
Journal of Computational Biology, 20(11):892-904, 2013.

[80] M. Yamada, W. Jitkrittum, L. Sigal, **E. P. Xing**, and M. Sugiyama, *High-Dimensional Feature Selection by Feature-Wise Kernelized Lasso*.
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[81] R. Curtis, S. Kim, J. L. Woolford, W. Xu, and **E. P. Xing**, *Structured association analysis leads to insight into Saccharomyces cerevisiae gene regulation by finding multiple contributing eQTL hotspots associated with functional gene modules*.
BMC Genomics, vol. 14, no. 196, 2013.

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Technical Report CMU-CALD-05-114, Carnegie Mellon University, 2005.

[520] **E. P. Xing**, *On Topic Evolution*.

Technical Report CMU-CALD-05-115, Carnegie Mellon University, 2005.

[521] F. Guo and **E. P. Xing**, *Bayesian Exponential Family Harmoniums*.
Technical Report CMU-ML-06-103, Carnegie Mellon University, 2006.

[522] F. Li, Y-M. Yang and **E. P. Xing**, *Inferring regulatory networks using a hierarchical Bayesian graphical Gaussian model*.
Technical Report CMU-ML-06-117, Carnegie Mellon University, 2006.

Professional Service

- **Invited or Guest Lecturer**
  - The "Dragon Star Lecture" on Machine learning, 2009 (Tsinghua/Pekin University) and 2010 (Shanghai Jiaoto/Fudan University). Delivered a week-long 20 lecture series at the invitation of the Chinese Academic of Science.
  - Invited Lecturer on Probabilistic Graphical Models at University of Heidelberg, 2011. Delivered a week long lecture series at the invitation of University of Heidelberg.
- **Editorial Board** of
  - *Journal of the American Statistical Association* (associate editor)
  - *Annals of Applied Statistics* (associate editor)
  - *Journal of Machine Learning Research* (action editor)
  - *Machine Learning* Journal (action editor)
  - *IEEE Transactions on Pattern Analysis and Machine Intelligence* (associate editor)
  - *PLoS Computational Biology* (guest associate editor)
- **Member** of
  - DARPA Information Science and Technology (ISAT) Advisory Group
  - NIH Biodata Management and Analysis (BDMA) Study Section
- **Invited panelist/participant** of
  - DARPA CS Futures II, 2007-2008.
  - International Expert Review Committee of the Doctoral Plus Program (DK-plus) ÒPopulation GeneticsÓ of University of Vienna (October 22nd, 2008, and November 5, 2009), invited by the Austrian Science Fund (FWF) Board of Trustees.
- **Organizer or Co-Organizer** for
  - Workshop on "Divergence Methods for Probabilistic Inference, ICML 2014
  - Workshop on "Spectral Learning", NIPS 2012
  - Workshop on Structured Sparsity: Learning and Inference, ICML 2011
  - Workshop on Analyzing Graphs: Theories and Applications. Advances in Neural Information Processing Systems 22, NIPS-08 (2008)
  - Workshop on Statistical Models of Networks. Advances in Neural Information Processing Systems 21, NIPS-07 (2007)
  - Workshop on Learning in Structured Output Spaces. The 24th International Conference on Machine Learning, ICML-07 (2007)
  - Institute of Mathematical Statistics (IMS) Session on Dynamic Network Models. International Biometric Society-ENAR Annual Meetings, Atlanta, Georgia, 2007
  - Workshop on Learning in Structured Output Spaces. The 23rd International Conference on

Machine Learning, ICML-06 (2006)

  - Workshop on Statistical Network Analysis: Models, Issues and New Directions. The 23rd International Conference on Machine Learning, ICML-06 (2006)

- **Chair, co-Chair**, or **Senior Program Committee** member for
  - General Chair, The Thirtyfifth International Conference on Machine Learning, ICML-19 (2019)
  - Program Committee Chair, The Thirtieth International Conference on Machine Learning, ICML-14 (2014)
  - Area Chair: Advances in Neural Information Processing Systems 26 NIPS-12, (2012).
  - Area Chair: Advances in Neural Information Processing Systems 25 NIPS-11, (2011).
  - Area Chair: The 28th International Conference on Machine Learning ICML-11, (2011).
  - Area Chair: The 19th International Conference on Intelligent Systems for Molecular Biology ISMB-11, (2011).
  - SPC: The Seventeenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, KDD-11 (2011).
  - Area Chair: The 18th International Conference on Intelligent Systems for Molecular Biology ISMB-10, (2010).
  - Tutorial Chair: The 7th Asia Pacific Bioinformatics Conference, APBC09 (2009)
  - Publication Chair, and SPC, The Twenty-Fifth International Conference on Conference on Uncertainty in Artificial Intelligence, UAI'09 (2009)
  - SPC, The Fourteenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, KDD-08 (2008)
  - SPC, The Fourteenth Annual International Conference on Research in Computational Molecular Biology, RECOMB-10 (2010).
  - SPC, The Thirteenth Annual International Conference on Research in Computational Molecular Biology, RECOMB-09 (2009).
  - SPC, The Twelfth Annual International Conference on Research in Computational Molecular Biology, RECOMB-08 (2008).
  - SPC, The Twenty-Fourth International Conference on Machine Learning, ICML-07 (2007)
- **Program Committee** member for
  - The 24th International Conference on Conference on Uncertainty in Artificial Intelligence, UAI'08 (2008)
  - European Conference on Computer Vision, ECCV-08 (2008)
  - The NIPS workshop on Machine Learning in Computational Biology, NIPS (2007)
  - Joint Conference on Empirical Methods in Natural Language Processing and Computational Natural Language Learning, EMNLP-CoNLL (2007)
  - The 11th IEEE International Conference on Computer Vision, ICCV (2007)
  - IEEE Conference on Computer Vision and Pattern Recognition Program, CVPR (2007, 2008)
  - SIAM International Conference on Data Mining, SDM (2007)
  - Workshop on Multimodal Information Retrieval. The Twentieth International Joint Conference of Artificial Intelligence, IJCAI (2007)
  - Workshop on Learning with Nonparametric Bayesian Mothods. The Twenty-Third International Conference on Machine Learning, ICML (2006)

  - The Twenty-Third International Conference on Machine Learning, ICML (2006)
  - The Twenty-First, Twenty-Third, National Conference on Artificial Intelligence, AAAI (2006, 2008), and and AAAI-08 Nectar track (2008)
  - The Fourth and Seventh Asia-Pacific Bioinformatics Conference, APBC (2006, 2009)
  - The Sixteenth, Seventeenth and Eighteenth International Conference on Genome Informatics (2005, 2006, 2007)
  - The Tenth and Eleventh International Conference on Artificial Intelligence and Statistics, AISTAT (2005, 2007)
  - The First, Second, Third, and Fifth Annual RECOMB Satellite Workshop on Regulatory Genomics (2004, 2005, 2006, 2008)
- **Reviewer** for
  - *American Journal of Human Genetics*,
  - *Annals of Applied Statistics*,
  - *Proc. Natl. Acad. Sci.*,
  - *PLOS Computational Biology*,
  - *PLOS Genetics*,
  - *ACM Transactions on Knowledge Discovery from Data*,
  - *Bioinformatics*,
  - *BMC Bioinformatics*,
  - *International Journal of Computer Vision*,
  - *Journal of American Statistical Association*,
  - *Journal of Computational Biology*,
  - *Journal of Machine Learning Research*,
  - *Journal of Artificial Intelligence Research*,
  - *IEEE Transactions on Information Theory*,
  - *Genome Research*,
  - *Knowledge and Information Systems*,
  - *Machine Learning*,
  - *Nature, Methods*,
  - *Nucleic Acid Research*,
  - *Social Networks*,
  - *Statistica Sinica*,
  - Annual Conference on Advances in Neural Information Processing Systems (*NIPS*),
  - Annual Conference on Uncertainty in Artificial Intelligence (*UAI*),
  - Annual Conference on International Conference on Machine Learning (*ICML*),
  - Annual IEEE Conference on Computer Vision and Pattern Recognition (*CVPR*),
  - Annual Conference on Research in Computational Molecular Biology (*RECOMB*),
  - Annual Conference on Intelligent Systems for Molecular Biology (*ISMB*),
  - Annual Pacific Symposium on Biocomputing (*PSB*),

  - National Conference on Artificial Intelligence (*AAAI*).
- **Grant Panelist** (domestic) for
  - Biological Databases & Informatics, National Science Foundation
  - Information & Knowledge Management panel, IIS, National Science Foundation
  - Plant Genome Research Program, National Science Foundation
  - NSF Career Panel
  - NSF RI/IIS Panel
  - NIH BDMA study section
  - NIH Special Emphasis Panel
  - NIH DirectorÕs New Innovator Award Panel
- **Grant and Award Reviewer/Panelist** (international) for
  - Austrian Science Fund (FWF)
  - British Computer Society (BCS), Distinguished Dissertation Award
  - Canada Foundation for Innovation (CFI)
  - Israel Science Foundation
  - The Research Grants Council (RGC) of Hong Kong
  - The Wellcome Trust
- **Professional organizations:**
  - American Statistical Association (ASA: ID 137567),
  - Institute of Mathematical Statistics (IMS: ID 31579),
  - Society for Industrial and Applied Mathematics (SIAM: ID 20837743),
  - Association for Computing Machinery (ACM: ID 9708021),
  - Institute of Electrical and Electronics Engineers (IEEE),
  - International Society for Bayesian Analysis (ISBA),
  - American Association for Artificial Intelligence (AAAI),
  - American Association for Cancer Research (AACR),
  - International Society for Computational Biology (ISCB).

University Services (A partial listing)

- Annual Machine Learning Summer School, co-organizer (2005, 2006), Machine Learning Department, CMU.
- Faculty Search Committee, member (2006, 2007, 2008, 2012, 2013,2015,2016), chair (2013,2015), Machine Learning Department, CMU.
- Admissions Committee, member (2006), Machine Learning Department, CMU.
- Admissions Committee, member (2005), Language Technology Institute, CMU.
- Admissions Committee, member (2006), chair (2007, 2008), Joint CMU-Pitt Ph.D. Program in Computational Biology.
- Curriculum Committee, member (2006, 2007), Joint CMU-Pitt Ph.D. Program in Computational Biology.

- ACM Doctoral Dissertation Award and SCS Best Thesis Award Committee, member (2007), chair (2008), SCS, CMU.
- New Collaborations Competition, Reviewer (2007), Language Technology Institute, CMU.

Advising

Current students, Postdocs, and Research Scientists:

Graduate Student:

Current Ph.D. Students: Aviv Bick (CSD), Sangkeun Choe (LTI), Caleb Ellington (CBD), Han Guo (LTI), Lingjing Kong (CSD), Xiangchen Song (MLD), Bowen Tan (LTI), Yonghao Zhuang (CSD)

Post Doctoral Fellow and Project Scientist: Hongyi Wang (University of Wisconsin - Madison)

Students graduated:
Henry Lin (LTI, M.S. 2006, now Research Scientist at Microsoft Research)
Bing Zhao (LTI, Ph.D. 2007, now Research Scientist at Stanford Research Institute (SRI))
Steve Hanneke (MLD, Ph.D. 2009, now Asst. Prof. stat@CMU)
Wenjie Fu (CSD, MS. 2009, now Software Engineer at Facebook)
Pradipta Ray (LTI, Ph.D. 2010, now Research Scientist at U. of Texas)
Amr Ahmed (LTI, Ph.D. 2011, now Research Scientist at Google, KDD 2012 best dissertation winner)
Hetunandan Kamichetty (CSD, Ph.D. 2011, now Research Scientist at Facebook, honorable mention, SCS Doctoral Dissertation Award, 2011.))
Ross Curtis (CompBio, Ph.D. 2011, now Software Engineer at AncestryDNA)
Kyung-Ah Sohn (CSD, Ph.D. 2011, now Assistant Professor at Ajou University, South Korea)
Anuj Goyal (LTI, M.S. 2012, now Software Engineer at LinkedIn)
Andre Martins (LTI, Ph.D. 2012, now Research Scientist, Priberam Labs and Instituto Superior Tcnico, honorable mention, SCS Doctoral Dissertation Award, 2012.)
Suyash Shringarpure (MLD, Ph.D. 2012, now Postdoc at Stanford University)
Mladen Kolar (MLD, Ph.D. 2013, now Assistant Professor at U. of Chicago, KDD 2014 best dissertation honorable mention)
Kriti Puniyani (LTI, Ph.D. 2013, now Research Scientist at Google)
Gunhee Kim (CSD, Ph.D. 2013, now Assistant Professor at Seoul National University, KDD 2014 best dissertation winner)
Judie Howrylak (M.D./Ph.D., 2013, now Assistant Professor, Penn State University Medical Center)
Abhimanu Kumar (LTI, MS, 2014, now Director of Engineer, GageIn)
Qirong Ho (MLD, Ph.D. 2014, (now Assistant Professor, MBZUAI; CTO, Petuum Inc. KDD 2015 best dissertation runner-up)
Bin Zhao (MLD, Ph.D. 2014, VP of ML at Petuum Inc.)
Seunghak Lee (CSD, Ph.D. 2015, now Research Scientist, Human Longevity)
Ankur Parikh (MLD, Ph.D. 2015, now Research Scientist at Google, Assistant Professor at NYU)
Seunghak Lee (2016, Research Scientist, Facebook)
Pengtao Xie (2018, Assistant Professor at UCSD)
Wei Dai (2018, Research Scientist, Apple)
Jin Kyu Kim (2019, Research Scientist, Facebook)
Willie Neiswanger (2019, Postdoc Associate at CMU)
Mrinmaya Sachan (2019, Assistant Professor at ETH Zurich)

Jinliang Wei (2020, Engineer, Google)
Kumar Avinava Dubey (2020, Research Scientist, Google)
Zhiting Hu (2020, Assistant Professor, UCSD)
Xun Zheng (2020, Research Scientist, Waymo)
Lisa Lee (2020, Research Scientist, Google)
Hao Zhang (2020, PostDoc, UC Berkeley)
Aurick Qiao (2021, CEO, Petuum Inc)
Maruan Al-Shedivat (2021, Principal Research Scientist, Genesis Therapeutics)
Ben Lengerich (2021, Postdoc, MIT)
Haohan Wang (2021, Assistant Professor, UIUC)

Postdocs graduated:
Seyoung Kim (2010, Asst. Prof. cs@CMU)
Le Song (2011, Asst. Prof. cs@ Georgia Tech)
Jun Zhu (2011, Asso Prof. cs@Tsinghua Univ)
Jacob Eisenstein (2012, Asst Prof. cs@ Georgia Tech)
Sinead Williamson (2013, Asst Prof. stat@UT Austin)
Chong Wang (2014, Microsoft Research)
Junming Yin (2014, Asst Prof. business@Arizona State University)
Andrew Wilson (2016, Asst Prof. cs@Cornell University)
Yaoliang Yu (2016, Asst Prof. cs@University of Waterloo)
Xiaodan Liang (2018, Associate Prof. cs@ZhongShang University)
Bryon Aragam (2019, Asst Prof. at U. of Chicago)

Served or serving on the thesis committee of:

Edoardo Airoldi (CSD), Anton Chechetka (RI), Shay Cohen (LTI), Jason Ernest (ML), Kevin Gimpel (LTI), Lei Li (CSD), Weihao Lin (LTI), Yan Liu (LTI), Yong Lu (CSD), Pradeep Ravikumar (ML), Indrayana Rustandi (CSD), Chenhe Yuan (Pitt, CS), Yu-Chiang Frank Wang (ECE).