

Kevin S. Xu

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Research Interests

Machine learning and statistical signal processing with applications to network science, human dynamics, and health. Current projects:

- Statistical models and efficient inference procedures for discrete-time and continuous-time dynamic network data, particularly social network data
- Development of robust algorithms for analysis of physiological data (including electrodermal activity and heart rate variability) collected using wearable sensors
- Prediction of human performance and cognitive load levels for human-machine collaboration
- Interactive methods for scalable and interpretable visualization of large dynamic networks

Education

PhD, Electrical Engineering: Systems University of Michigan, Ann Arbor, MI, USA	2012
MSE, Electrical Engineering: Systems University of Michigan, Ann Arbor, MI, USA	2009
BASc, Electrical Engineering, <i>With Distinction, Dean's Honors List</i> University of Waterloo, Waterloo, ON, Canada	2007

Appointments

Assistant Professor University of Toledo, Toledo, OH, USA	2015–present
Researcher Technicolor Research and Innovation Center, Los Altos, CA, USA	2014–2015
Senior Research Scientist 3M Corporate Research Laboratory, St. Paul, MN, USA	2012–2013
Interim Lecturer University of Michigan, Ann Arbor, MI, USA	2012

Honors and Awards

- Exceptional Service Award, International Conference on Social Computing, Behavioral-Cultural Modeling, & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRiMS), 2016
- Winner, International Conference on Social Computing, Behavioral-Cultural Modeling, & Prediction (SBP) Challenge, 2013
- Postgraduate scholarship: Doctorate, Natural Sciences and Engineering Research Council of Canada (NSERC), 2010–2012
- Postgraduate scholarship: Master's, Natural Sciences and Engineering Research Council of Canada (NSERC), 2008–2009

Publications

Books and Edited Volumes

- [1] **K. S. Xu**, D. Reitter, D. Lee, and N. Osgood, editors. *Social, cultural, and behavioral modeling*, volume 9708 of *Lecture Notes in Computer Science*. Springer, Cham, 2016.
- [2] N. Agarwal, **K. S. Xu**, and N. Osgood, editors. *Social computing, behavioral-cultural modeling, and prediction*, volume 9021 of *Lecture Notes in Computer Science*. Springer, Cham, 2015.

Articles in Journals

- [1] S. Jain, U. Oswal, **K. S. Xu**, B. Eriksson, and J. Haupt. A compressed sensing based decomposition of electrodermal activity signals. *IEEE Transactions on Biomedical Engineering*, 64(9):2142–2151, 2017. [arXiv:1602.07754](#).
- [2] K.-J. Hsiao, **K. S. Xu**, J. Calder, and A. O. Hero. Multicriteria similarity-based anomaly detection using Pareto depth analysis. *IEEE Transactions on Neural Networks and Learning Systems*, 27(6):1307–1321, 2016. [arXiv:1508.04887](#).
- [3] **K. S. Xu** and A. O. Hero III. Dynamic stochastic blockmodels for time-evolving social networks. *IEEE Journal of Selected Topics in Signal Processing*, 8(4):552–562, 2014. [arXiv:1403.0921](#).
- [4] **K. S. Xu**, M. Klinger, and A. O. Hero III. Adaptive evolutionary clustering. *Data Mining and Knowledge Discovery*, 28(2):304–336, 2014. [arXiv:1104.1990](#).
- [5] **K. S. Xu**, M. Klinger, and A. O. Hero III. A regularized graph layout framework for dynamic network visualization. *Data Mining and Knowledge Discovery*, 27(1):84–116, 2013. [arXiv:1202.6042](#).

Articles in Conference Proceedings

- [1] R. Ahmad and **K. S. Xu**. Effects of contact network models on stochastic epidemic simulations. In *Proceedings of the 9th International Conference on Social Informatics*, pages 101–110, 2017. [arXiv:1707.08607](#).
- [2] Y. Zhang, M. Haghdan, and **K. S. Xu**. Unsupervised motion artifact detection in wrist-measured electrodermal activity data. In *Proceedings of the 21st ACM International Symposium on Wearable Computers*, pages 54–57, 2017. [arXiv:1707.08287](#).
- [3] J. Yalamanchili, R. C. Green II, **K. S. Xu**, and V. K. Devabhaktuni. Performance enhanced multiset similarity joins. In *Proceedings of the 6th IEEE International Conference on Big Data and Cloud Computing*, pages 21–28, 2016.
- [4] R. R. Junuthula, **K. S. Xu**, and V. K. Devabhaktuni. Evaluating link prediction accuracy on dynamic networks with added and removed edges. In *Proceedings of the 9th IEEE International Conference on Social Computing and Networking*, pages 377–384, 2016. [arXiv:1607.07330](#).
- [5] A. Natarajan, **K. S. Xu**, and B. Eriksson. Detecting divisions of the autonomic nervous system using wearables. In *Proceedings of the 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, pages 5761–5764, 2016.
- [6] Y. Li, **K. S. Xu**, and C. K. Reddy. Regularized parametric regression for high-dimensional survival analysis. In *Proceedings of the 2016 SIAM International Conference on Data Mining*, pages 765–773, 2016. Acceptance rate: 26%.
- [7] Q. Han, **K. S. Xu**, and E. M. Airoldi. Consistent estimation of dynamic and multi-layer block models. In *Proceedings of the 32nd International Conference on Machine Learning*, pages 1511–1520, 2015. [arXiv:1410.8597](#). Acceptance rate: 26%.

- [8] **K. S. Xu**. Stochastic block transition models for dynamic networks. In *Proceedings of the 18th International Conference on Artificial Intelligence and Statistics*, pages 1079–1087, 2015. [arXiv:1411.5404](#). Oral presentation: top 6% of submitted papers.
- [9] **K. S. Xu** and A. O. Hero III. Dynamic stochastic blockmodels: Statistical models for time-evolving networks. In *Proceedings of the 6th International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction*, pages 201–210, 2013. [arXiv:1304.5974](#).
- [10] K.-J. Hsiao, **K. S. Xu**, J. Calder, and A. O. Hero III. Multi-criteria anomaly detection using Pareto depth analysis. In *Advances in Neural Information Processing Systems 25*, pages 854–862, 2012. [arXiv:1110.3741](#). Spotlight presentation: top 5% of submitted papers.
- [11] **K. S. Xu**, M. Klinger, and A. O. Hero III. Tracking communities in dynamic social networks. In *Proceedings of the 4th International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction*, pages 219–226, 2011.
- [12] **K. S. Xu**, M. Klinger, and A. O. Hero III. A shrinkage approach to tracking dynamic networks. In *Proceedings of the IEEE Statistical Signal Processing Workshop*, pages 517–520, 2011.
- [13] **K. S. Xu**, M. Klinger, and A. O. Hero III. Visualizing the temporal evolution of dynamic networks. In *Proceedings of the 9th Workshop on Mining and Learning with Graphs*, 2011.
- [14] **K. S. Xu**, M. Klinger, and A. O. Hero III. Identifying spammers by their resource usage patterns. In *Proceedings of the 7th Collaboration, Electronic Messaging, Anti-Abuse, and Spam Conference*, 2010.
- [15] **K. S. Xu**, M. Klinger, and A. O. Hero III. Evolutionary spectral clustering with adaptive forgetting factor. In *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing*, pages 2174–2177, 2010.
- [16] **K. S. Xu**, M. Klinger, Y. Chen, P. J. Woolf, and A. O. Hero III. Revealing social networks of spammers through spectral clustering. In *Proceedings of the IEEE International Conference on Communications*, 2009. [arXiv:1305.0051](#).

Other

- [1] **K. S. Xu**, N. Agarwal, D. Lee, and N. Osgood. Guest editorial on social computing, behavioral-cultural modeling and prediction. *IEEE Transactions on Computational Social Systems*, 3(2):43–45, 2016. Introduction to guest-edited special issue.
- [2] B. O’Leary and **K. S. Xu**. Web-based interactive multi-level graph visualization. In *Proceedings of the International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling & Simulation*, 2016. Extended abstract of demo presentation.
- [3] **K. S. Xu**. Predictability of social interactions. Extended abstract selected as winner of International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction Challenge, 2013.
- [4] **K. S. Xu**. *Computational methods for learning and inference on dynamic networks*. PhD thesis, University of Michigan, 2012.
- [5] **K. S. Xu**, M. Klinger, and A. O. Hero III. Tracking communities of spammers by evolutionary clustering. Presented at the International Conference on Machine Learning Workshop on Social Analytics: Learning from Human Interactions, 2010.
- [6] **K. S. Xu** and A. O. Hero III. Revealing social networks of spammers. *The Next Wave*, 18(3):26–34, 2010. Article in the National Security Agency’s review of emerging technologies.

Invited Talks

- Joint Statistical Meetings, 2017

- Department of Computer Science, Bowling Green State University, 2016
- Department of Computer Science and Electrical Engineering, West Virginia University, 2016
- School of Information Sciences, University of Pittsburgh, 2016
- Computer Science Department, Wayne State University, 2016.
- Inference on Networks: Algorithms, Phase Transitions, New Models and New Data Workshop, Santa Fe Institute, 2015.
- Statistics Department, University of California, Berkeley, 2015.
- Information Systems Laboratory Colloquium, Stanford University, 2014.
- Digital Technology Center, University of Minnesota, 2013.

Courses Taught

University of Toledo

- EECS 1100: Digital Logic Design (Fall 2017)
- EECS 1510: Introduction to Object-Oriented Programming (Fall 2015)
- EECS 4750/5750: Machine Learning (Fall 2017, Fall 2016)
- EECS 6980/8980: Special Topics – Social Network Analysis (Spring 2016)

University of Michigan

- EECS 401: Probabilistic Methods in Engineering (Summer 2012)

Students Advised

University of Toledo

PhD students

- Abhishek Mukherjee, 2016–present
- Ruthwik R. Junuthula, 2015–present (co-advisor: Vijay Devabhaktuni)
- Rehan Ahmad, 2015–present

MS students

- Sai K. Nittala, 2016–present (co-advisor; primary advisor: Vijay Devabhaktuni)
- Brian O’Leary, 2016–present
- Maysam Haghdan, 2016–2017
- Yuning Zhang, 2015–2017

BS students

- Makan S. Arastuie, 2016–present
- Jay M. Kiker, 2016–2017

Technicolor Research and Innovation Center

- Paris Syminelakis, PhD student at Stanford University, 2015
- Annamalai Natarajan, PhD student at the University of Massachusetts Amherst (co-advised with Brian C. Eriksson), 2015
- Wenling (Wendy) Shang, PhD student at the University of Michigan, 2015
- Urvashi Oswal, PhD student at the University of Wisconsin-Madison (co-advised with Brian C. Eriksson), 2015
- Swayambhoo Jain, PhD student at the University of Minnesota (co-advised with Brian C. Eriksson), 2015
- Yan Li, PhD student at Wayne State University, 2015

- Qiuyi (Christina) Han, PhD student at Harvard University, 2014
- Mohammad Ali Abbasi, PhD student at Arizona State University, 2014

Professional Activities

Associate editor

- IEEE Transactions on Computational Social Systems (TCSS), 2016–present

Program co-chair

- International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction and Behavior Representation in Modeling and Simulation (SBP-BRiMS), 2016–2017
- International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction (SBP), 2015

Guest editor

- IEEE TCSS special issue on Social Computing, Behavioral-Cultural Modeling, and Prediction, 2015 (Lead guest editor)

Area chair

- SBP 2014

Program committee member

- AAAI Conference on Artificial Intelligence (AAAI), 2017–2018
- International World Wide Web Conference (WWW), 2017–2018
- International Conference on Network Science (NetSci), 2017
- International Conference on Social Informatics (SocInfo), 2017
- IEEE Workshop on Parallel and Distributed Processing for Computational Social Systems (ParSocial), 2016–2017
- International Joint Conference on Artificial Intelligence (IJCAI), 2016
- Midstates Conference for Undergraduate Research in Computer Science and Mathematics, 2015

Co-chair of Grand Data Challenge for SBP-BRiMS 2016 and SBP 2014

Faculty mentor for University of Toledo ACM and ACM-W chapters, 2015–present

NSF panelist, 2016

NSF ad-hoc reviewer, 2016

Reviewer

- Network Science, 2017
- Social Networks, 2017
- Computational Mathematical and Organization Theory, 2017
- Journal of the Royal Statistical Society: Series C (Applied Statistics), 2017
- Annals of Statistics, 2016–2017
- Computational Statistics and Data Analysis, 2016–2017
- Journal of Computational and Graphical Statistics, 2015–2017
- IEEE Transactions on Pattern Analysis and Machine Intelligence, 2016
- Biometrika, 2016
- Annals of Applied Statistics, 2016
- Advances in Neural Information Processing Systems (NIPS), 2016
- Journal of Machine Learning Research, 2016
- Information Sciences, 2013, 2016
- Computational Statistics, 2015–2016

- IEEE Transactions on Neural Networks and Learning Systems, 2014–2015
- PLOS ONE, 2015
- IEEE Transactions on Signal and Information Processing over Networks, 2015
- Expert Systems with Applications, 2014
- IEEE Journal of Selected Topics in Signal Processing, 2012
- IEEE Signal Processing Letters, 2012
- IEEE Statistical Signal Processing Workshop, 2011

Judge for University of Michigan Engineering Graduate Symposium, 2015

Student organizing committee

- Michigan Student Symposium for Interdisciplinary Statistical Sciences, 2011
- Student SPEecs signal processing seminar series, 2011–2012

Member of IEEE, ACM, and Tau Beta Pi