Xiao Shou
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Education

Rensselaer Polytechnic Institute, Troy NY
- School of Science: PhD in Applied Mathematics (Optimization) Fall 2018 – August 2023
- Thesis: Learning and Inference for Temporal Event Sequences
- **RPI – IBM AI Scholar (2020-2023)**

Rensselaer Polytechnic Institute, Troy NY
- School of Science: MS in Computer Science May 2023

The Ohio State University, Columbus Ohio
- College of Arts & Sciences: MS in Chemistry August 2014

Wittenberg University, Springfield Ohio
- BA in Chemistry with highest distinction May 2012
- Minor in Applied Mathematics, Japanese and East Asia Studies

Research Interests

Probabilistic Machine Learning, Optimization for Machine Learning, Causal Reasoning & Inference, Graphical Models for Computer Vision, (Neural) Temporal Point Processes, Health Informatics & Engineering, Deep Generative Models, AI for Science, (Deep) Reinforcement Learning for Sequential Decision Making, Large Language Models, Foundation Models with Reasoning

Awards & Honors

- RPI-IBM AI Research Collaboration (AIRC) Scholar
- RPI-IBM AIRC Fellowship (2020-2023)
- The 12th ACM Conference on Bioinformatics, Computational Biology, and Health Informatics: Best Student Paper Award
- Patterson Award for Outstanding Junior in Chemistry
- Midwest Regional College Math Competition Team First Place

Relevant Experiences

AI Scholar IBM-AI Research August 2020 – Present
- Conduct cutting-edge research on learning and inference from temporal event sequences
- Research in graphical event models: the intersection of point process and graphical models
- Develop novel framework, models and software packages (@ https://github.com/xshou1990) for temporal event sequences
- Contribute independent research work to main AI venues: *NeurIPS, AAAI, CLeaR*

Graduate Research Assistant RPI January 2019 – August 2020
- Performed applied research in healthcare industry and health informatics
- Developed subpopulation models for public health with different risk factors
- Designed, deployed and automated patient referral to complex care management program via mixture of hidden Markov model on time series data for a major insurance company
- Published in top health / (bio)informatics venues: *ACM BCB, IEEE BIBM*, Journal *Methods*

Chemist Precision Labs April 2015 – June 2018
- Extracted and analyzed clinical chromatography data for medical insights
- Developed statistical models of drug level (addiction medicine) on medical devices
- Implemented quality control monitoring processes for instrumental and model performance

Product Safety Coordinator LBrands November 2014 – April 2015
- Supported data and document to product team in administering safety and efficacy testing process
- Reviewed myriads of clinical toxicological data in compliance with EU Directive and FDA
- Mined in relational databases to extract, transfer, and analyze data to prepare toxicological reports

Publications

- **Shou, X.,** Mavroudeas, G., New, A., Arhin, K., Kuruzovich, J. N., Magdon-Ismail, M., & Bennett, K. P. Supervised mixture models for population health. *IEEE International Conference on Bioinformatics and Biomedicine (BIBM), 2019.*
- **Shou, X**., Gao, T., Subramanian, D., & Bennett, K. P. Match2: hybrid self-organizing map and deep learning strategies for treatment effect estimation. *ACM Conference on Bioinformatics, Computational Biology, and Health Informatics* (***Best Student Paper Award*****),** 2021**.**

- Gao, T., Subramanian, D., Bhattacharjya, D., **Shou, X**., Mattei, N., & Bennett, K. Causal Inference for Event Pairs in Multivariate Point Processes. *NeurIPS*, 2021.
- Mavroudeas, G., Neehal, N., **Shou, X.,** Magdon-Ismail, M., Kuruzovich, J., and Bennett K. P. Predictive Modeling for Complex Care Management. *IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, 2021.
- **Shou, X.,** Mavroudeas, G., Magdon-Ismail, M., Figueroa, J., Kuruzovich, J. N., & Bennett, K. P. Supervised mixture of expert models for population health. *Methods*, *179*, 101-110, 2020.
- Mavroudeas, G., Magdon-Ismail M., **Shou, X.,** and Bennett K. P. HMM-Boost: Improved Time Series State Prediction Via Supervised Hidden Markov Models: Case Studies in Epileptic Seizure and Complex Care Management.
    - Workshop on Data Mining in Biomedical Informatics and Healthcare 2022 (ICDM-DMBIH'22).
    - IEEE International Conference on Knowledge Graph (ICKG), 2022.
- **Shou, X**., Gao, T., Subramanian, D., Bhattacharjya, D. & Bennett, K. P. Multi-Label Event Prediction in Continuous Time. AAAI 23. (**Oral Presentation**)
- Bhattacharjya D., Gao T., Subramanian, D., & **Shou, X**. Score-Based Learning of Graphical Event Models with Background Knowledge Augmentation. AAAI 23.
- **Shou, X**., Gao, T., Subramanian, D., Bhattacharjya, D. & Bennett, K. P. Influence-Aware Attention for Multi-dimensional Temporal Point Process. CLeaR 23 (Causal Learning and Reasoning).
- **Shou, X**., Bhattacharjya, D. Gao, T., Subramanian, D., Hassanzadeh, O., & Bennett, K. P. Probabilistic Attention-to-Influence Neural Models for Event Sequences. ICML 23.

Manuscripts In Preparation

- **Shou, X**., Subramanian, D., Bhattacharjya, D., Gao, T. & Bennett, K. P. Event-former: A Self-supervised Learning Paradigm for Temporal Point Processes. Under review at NeurIPS 23.
- **Shou, X**., Gao, T, Subramanian, D., Bhattacharjya, D., Hassanzadeh, O. & Bennett, K. P. Pairwise Causality Guided Transformers for Event Sequences. Under review at NeurIPS 23.

Presentations

- ACM BCB 21: Match2: hybrid self-organizing map and deep learning strategies for treatment effect estimation. Virtual presentation, August 3, 2021.
- IBM RPI AIRC scholarly presentation: Learning and Causal Inference in Marked Temporal Point Processes. Virtual event. November 18, 2022.
- IBM RPI AIRC Fall Workshop Poster Presentation: Neural Temporal Point Processes - A Self-Supervised Learning Paradigm. IBM Yorktown Heights Research Center, November 16, 2022.
- RPI CS Poster Presentation: Event-former: A Self-supervised Learning Paradigm for Temporal Point Processes, Rensselaer Polytechnic Institute, December 2, 2022.
- IDEA Community Talk: Learning and Inference of Temporal Event Sequences. Rensselaer Polytechnic Institute, January 31, 2023.
- AAAI 23 Oral: Multi-Label Event Prediction in Continuous Time. Washington DC. February 7-14, 2023.
- CLeaR 23: Influence-Aware Attention for Multi-dimensional Temporal Point Process. Tübingen, Germany April 11-14, 2023
- IJCAI 23 Tutorial: Graphical Event Models. August 19-25, 2023.

Programming Languages

- Microsoft SQL, Python, C, C++, Pytorch, Tensorflow, R, Matlab, SAS, AMPL, Haskell, (Py)Spark

Patents

- Supervised Similarity Learning for Covariate Matching and Treatment Effect Estimation via Self-Organizing Maps
  patent application number: 17348492. publication date: 2022/12/15
  patent URL: https://patentimages.storage.googleapis.com/b3/99/e4/b89fc776201ac7/US20220398452A1.pdf

Professional Development

- Mentoring (Co-Mentor with Prof. Kristin P. Bennett)
    - Hannah Power (Accelerated BS/PhD, RPI) & Marguerite Demasi (Undergraduate, RPI)
      Project: Visualizing matched representations for causal inference via R shiny Fall 2021, RPI.
    - Aaron Green (PhD, RPI)
      Project: clustering event streams, Spring 2022, RPI.
- Conference Reviewing:
    - AMIA 22, AISTATS 23, NeurIPS 23