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Biography

I pursued my undergraduate study in the Applied Mathematics Department at South China University of Technology and got my bachelor's degree in 2005.

After that, I continued my postgraduate study in the Computer Science Department at the same university and got my Ph. D in 2010.

I was a visiting student at the National University of Singapore in 2007-2009.

I was a Postdoc Researcher at Advanced Digital Sciences Center (University of Illinois at Urbana-Champaign's Research Center in Singapore) in 07/2013-07/2014.

Research Interests

My research interests focus on causal discovery, causality-related learning, and their applications to social science, bioinformatics, and industries.

Selected Publications

2022

- **Ruichu Cai**, Liting Huang, Wei Chen, Jie Qiao, Zhifeng Hao. Learning dynamic causal mechanisms from non-stationary data. Applied Intelligence, 2022: 1-12

- **Ruichu Cai**, Siyu Wu, Jie Qiao, Zhifeng Hao, Keli Zhang, Xi Zhang. THP: Topological Hawkes Processes for Learning Causal Structure on Event Sequences. IEEE Transactions on Neural Networks and Learning Systems, 2022

- **Ruichu Cai**, Zhaolong Lin, Wei Chen, Zhifeng Hao. Shared state space model for background information extraction and time series prediction. Neurocomputing, 2022: 468: 85-96

- **Ruichu Cai**, Fengzhu Wu, Zijian Li, Jie Qiao, Wei Chen, Yuexing Hao, Hao Gu. REST: Debiased Social Recommendation via Reconstructing Exposure Strategies. IEEE Ttransactions on neural networks and learning systems, 2022

- Zijian Li, **Ruichu Cai**, Jiawei Chen, Yuguan Yan, Wei Chen, Keli Zhang, Junjian Ye. Time-Series Domain Adaptation via Sparse Associative Structure Alignment: Learning Invariance and Variance. AAAI 2022

- Zijian Li, **Ruichu Cai**, Jiawei Chen, Yuguan Yan, Wei Chen, Keli Zhang, Junjian Ye. Time-Series Domain Adaptation via Sparse Associative Structure Alignment: Learning Invariance and Variance. AAAI 2022

2021

- **Ruichu Cai**, Jiawei Chen, Zijian Li, Wen Chen, Keli Zhang, Junjian Ye, Zhuozhang Li, Xiaoyan Yang, Zhenjie Zhang. Time Series Domain Adaptation via Sparse Associative Structure Alignment, AAAI 2021 [code]

- **Ruichu Cai#**, Hao Zhang#, Wen Liu#, Shenghua Gao, Zhifeng Hao. Appearance-Motion Memory Consistency Network for Video Anomaly Detection, AAAI 2021.

- **Ruichu Cai**, Jinjie Yuan, Boyan Xu, Zhifeng Hao. SADGA: Structure-Aware Dual Graph Aggregation Network for Text-to-SQL. NeurIPS 2021

- **Ruichu CAI**, Yiming BAI, Jie QIAO, Zhifeng HAO. Causal inference method based on confounder hidden compact representation model. Journal of Computer Applications, 2021: 41(10): 2793

- **Ruichu Cai**, Weilin Chen, Jie Qiao, Zhifeng Hao. On the Role of Entropy-based Loss for Learning Causal Structures with Continuous Optimization. IEEE Ttransactions on neural networks and learning systems, 2021

- Zijian Li, **Ruichu Cai**, Tom ZJ Fu, Kun Zhang. Transferable Time-Series Forecasting under Causal Conditional Shift. AAAI 2021 (CCF A 类)

- Jie Qiao, **Ruichu Cai#**, Kun Zhang, Zhenjie Zhang, Zhifeng Hao. Causal Discovery with Confounding Cascade Nonlinear Additive Noise Models. ACM Transactions on Intelligent Systems and Technology (TIST), 2021: 12 (6): 1-28

- Zhifeng Hao, Di Wu, Yuan Fang#, Min Wu#, **Ruichu Cai#**, and Xiaoli Li. Prediction of Synthetic Lethal Interactions in Human Cancers Using Multi-View Graph Auto-Encoder. IEEE Journal Biomedicine Health Informatics, 2021: 25(10): 4041-4051

- Wei Chen, **Ruichu Cai**, Kun Zhang, Zhifeng Hao. Causal Discovery in Linear Non-Gaussian Acyclic Model with Multiple Latent Confounders. IEEE Transactions on Neural Networks and Learning Systems, 2021

- Zijian Li, **Ruichu Cai**, Hongwei Ng, Marianne Winslett, Tom Z. J. Fu, Boyan Xu, Xiaoyan Yang, Zhenjie Zhang. Causal Mechanism Transfer Network for Time Series Domain Adaptation

in Mechanical Systems[J]. ACM Transactions on Intelligent Systems and Technology, 2021: 12 (2): 1-21

- Zhifeng Hao, Di Lv, Zijian Li, **Ruichu Cai**, Wen Wen, Boyan Xu. Semi-Supervised Disentangled Framework for Transferable Named Entity Recognition. Neural Networks, 2021 [code]

2020

- **Ruichu Cai**, Kaibin Guo, Boyan Xu, Xiaoyan Yang, Zhenjie Zhang. Meta Multi-Task Learning for Speech Emotion Recognition. INTERSPEECH, 2020

- **Ruichu Cai**, Zhihao Liang, Boyan Xu, zijian li, Yao Chen and Yuexing Hao. TAG: Type Auxiliary Guiding for Code Comment Generation. ACL2020.

- **Ruichu Cai**, Jiahao Li, Zhenjie Zhang, Xiaoyan Yang, Zhifeng Hao. DACH: Domain Adaptation without Domain Information. IEEE Transactions on Neural Networks and Learning Systems, 2020:31(12):5055-5067.

- **Ruichu Cai**, Xuexin Chen, Yuan Fang, Min Wu, Yuexing Hao. Dual-Dropout Graph Convolutional Network for Predicting Synthetic Lethality in Human Cancers. Bioinformatics, 2020: 36(16): 4458–4465

- **Ruichu Cai,** Jincheng Ye, Jie Qiao, Huiyuan Fu, Zhifeng Hao. FOM: Fourth-Order Moment based Causal Direction Identification on the Heteroscedastic Data. Neural Networks, 2020, 124: 193-201

- Feng Xie#, **Ruichu** Cai#, Biwei Huang, Clark Glymour, Zhifeng Hao, Kun Zhang#. Generalized Independent Noise Condition for Estimating Linear Non-Gaussian Latent Variable Graphs. NeurIPS 2020 (CCF A 类)[code].

- Zhifeng Hao, Di Lv, Zijian Li, **Ruichu Cai**, Wen Wen, Boyan Xu. Semi-Supervised Disentangled Framework for Transferable Named Entity Recognition. Neural Networks, 2021

- Yan Zeng, Zhifeng Hao, **Ruichu Cai***(Corresponding Author), Liang Ou, Ruihui Huang. A Causal Discovery Algorithm Based on the Prior Selection of Leaf Nodes. Neural Networks, 2020: 124: 130-145

- Wei Chen, **Ruichu Cai***(Corresponding Author), Zhifeng Hao, Chang Yuan, Feng Xie. Mining hidden non-redundant causal relationships in online social networks. Neural Computing and Applications, 2020

2019 and prior

- **Ruichu Cai**, Feng Xie, Clark Glymour, Zhifeng Hao, Kun Zhang. Triad Constraints for Learning Causal Structure of Latent Variables. NeurIPS 2019 [pdf][code]

- **Ruichu Cai**, Jie Qiao, Kun Zhang, Zhenjie Zhang, Zhifeng Hao. Causal Discovery with Cascade Nonlinear Additive Noise Model. IJCAI 2019 [pdf][code]

- **Ruichu Cai**, Zijian Li, Pengfei Wei, Jie Qiao, Kun Zhang, Zhifeng Hao. Learning Disentangled Semantic Representation for Domain Adaptation. IJCAI 2019 [pdf][code]

- Biao Wu, Zhifeng Hao, Wen Wen, **Ruichu Cai**. Multi-context aware user-item embedding for recommendation. Neural Networks, 2019

- Zhifeng Hao, Biao Wu, Wen Wen, **Ruichu Cai**. A subgraph-representation-based method for answering complex questions over knowledge bases. Neural Networks, 2019

- **Ruichu Cai**, Jie Qiao, Kun Zhang, Zhenjie Zhang, Zhifeng Hao. Causal Discovery on Discrete Data using Hidden Compact Representation. NIPS,2018.[code]

- **Ruichu Cai**, Jie Qiao, Kun Zhang, Zhenjie Zhang, Zhifeng Hao. Causal Inference from Discrete Data using Hidden Compact Representation. NeurIPS 2018

- Ruichu Cai, Boyan Xu, Xiaoyan Yang, Zhengjie Zhang, Zijian Li, Zhihao Liang. An Encoder-Decoder Framework Translating Natural Language to Database Queries. IJCAI 2018

- **Ruichu Cai**, Jie Qiao, Zhenjie Zhang, Zhifeng Hao. SELF: Structural Equational Embedded Likelihood Framework for Causal Discovery. AAAI,2018.[code]

- Li Wang, **Ruichu Cai**, Tom Z. J. Fu, Jiong He, Zijie Lu, Marianne Winslett, Zhenjie Zhang. Waterwheel: Realtime Indexing and Temporal Range Query Processing over Massive Data Streams. ICDE 2018

- **Ruichu cai**, Zhenjie Zhang, Zhifeng Hao, Marianne Winslett. Sophisticated Merging over Random Partitions: A Scalable and Robust Causal Discovery Approach. IEEE Transactions on Neural Networks and Learning Systems,2017

- **Ruichu Cai**, Zijie Lu, Li Wang, Zhenjie Zhang. DITIR: Distributed Index for High Throughput Trajectory Insertion and Real-time Temporal Range Query，PVLDB，2017 10（12）[video]

- **Ruichu Cai**, Mei Liu, Yong Hu , Brittany L. Melton, Michael E. Matheny,Hua Xu, Lian Duan, Lemuel R. Waitman. Identification of adverse drug-drug interactions through causal association rule discovery from spontaneous adverse event reports. Artificial Intelligence in Medicine 76 (2017) 7–15

- **Ruichu Cai**, Zhenjie Zhang, Zhifeng Hao, Marianne Winslett. Understanding Social Causalities Behind Human Action Sequences. IEEE Transactions on Neural Networks and Learning Systems. 2017，28（8）：1801-1813.

- Yiyang Yang, Zhiguo Gong, Qing Li, U Leong Hou, **Ruichu Cai**, Zhifeng Hao. A Robust Noise Resistant Algorithm for POI Identification from Flickr Data. IJCAI 2017

- **Ruichu Cai**,Zhenjie Zhang,Srinivasan Parthasarathy,Anthony K. H. Tung,Zhifeng Hao,Wen Zhang.Multi-Domain Manifold Learning for Drug-Target Interaction Prediction.2016 SIAM International Conference on Data Mining.

- **Ruichu Cai**, Zhifeng Hao, Marianne Winslett, Xiaokui Xiao, Yin Yang, Zhenjie Zhang,Shuigeng Zhou. Deterministic Identification of Specific Individuals from GWAS Results[J]. Bioinformatics, 2015

- **Ruichu Cai**, Zhenjie Zhang, A K H Tung, et al. A general framework of hierarchical clustering and its applications[J]. Information Sciences, 2014: 272, 29-48

- Mei Liu, **Ruichu Cai** (co-first author), Yong Hu, Michael E Matheny, Jingchun Sun, Jun Hu, Hua Xu. Determining molecular predictors of adverse drug reactions with causality analysis based on structure learning, Journal of the American Medical Informatics Association, 2013

- **Ruichu Cai**, Zhenjie Zhang, Zhifeng Hao. SADA: A General Framework to Support Robust Causation Discovery, ICML 2013

- **Ruichu Cai**, Zhenjie Zhang, Zhifeng Hao. Causal Gene Identification Using Combinatorial V-Structure Search, Neural Networks. 2013;43:63-71

- **Ruichu Cai**, Zhifeng Hao, Wen Wen, Lijuan Wang. Regularized Gaussian Mixture Model Based Discretization for Gene Expression Data Association Mining, Applied Intelligence. 2013; 39:607–613

- **Ruichu Cai**, Zhenjie Zhang, Zhifeng Hao. BASSUM:A Bayesian semi-supervised method for classification feature selection,Pattern Recognition. 2011;44(4):811-820(SCI:711BV)[bibtex]

- **Ruichu Cai**, Tung K.H. Anthony, Zhifeng Hao, Zhenjie Zhang. What is Unequal among the Equals? Ranking Equivalent Rules from Gene Expression Data. IEEE Transactions on Knowledge and Data Engineering. 2011;23(11):1735-1747(SCI:824CX)[bibtex]

- **Ruichu Cai**, Zhifeng Hao, Xiaowei Yang, Han Huang. A New Hybrid Method for Gene Selection. Pattern Analysis and Application.2010;14(1):1-8.(SCI)[bibtex]

- **Ruichu Cai**, Zhifeng Hao. Kernel Based Gene Expression Pattern Discovery and Its Application on Cancer Classification. Neurocomputing. 2010; 73(13-15):2562-2570(SCI) [bibtex]

- **Ruichu Cai**, Zhifeng Hao, Xiaowei Yang,Wen Wen. An efficient gene selection algorithm based on mutual information. Neurocomputing. 2009; 72(4-6):991-999.(SCI)[bibtex]

- Zhenjie Zhang, Yin Yang, **Ruichu Cai**, etc. Kernel-Based Skyline Cardinality Estimation, SIGMOD conference. 2009: 509-522 (EI) [bibtex]

- **Ruichu Cai**, Zhifeng Hao, Wen Wen. A Novel Gene Ranking Algorithm Based on Random Subspace Method. International Joint Conference on Neural Networks. 2007:219-223 (EI)[bibtex]

- Zhifeng Hao, **Ruichu Cai**, Han Huang. An Adaptive Parameter Control strategy for ACO. International Conference on Machine Learning and Cybernetics. 2006: 203-206 (EI)

- 蔡瑞初, 陈薇, 张坤, 郝志峰. 基于非时序观察数据的因果关系发现综述[J]. 计算机学报, 2017, 40(6): 1470-1490.

- 蔡瑞初, 谢伟浩, 郝志峰, 王丽娟, 温 雯. 基于多尺度时间递归神经网络的人群异常检测[J]. 软件学报, 2015, 26(11): 2884–2896

Professional Activities

- Senior PC: AAAI 2019-2021, IJCAI 2019-2021

- PC: AAAI 2015-2019, IJCAI 2018-2019, NIPS 2016-2018, ICML 2015-2018, AISTATS 2016-2019, ICLR 2018-2019 SIGKDD Workshop on Causal Discovery 2016-2018

- Publication Co-Chair: APWEB 2015

- Reviewer: TNNLS, TKDE, TIST, Neural Network, Pattern Recognition, Bioinformatics, Neurocomputing, Information Sciences, National Science Review, Plos ONE, Science China-Information Sciences

Funding

- Causal discovery on high dimensional data and applications (09/2019-12/2020), supported by Huawei

- Causality related network embedding (06/2020-06/2021), supported by Wechat

- Public user profile based causal recommendation (05/2017-05/2019), supported by Vipshop

- Research on Causal Mechanism and Methods of Nonstationary Social Network User Behaviors (01/2019-12/2022), supported by Natural Science Foundation of China :

- Causal Discovery on High Dimensional Data: Theory and Applications (01/2015-12/2018)，supported by Guangdong Natural Science Funds for Distinguished Young Scholar：

- Causal Inference on High Dimensional Incomplete Observational Data and Its Applications (finished)，supported by Natural Science Foundation of China

- Public Opinion Mining System For Enterprise Decision (finished) ，supported by Science and Technology Plan Project of Guangzhou City

- Research on Causal Inference Based Disease-Causal Gene Discovery (finished)，supported by Natural Science Foundation of China

Links

- Github: https://github.com/DMIRLAB-Group/

- Homepage: https://dmir.gdut.edu.cn/