

Tong Wang

tong-wang@uiowa.edu
(+1)617-851-5681
biz.uiowa.edu/tongwang/
Google Scholar

EMPLOYMENT	University of Iowa Department of Business Analytics, Tippie College of Business Affiliated with the Applied Mathematical and Computational Sciences <i>Assistant Professor</i>	2016 - PRESENT
EDUCATION	Massachusetts Institute of Technology Ph.D. in Computer Science Advisor: Cynthia Rudin	2012 - 2016
	Massachusetts Institute of Technology M.S. in Electrical Engineering and Computer Science	2010 - 2012
	Beijing University of Posts and Telecommunications B.S. in Electrical Engineering with <i>Highest Distinction</i>	2006 - 2010
RESEARCH OVERVIEW	I work on two types of research. 1) I develop new interpretable machine learning models that enable human understanding of the decision-making processes. 2) I use machine learning methods to solve business problems, understand phenomena, or discover insights.	
PUBLICATIONS	[ML]: MACHINE LEARNING METHODS [BA]: BUSINESS APPLICATIONS [SG]: SOCIAL GOOD (CRIMINAL JUSTICE, HEALTHCARE, SERVICE, ETC)	
PREPRINTS	<p>[U1]. Leveraging Algorithm Discretion in AI-Advised Teams [ML][BA][SG] Nicholas Wolczynski, Maytal Saar-Tsechansky⁺, Tong Wang⁺ (⁺ Equal Contribution) Under Review</p> <p>[U2]. PIE – A Partially Interpretable Model with Black-box Refinement [ML] Tong Wang, Yunyi Li, Jingyi Yang, Boxiang Wang Under Review</p> <p>[U3]. Can Your Toothpaste Shopping Predict Mutual Fund Purchasing? Transferring Knowledge from Consumer Goods to Financial Products via Machine Learning [ML][BA] Shenghao Wang[†], Tong Wang, Cheng He and Yu Jeffrey Hu ([†] student under my supervision) Under Review</p> <p>[U4]. Interpretable Text Classification Via Prototype Trajectory [ML] Dat Hong[†], Stephen Baek, Tong Wang[*] ([†] student under my supervision; [*]corresponding author) Under Review</p> <p>[U5]. Making Early and Accurate Deep Learning Predictions to Help Disadvantaged Individuals in Medical Crowdfunding [BA][ML][SG] Tong Wang, Fujie Jin, Yuan Cheng, Yu Hu Under Review</p>	

- [U6]. Augmented Fairness: An Interpretable Model Augmenting Decision-Makers' Fairness
Tong Wang, Maytal Saar-Tsechansky
Best Paper Award at 2020 INFORMS Workshop on Data Science

PUBLISHED

MACHINE LEARNING CONFERENCE AND JOURNAL PUBLICATIONS

- [C1]. ProtoX – Explaining a Reinforcement Learning Agent via Prototyping [\[ML\]](#)
 Ronilo Ragodos[†], **Tong Wang**^{*}, Qihang Lin, Xun Zhou
 († student under my supervision; *corresponding author)
 NeurIPS – *Conference on Neural Information Processing Systems*, 2022
- [C2]. AdaAX - Explaining Recurrent Neural Networks by Learning Automata with Adaptive States [\[ML\]](#)
 Dat Hong[†], Alberto Maria Segre, **Tong Wang**^{*}
 († student under my supervision; *corresponding author)
 KDD – *SIGKDD Conference on Knowledge Discovery and Data Mining*, 2022
- [J1]. Hybrid Predictive Model: When an Interpretable Model Collaborates with a Black-box Model [\[ML\]](#)
Tong Wang, Qihang Lin
 JMLR – *Journal of Machine Learning Research*, 2021
Finalist, Best Paper Award at INFORMS Workshop on Data Mining & Decision Analytics, 2018.
- [C3]. Transparency Promotion with Model-Agnostic Linear Competitors [\[ML\]](#)
 Hassan Rafique, **Tong Wang**^{*}, Qihang Lin, Arshia Sighani
 (* corresponding author)
 ICML – *International Conference on Machine Learning*, 2020
Runner-up of Best Paper Awards at INFORMS Workshop on Data Science, 2019
- [C4]. Interpretable Companions for Black-box Classifiers [\[ML\]](#)
 Danqing Pan, **Tong Wang**, Satoshi Hara
 AISTATS - *International Conference on Artificial Intelligence and Statistics*, 2020
- [C5]. Gaining Free or Low-Cost Interpretability with Interpretable Partial Substitute [\[ML\]](#)
Tong Wang
 ICML - *International Conference on Machine Learning*, 2019
- [C6]. Multi-value Rule Sets for Interpretable Classification with Feature-Efficient Representations [\[ML\]](#)
Tong Wang
 NeurIPS - *Conference on Neural Information Processing Systems*, 2018
- [J2]. A Bayesian Framework for Learning Rule Sets for Interpretable Classification [\[ML\]](#)
Tong Wang, Cynthia Rudin, Finale Doshi-Velez, Yimin Liu, Erica Klampfl, Perry MacNeille
 JMLR - *Journal of Machine Learning Research*, 2017
- [C7]. Bayesian Rule Sets for Interpretable Classification [\[ML\]](#)
Tong Wang, Cynthia Rudin, Finale Doshi-Velez, Yimin Liu, Erica Klampfl, Perry MacNeille
 ICDM – *The IEEE International Conference on Data Mining*, 2016
- [J3]. Finding Patterns with a Rotten Core: Data Mining for Crime Series with Core Sets [\[ML\]](#)[\[SG\]](#)
Tong Wang, Cynthia Rudin, Daniel Wagner, Rich Sevieri
Big Data, 2015
The Second Place for the INFORMS “Doing Good with Good OR” Award, 2015
- [C8]. Learning to Detect Patterns of Crime [\[ML\]](#)[\[SG\]](#)
Tong Wang, Cynthia Rudin, Daniel Wagner, Rich Sevieri
 ECML/PKDD - *the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases*, 2013

Ideas from this paper were adopted by the New York Police Department and are running live in their Domain Awareness System (see article). Media coverage on WIRED, Boston Globe, etc

BUSINESS JOURNAL PUBLICATIONS

- [J4]. Same-Day Delivery with Fair Customer Service [ML][BA][SG]
Xinwei Chen, **Tong Wang**, Barrett Thomas, Marlin W. Ulmer
EJOR - *European Journal on Operational Research*, 2022
- [J5]. Disjunctive Rule Lists [ML]
Ronilo Ragodos[†], **Tong Wang***
([†] student under my supervision, *corresponding author)
IJOC - *INFORMS Journal on Computing*, 2022
- [J6]. Paralanguage Classifier (PARA): An Algorithm for Automatic Coding of Paralinguistic Nonverbal Parts of Speech in Text [ML][BA]
Andrea Luangrath, Yixiang Xu, **Tong Wang**
JMR - *Journal of Marketing Research*, 2022
- [J7]. Causal Rule Sets for Identifying Subgroups with Enhanced Treatment Effect [ML]
Tong Wang, Cynthia Rudin
IJOC – *INFORMS Journal on Computing*, 2022
- [J8]. Evaluating the Effectiveness of Marketing Campaigns for Malls Using A Novel Interpretable Machine Learning Model [ML][BA]
Tong Wang, Cheng He, Fujie Jin, Yu Jeffrey Hu
ISR – *Information Systems Research*, 2021
- [J9]. A Holistic Approach to Interpretability in Financial Lending: Models, Visualizations, and Summary-Explanations [ML][BA]
Chaofan Chen, Kangcheng Lin, Cynthia Rudin, Yaron Shaposhnik, Sijia Wang, **Tong Wang**
(Author names are listed alphabetically)
DSS – *Decision Support Systems*, 2021
Winner of FICO Recognition Award in FICO xML Challenge, 2018

ARTICLES IN HEALTHCARE AND SOCIOLOGY JOURNALS

- [J10]. Dental Anomaly Detection Using Intraoral Photos Via Deep Learning [ML][SG]
Ronilo Ragodos[†], **Tong Wang***, George L. Wehby, Seth M. Weinberg, Deborah V. Dawson, Mary L. Marazita, Lina M. Moreno Uribe, Brian J. Howe*
([†] student under my supervision, *Co-Corresponding Authors)
Nature Scientific Reports, 2022
- [J11]. Humans in the Loop: Priors and Missingness on the Road to Prediction [ML][SG]
Anna Filippova, Connor Gilroy, Ridhi Kashyap, Antje Kirchner, Allison C. Morgan, Kivan Polimis, Adaner Usmani, **Tong Wang**
(Author names are listed alphabetically)
Socius, 2019
- [J12]. Prevalence and Predictors of C. Difficile Infections in Those Who Had Major Surgical Procedures in USA: Analysis Using the Traditional and Machine Learning Methods [ML][SG]
VeeraJalandhar Allareddy, **Tong Wang**, Sankeerth Rampa, Jennifer Caplin, Romesh P Nalliah, Aditya Badheka, Veerasathpurush Allareddy
American Journal of Surgery, 2018

OTHER PUBLICATIONS

- [W1]. Next Hit Predictor - Self-exciting Risk Modeling for Predicting Next Locations of Serial Crimes [ML][SG]
Yunyi Li[†], **Tong Wang**
([†] student under my supervision)
NeurIPS Workshop on AI for Social Good, 2018
- [W2]. Interpretable Patient Mortality Prediction with Multi-value Rule Sets [ML][SG]
Tong Wang, Veerajalandhar Allareddy, Sankeerth Rampa, Veerasathpurush Allareddy
KDD Workshop on Machine Learning for Medicine and Healthcare, 2018
- [W3]. Detecting Patterns of Crime with Series Finder [ML][SG]
Tong Wang, Cynthia Rudin, Daniel Wagner, Rich Sevieri
AAAI Late Breaking Track - Twenty-Seventh AAAI Conference on Artificial Intelligence, 2013
- [C9]. Network Coded Storage with Multi-Resolution Codes
Ulric J. Ferner, **Tong Wang**, Muriel Medard
Asilomar Conference on Signals, Systems, and Computers, 2013
- [C10]. Joint Design of Multi-Resolution Codes and Intra/Inter-Layer Network Coding
Tong Wang, Muriel Medard, Lizhong Zheng,
Asilomar Conference on Signals, Systems, and Computers, 2012
- [J13]. On the Design of Network Coding for Multiple Two Way Relaying Channels
Zhiguo Ding, **Tong Wang**, Mugen Peng, Wenbo Wang
TWC – IEEE Transactions on Wireless Communications, 2011

PATENT Medard, M., Ferner, U., and Wang, T., “Network Coded Storage With Multi-Resolution Codes”, US Patent App. 13/965,721. 2017.

SELECTED
PRESENTATIONS
AT BUSINESS
CONFERENCES

- Can Your Toothpaste Shopping Predict Mutual Fund Purchasing? Transferring Knowledge from Consumer Goods to Financial Products via Machine Learning
Shenghao Wang, **Tong Wang**, Cheng He and Yu Jeffrey Hu
 - SCECR - *Symposium on Statistical Challenges in Electronic Commerce Research*, 2022
 - ISMS *Marketing Science Conference*, 2022
 - CIST - *Conference on Information Systems and Technology*, 2021
- Picture Perfect: How Image Features Influence Herding Behavior in Medical Crowdfunding
Fujie Jin, Junho Yoon, **Tong Wang** (equal contributions)
SCECR - Symposium on Statistical Challenges in Electronic Commerce Research, 2022
- The Causal Impact of Mall Entry on Incumbents: Substitution, Agglomeration and the Key Role of Mall Positioning
Lu Feng, Keyan Zhu, Cheng He, **Tong Wang**, Yu Jeffrey Hu
ISMS Marketing Science Conference, 2022
- Augmented Fairness: An Interpretable Model Augmenting Decision-Makers’ Fairness
Tong Wang, Maytal Saar-Tsechansky
INFORMS Workshop on Data Science, 2020
- Transparency Promotion with Model-Agnostic Linear Competitors
Hassan Rafique, **Tong Wang***, Qihang Lin
(* correponding author)
INFORMS Workshop on Data Science, 2019
- Does Having More Friends Reduce Cancer Risks? – Evidence from New Mobile-Based Health Data
Yuan Cheng, Yu Jeffrey Hu, Fujie Jin and **Tong Wang**
SCECR - Symposium on Statistical Challenges in Electronic Commerce Research, 2019

FUNDED RESEARCH	Interpretable Machine Learning for Assisting Electronic Chip Design, funded by InZone.AI, Jun - Aug, 2017; Jan - May, 2018 Should I Wait, Reduce Price, or Withdraw? Learning the Best Strategies for Selling a House in Iowa, Research Excellence Internal Grant, awarded by Tippie College of Business, April, 2019	
SELECTED AWARDS	Winner of the Best Paper Award at INFORMS Workshop on Data Science Runner-up for the Best Paper Awards at INFORMS Workshop on Data Science Research Excellence Award, Tippie College of Business, University of Iowa FICO Recognition Award, FICO Explainable Machine Learning Challenge Finalist for the Best Paper Awards at 13th INFORMS DM&DA Workshop Second place winner of "Doing Good with Good OR", INFORMS LinkedIn Intern Women in Tech Scholarship Presidential fellowship – Joan and Irwin Jacobs fellowship, MIT Best Bachelor Thesis Award, BUPT	Nov, 2020 Oct, 2019 2019 Dec, 2018 Nov, 2018 Nov, 2015 2014 2010 - 2011 2010
TEACHING EXPERIENCE	BAIS:3500 (Data Mining - Undergrad Level) BAIS:6070 (Data Science - MSBA Level) BAIS:7000 (Interpretable machine Learning - PhD Level)	
INDUSTRY EXPERIENCE	LinkedIn , Mountain View, CA <i>Data Science Intern at Search, Network and Analysis Team</i> Groupon , Palo Alto, CA <i>Data Science Intern at Merchant Engineering Team</i>	<i>Jun - Aug, 2014</i> <i>Jun - Aug, 2013</i>
STUDENTS	Shenghao Wang, PhD Candidate in Business Analytics Ronilo Ragodos, PhD Candidate in Business Analytics Dat Hong, PhD Candidate in Computer Science	
ACADEMIC SERVICES	GRANT REVIEW National Science Foundation Panelist ORGANIZING ROLES Cluster chair for Making Sense of AI Cluster, INFORMS Annual Meeting Web chair for Workshop on Information Technologies and Systems Co-chair for 2019 INFORMS Workshop on Data Mining and Analytics Chair for Data Mining Best Paper Competition, INFORMS Council member for Data Mining Section, INFORMS, Session chairs at INFORMS	2019 and 2021 2022 2021 2019 2017, 2018 2016 - 2018 2016 - 2022
	REVIEW SERVICE COMPUTER SCIENCE CONFERENCES AND JOURNALS Area Chair for FAccT Reviewer for JMLR, NeurIPS, ICML, ICLR, AISTATS, AAAI, IJCAI, FATML, TKDE, Machine Learning Journal, etc BUSINESS JOURNALS Associate Editor, INFORMS Journal on Computing Reviewer for Management Science, Information Systems Research, MIS Quarterly, Manufacturing & Service Operations Management, Production and Operations Management	2023 2023 - present