

# Tong Wang

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Google Scholar

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- EMPLOYMENT**      **University of Iowa**      *Aug, 2016 - PRESENT*  
Department of Business Analytics, Tippie College of Business  
Affiliated with the Applied Mathematical and Computational Sciences  
*Assistant Professor*
- EDUCATION**      **Massachusetts Institute of Technology**      *2012 - 2016*  
Ph.D. in Electrical Engineering and Computer Science  
Advisor: Cynthia Rudin
- Massachusetts Institute of Technology**      *2010 - 2012*  
M.S. in Electrical Engineering and Computer Science
- Beijing University of Posts and Telecommunications**      *2006 - 2010*  
B.S. in Electrical Engineering with *Highest Distinction*
- 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**      [U1]. Leveraging Algorithm Discretion in AI-Advised Teams **[ML][BA][SG]**  
                         Nicholas Wolczynski, Maytal Saar-Tsechansky<sup>+</sup>, **Tong Wang**<sup>+</sup>  
                         (+ Equal Contribution)  
                         Under Review
- [U2]. PIE – A Partially Interpretable Model with Black-box Refinement **[ML]**  
                         **Tong Wang**, Yunyi Li, Jingyi Yang, Boxiang Wang  
                         Under Review
- [U3]. Can Your Toothpaste Shopping Predict Mutual Fund Purchasing? – Transferring Knowledge from Consumer Goods to Financial Products via Machine Learning **[ML][BA]**  
                         Shenghao Wang<sup>†</sup>, **Tong Wang**, Cheng He and Yu Jeffrey Hu  
                         († student under my supervision)  
                         Under Review
- [U4]. Interpretable Text Classification Via Prototype Trajectory **[ML]**  
                         Dat Hong<sup>†</sup>, Stephen Baek, **Tong Wang**<sup>\*</sup>  
                         († student under my supervision; \*corresponding author)  
                         Under Review
- [U5]. Augmented Fairness: An Interpretable Model Augmenting Decision-Makers' Fairness  
                         **Tong Wang**, Maytal Saar-Tsechansky  
                         **Best Paper Award at 2020 INFORMS Workshop on Data Science**

- [C1]. Explaining a Reinforcement Learning Agent via Prototyping [ML]  
 Ronilo Ragodos<sup>†</sup>, **Tong Wang**<sup>\*</sup>, Qihang Lin, Xun Zhou  
 († student under my supervision; \*corresponding author)  
 NeurIPS – *Conference on Neural Information Processing Systems*, 2022
- [C2]. Explaining Recurrent Neural Networks by Learning Automata with Adaptive States [ML]  
 Dat Hong<sup>†</sup>, Alberto Maria Segre, **Tong Wang**<sup>\*</sup>  
 († 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**<sup>\*</sup>, 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**

- [J4]. Same-Day Delivery with Fair Customer Service [ML][BA][SG]  
Xinwei Chen, **Tong Wang**, Barrett Thomas, Marlin W. Ulmer  
*European Journal on Operations Research*, 2022
- [J5]. Disjunctive Rule Lists [ML]  
Ronilo Ragodos<sup>†</sup>, **Tong Wang**\*  
(<sup>†</sup> 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<sup>†</sup>, **Tong Wang**\*, George L. Wehby, Seth M. Weinberg, Deborah V. Dawson, Mary L. Marazita, Lina M. Moreno Uribe, Brian J. Howe\*  
(<sup>†</sup> 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<sup>†</sup>, **Tong Wang**  
(<sup>†</sup> 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	Nov, 2020
	Runner-up for the Best Paper Awards at INFORMS Workshop on Data Science	Oct, 2019
	Research Excellence Award, Tippie College of Business, University of Iowa	2019
	FICO Recognition Award, FICO Explainable Machine Learning Challenge	Dec, 2018
	Finalist for the Best Paper Awards at 13th INFORMS DM&DA Workshop	Nov, 2018
	Second place winner of "Doing Good with Good OR", INFORMS	Nov, 2015
	LinkedIn Intern Women in Tech Scholarship	2014
	Presidential fellowship – Joan and Irwin Jacobs fellowship, MIT	2010 - 2011
	Best Bachelor Thesis Award, BUPT	2010
TEACHING EXPERIENCE	BAIS:3500 (Data Mining - Undergrad Level)	
	BAIS:6070 (Data Science - MSBA Level)	
	BAIS:7000 (Interpretable machine Learning - PhD Level)	
INDUSTRY EXPERIENCE	<b>LinkedIn</b> , Mountain View, CA	<i>Jun - Aug, 2014</i>
	<i>Data Science Intern at Search, Network and Analysis Team</i>	
	<b>Groupon</b> , Palo Alto, CA	<i>Jun - Aug, 2013</i>
	<i>Data Science Intern at Merchant Engineering Team</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	2019 and 2021
	ORGANIZING ROLES	
	Cluster chair for Making Sense of AI Cluster, INFORMS Annual Meeting	2022
	Web chair for Workshop on Information Technologies and Systems	2021
	Co-chair for 2019 INFORMS Workshop on Data Mining and Analytics	2019
	Chair for Data Mining Best Paper Competition, INFORMS	2017, 2018
	Council member for Data Mining Section, INFORMS,	2016 - 2018
	Session chairs at INFORMS	2016 - 2022
	REVIEW SERVICES	
	COMPUTER SCIENCE CONFERENCES AND JOURNALS	
	JMLR, NeurIPS, ICML, ICLR, AISTATS, AAI, IJCAI, FATML, TKDE, Machine Learning Journal, etc	
	BUSINESS JOURNALS	
	Management Science, Information Systems Research, MIS Quarterly, Manufacturing & Service Operations Management, Production and Operations Management, INFORMS Journal on Computing	