An Introduction to the Fairness in Machine Learning, Fundamental Concepts, and Real-World Examples

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Abstract

Machine learning algorithms have achieved dramatic progress nowadays, and are increasingly being deployed in high-stake applications, including employment, criminal justice, personalized medicine, etc. Nevertheless, fairness in machine learning remains a critical problem. Machine learning algorithms have the risk of amplifying societal stereotypes by over associating protected attributes, e.g., race and gender, with the prediction task. It may not only limit a person's opportunity that s/he is qualified, but also might further exacerbate social inequity.

This talk is to firstly introduce the fairness in machine learning with real-world examples and fundamental concepts. The speaker will then discuss fairness in machine learning from a computational perspective, including fairness categorization and measurement, interpretability for addressing fairness problems, detection and mitigation of model bias. At the end, the speaker will provide a concrete example to illustrate how to mitigate gender bias in an image captioning system with details.

Biography

Dr. Na Zou is currently an assistant professor in Engineering Technology and Industrial Distribution at Texas A&M University. She was an Instructional Assistant Professor in Industrial and Systems Engineering at Texas A&M University from 2016 to 2020. She holds both a Ph.D. in Industrial Engineering and a MSE in Civil, Environmental and Sustainable Engineering from Arizona State University. Her research focuses on interpretable machine learning, transfer learning, network modeling and inference, and brain informatics, supported by NSF and industrial sponsors. The research projects have resulted in publications at prestigious journals such as Technometrics, IISE Transactions and ACM Transactions, including one Best Paper Finalist and one Best Student Paper Finalist at INFORMS QSR section and two featured articles at ISE Magazine. She was the recipient of IEEE Irv Kaufman Award.