TOPIC	Understanding Data and Models Through Visualization
ORGANIZERS	Student Leadership Council and Faculty of ACIT Institute and TECHLAV Center
AREA	
SPEAKER	Cynthia Rudin
DATE	Friday November 20, 2020
TIME	3:00 – 4:00 P.M. (EST)
VENUE	WebEx video-conferencing
FEES	No Charge

SYNOPSIS

When you look carefully at data and models, you never know what you might find. In this talk, I will present several stories that provide interesting lessons for modern design of models, the ways we look into them, and sacrifices we might need to make when we try to look at high dimensional data. In particular:

Part 1: Interpretable Models don't need to be simple, particularly if you can co-design interpretable models with their visualizations. I will give two examples of machine learning models that are complex, but that are also interpretable because the important parts of their reasoning processes can be visualized: These examples are (1) an entry into the FICO Explainable Machine Learning Challenge, and (2) a deep neural network (ProtoPNet) that uses cased-based reasoning to explains how it classifies an image.

Part 2: When visualizing complex high dimensional data in lower dimensional spaces, there is a tradeoff between local and global structure preservation. Dimension reduction techniques, such as t-SNE, UMAP, and LargeVis, can be used as visualization tools for high-dimensional data. These methods aim to preserve as much structure as possible when transforming data from high-dimensions to low dimensions, but there is a fundamental tradeoff between the preservation of local and global structure. I will discuss some insights into how this tradeoff works, and present a new approach that has advantages in this tradeoff.

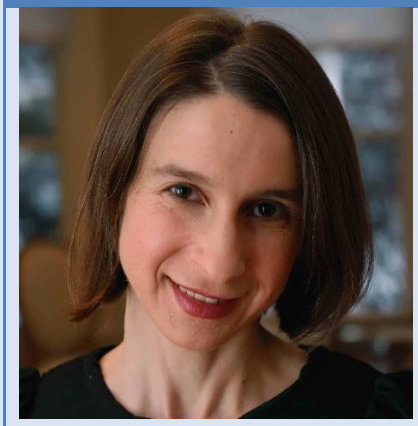
Papers I will discuss include:

This Looks Like That: Deep Learning for Interpretable Image Recognition. NeurIPS, 2019.
Chaofan Chen, Oscar Li, Alina Barnett, Jonathan Su, Cynthia Rudin
https://arxiv.org/abs/1806.10574

An Interpretable Model with Globally Consistent Explanations for Credit Risk. NIPS 2018 Workshop on Challenges and Opportunities for AI in Financial Services: the Impact of Fairness, Explainability, Accuracy, and Privacy, 2018.
Chaofan Chen, Kangcheng Lin, Cynthia Rudin, Yaron Shaposhnik, Sijia Wang, and Tong Wang
https://arxiv.org/abs/1811.12615

Understanding How Dimension Reduction Tools Work: An Empirical Approach to Deciphering t-SNE, UMAP, TriMAP, and PaCMAP for Data Visualization
Yingfan Wang, Haiyang Huang, Cynthia Rudin, and Yaron Shaposhnik
In Progress, 2020

ABOUT THE SPEAKER



Cynthia Rudin is a professor of computer science, electrical and computer engineering, and statistical science at Duke University. Previously, Prof. Rudin held positions at MIT, Columbia, and NYU. Her degrees are from the University at Buffalo and Princeton University. She is a three-time winner of the INFORMS Innovative Applications in Analytics Award, was named as one of the "Top 40 Under 40" by Poets and Quants in 2015, and was named by Businessinsider.com as one of the 12 most impressive professors at MIT in 2015. She has served on committees for INFORMS, the National Academies, the American Statistical Association, DARPA, the NIJ, and AAAI. She is a fellow of both the American Statistical Association and Institute of Mathematical Statistics. She is a Thomas Langford Lecturer at Duke University for 2019-2020.