PRINCETON ACM / IEEE-CS CHAPTERS
MAY 2023 JOINT MEETING

This Looks Like That: Interpretable Neural Networks for Medical Image Analysis

The use of deep neural networks has become increasingly popular for computer vision tasks. These models have the potential to achieve great accuracy in recognizing images, but they are often called "black boxes" because they generally suffer from a lack of *interpretability*. In fact, evidence has emerged, where some deep learning methods appeared to perform well, but based their decisions on confounding rather than truly relevant information.

This talk will focus on a neural network known as a prototypical part network (ProtoPNet). This network classifies an input image by comparing various parts of the image with learned features known as prototypes. In addition, the talk will show examples of medical image analysis using a prototypical case-based interpretable neural network model, with a focus on mammograms. Such an interpretable model will automatically detect areas of anomaly (such as spiculated mass margins) and present prototypical examples of similar anomalies found in other patients as explanations for their predictions. The talk will discuss training the neural network using a human-in-the-loop training scheme. Training is based on a small set of doctor-annotated images and is specifically designed to prevent the model from using confounding information. The explanations generated by our interpretable neural network for analyzing mammograms are useful because they augment the reports generated by radiologists, and this neural network may be able to assist doctors in diagnosing patients in the future.

Dr. Chaofan Chen is an Assistant Professor of Computer Science at the University of Maine. His research involves the design of interpretable machine learning models that can be understood ("interpreted") by human beings. In particular, Dr. Chen is interested in developing new techniques to enhance the interpretability and transparency of machine learning models, especially deep learning models, and in applying such techniques to healthcare, finance, and other application domains, where high-stakes decisions are made and interpretability is key for whether one can trust the predictions made by machine learning models.

Date: Thursday, May 18, 2023, 8:00pm EDT
Place: **ONLINE MEETING** – **registration required**
(no in-person meeting in May)
How to register:

- Send email to **PrincetonACM@gmail.com**
- OR Register on **Meetup.com**
(**http://meetup.com/IEEE-Princeton-Central-Jersey-Section**)

Information: Dennis Mancl (908) 285-1066
On-line info: **http://PrincetonACM.acm.org**

Note: the May 2023 Princeton ACM / IEEE-CS meeting will be "virtual" – no in-person meeting this month. To join the online, you must register in advance, and you will receive an email with instructions for how to connect to the talk.

All Princeton ACM / IEEE-CS meetings are open to the public. Students and their parents are welcome. There is no admission charge.