CIDSE Invited Talk with Chao Chen

Learning with Topological Information - Image Analysis and Label Noise

Friday, February 19, 2021

2:30–4 p.m.

Zoom https://asu.zoom.us/j/6337683868

Abstract

Modern machine learning faces new challenges. We are analyzing highly complex data with unknown noise. Topology provides novel structural information to model such data and noise. In this talk, we discuss two directions in which we are using topological information in the learning context. In image analysis, we propose a topological loss to segment and to generate images with not only per-pixel accuracy, but also topological accuracy. This is necessary in analysis of images of fine-scale biomedical structures such as neurons, vessels, etc. Extracting these structures with correct topology is essential for the success of downstream analysis. Meanwhile, we discuss how to use topological information to train classifiers robust to label noise. This is important in practice especially when we are using deep neural networks which tend to overfit noise. These results have been published in NeurIPS, ECCV, ICML and ICLR.

Bio

Dr. Chao Chen is an assistant professor at Stony Brook University. His research interest spans topological data analysis, machine learning and biomedical image analysis. He applies topological data analysis tools, such as persistent homology, to biomedical image analysis and to generic machine learning problems.

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