



Department of Computer Science

Advanced Operators for Graph Neural Networks

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Hosted by Senjuti Basu Roy

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Abstract: Graph structured data are ubiquitous in the real world such as social networks, molecular graphs, and emerging among a plethora of other diverse domains. Therefore, it is of great research importance to design advanced algorithms for representation learning on graph-structured data to facilitate improved predictions across numerous computational methods. Graph Neural Networks (GNNs), which generalize the deep neural network models to graph-structured data, pave a new way to effectively learn representations at both the graph and individual node level. I have significantly contributed to the fundamental research of GNNs by developing novel algorithms and practical research of GNNs by investigating their safety issues and real-world applications. In this talk, I will present two of my fundamental works contributing to the two key operations of GNNs: graph filtering operation and graph pooling operation. I will first present some commonly used graph filtering operations and then demonstrate how they can be observed from a unified graph signal denoising perspective. I will also introduce a graph pooling operation based on spectral graph theory, which helps GNNs learn better graph-level representations.

Bio: Yao Ma will be receiving his Ph.D. in Computer Science from Michigan State University (MSU) in Summer 2021. His research interests include network embedding and Graph Neural Networks (GNNs) for representation learning on graph-structured data. He has significantly contributed to the fundamental research and practical research of GNNs, which leads to numerous innovative works in top-tier conferences such as KDD, WWW, SIGIR, IJCAI, WSDM, ICDM, and SDM. He was the leading organizer and presenter of two well-received tutorials on GNNs at AAAI'2020 and KDD'2020, attracting more than 1000 attendees in total. His recent book *Deep Learning on Graphs* (https://cse.msu.edu/~mayao4/dlg_book/) has attracted tens of thousands of downloads from more than 100 countries. He received the Outstanding Graduate Student Award (2019-2020) from the College of Engineering at MSU.