Abstract:
Recently, there has been an increasing interest among machine learning researchers in topological approaches. Topological Data Analysis (TDA) is an emerging field that combines algebraic topology, statistics, and computer science to analyze data sampled from a metric space and recover the underlying topology. Our goal is to develop topology-based algorithms for graph machine learning tasks, with a specific emphasis on addressing the scalability issues that arise when working with large networks.

In this presentation, I will first introduce a new core decomposition algorithm that incorporates both edge and node features based on a topological approach. Next, I will discuss our ground-breaking work in scaling Persistent Homology, a powerful tool in TDA, to large networks using core decomposition. These approaches employ topology to create algorithms that are efficient and scalable for networks, opening new avenues for machine learning researchers to explore the topological and geometric structure of large networks.

Bio:
Cuneyt Gurcan Akcora is an assistant professor of computer science and statistics at the University of Manitoba in Canada. He received his Ph.D. from the University of Insubria, Italy. His research interests include data science on complex networks and large-scale graph analysis, with applications in social, biological, IoT, and blockchain networks. Akcora has been awarded a Fulbright Scholarship and has published his research in leading conferences and journals, including IEEEtran, KDD, NeurIPS, VLDB, ICDM, SDM, IJCAI, and ICDE.