Graph Learning: A Versatile Tool for Physics Simulations

Liping Liu, PhD
Department of Computer Science
Tufts University

In recent years, machine learning algorithms have significantly advanced physics simulations. One of the primary challenges in this field is enhancing computational efficiency. This requires the learning model to effectively utilize parallel computing and minimize unnecessary computations. Graph learning emerges as a versatile tool for achieving this goal. This talk will showcase two simulation models, one in fluid dynamics and the other in weather forecasting. For the first problem, we discretize irregular domains into graphs and apply a graph learning model to understand fluid dynamics. In the second problem, we demonstrate a method to reduce computation by sparsifying the graphs used in graph learning models. These two examples highlight the flexibility of graph learning and its strong performance in their respective tasks.

Dr Liping Liu completed his PhD at Oregon State University in 2016 and then worked as a postdoc researcher at Columbia University. He joined the Computer Science Department at Tufts University in 2017 as an assistant professor. He works in machine learning and has interests in probabilistic methods for graph data analysis and modeling problems arising from dynamic systems. His research on graph generation methods has won an NSF CAREER award.

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