Numerical Analysis and Scientific Computing Seminar

Nonlinear scientific computing in machine learning and applications

Wenrui Hao
Pennsylvania State University

Abstract: Machine learning has seen remarkable success in various fields such as image classification, speech recognition, and medical diagnosis. However, this success has also raised intriguing mathematical questions about optimizing algorithms more efficiently and applying machine-learning techniques to address complex mathematical problems. In this talk, I will discuss the neural network model from a nonlinear scientific computing perspective and present recent work on developing a homotopy training algorithm to train neural networks layer-by-layer and node-by-node. I will also showcase the use of neural network discretization for solving nonlinear partial differential equations. Finally, I will demonstrate how machine learning can be used to learn a mathematical model from clinical data in cases where the pathophysiology of a disease, such as Alzheimer's, is not well understood.

Thursday, February 29, 2024, 1:00 pm
MSC E300

Mathematics
Emory University