Partial Differential Equations Seminar

Title Operator learning methods for PDEs: finite element operator network

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Abstract

Partial differential equations (PDEs) underlie our understanding and prediction of natural phenomena across numerous fields, including physics, engineering, and finance. However, solving parametric PDEs is a complex task that necessitates efficient numerical methods. In this talk, I will introduce a novel approach for solving parametric PDEs using a Finite Element Operator Network (FEONet). The proposed method leverages the power of deep learning in conjunction with traditional numerical methods, specifically the finite element method, to solve parametric PDEs in the absence of any paired input-output training data. I will demonstrate the effectiveness of our approach on several benchmark problems and show that it outperforms existing state-of-the-art methods in terms of accuracy, generalization, and computational flexibility. The FEONet framework shows potential for application in various fields where PDEs play a crucial role in modeling complex domains with diverse boundary conditions and singular behavior. Furthermore, theoretical convergence analysis will be provided to support our approach, utilizing finite element approximation in numerical analysis.