PHYSICAL MATHEMATICS SEMINAR

Neural networks for interpretable physics discovery

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ABSTRACT:

A major challenge in the study of dynamical systems is that of model discovery: turning data into models that are not just predictive, but provide insight into the nature of the underlying dynamical system that generated the data and the best representation of an accompanying coordinate system. This problem is made more difficult by the fact that many systems of interest exhibit parametric dependencies and diverse behaviors across multiple time scales. We introduce a number of data-driven strategies for discovering nonlinear multiscale dynamical systems and their embeddings from data. We consider two canonical cases: (i) systems for which we have full measurements of the governing variables, and (ii) systems for which we have incomplete measurements. Our approaches provide a suite of mathematical strategies for reducing the data required to discover and model nonlinear multiscale systems, even in the presence of noise. Our discovery methods produce parsimonious, interpretable, and generalizable models, using neural networks for the core discovery process.

TUESDAY, OCTOBER 30, 2018
2:30 pm
Building 2, Room 136

Reception following in Building 2, Room 290
(Math Dept. Common Room)

http://math.mit.edu/seminars/pms/

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