LAUFER CENTER
FOR PHYSICAL AND QUANTITATIVE BIOLOGY

Seminar 2017

Playing Newton: Learning equations of motion from data

Arguably, science's goal of understanding nature can be formulated as inferring mathematical laws that govern natural systems from experimental data. With the fast growth of power of modern computers and of artificial intelligence algorithms, there has been a recent surge in attempts to automate this goal and to design, to some extent, an "artificial scientist." I will discuss this emerging field, but will focus primarily on our own approach to it. I will introduce an algorithm that we have recently developed, which allows one to infer the underlying dynamical equations behind a noisy time series, even if the dynamics are nonlinear, and only a few of the relevant variables are measured. I will illustrate the method on applications to toy problems, including inferring the iconic Newton's law of universal gravitation, as well as a few biochemical reaction networks. I will end with applications to experimental biological data: modeling the landscape of possible behavioral states underlying reflexive escape from pain in a roundworm and (if time permits) modeling insulin secretion in pancreatic beta cells.

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Friday December 8, 2017

2:30 PM Laufer Center 101

Host: Jin Wang

Refreshments: Hub 110 after seminar

Stony Brook University

For a disability related accommodation,
please call 631-632-5400