HEMI Seminar

AI for Materials

March 16th | 4 PM ET | MS Teams (link)

We will discuss learning (possibly physics informed) predictive laws at the macroscopic level from "big" data at the microscopic level (in this case, computational data that come from fine scale simulations). One example will involve e-coli swimming, modelled at the individual level, and the subsequent learning of macroscopic chemotactic closures. The second example will involve networks of coupled oscillators (and coupled neurons), and the discovery of "emergent spaces" in which useful collective models can then be learned (using tools like Gaussian Processes, Manifold Learning or (Deep) Neural Networks).

Felix Kemeth is a postdoctoral research at the Department of Chemical and Biomolecular Engineering at the Johns Hopkins University. His research focuses on learning dynamical models from data, in particular in the context of multiagent systems. Before joining the JHU, Felix Kemeth worked as an AI Strategist at the Fraunhofer Institute for Integrated Circuits, where he developed machine learning tools for automated electrocardiogram classification.

Yannis Kevrekidis is a Bloomberg Distinguished Professor in ChemBE, AMS and the Medical School. He was an undergraduate engineer in Greece; his graduate studies were in Chemical Engineering and Mathematics in Minnesota; he was a postdoc in Los Alamos when the Soviet Union still existed; and taught at Princeton for 31 years before joining JHU. His research interests have developed from (a) nonlinear dynamics, pattern formation and their scientific computation to (b) multiscale scientific computing algorithms (he developed the so-called equation-free/variable-free approach to multiscale computation) to (c) manifold learning and data driven modeling, returning in recent years to nonlinear identification using neural networks that we worked on in the 1990s. Recent interests include data fusion and transformation across different first principles, data driven, and physics informed models. Applications range from chemical and biochemical/cellular dynamics to materials design and transport.

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