PHYSICAL MATH SEMINAR

Dynestyx: A Probabilistic Programming Library for Dynamical Systems



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ABSTRACT:

State-space models (SSMs) are the standard formalism for Bayesian treatment of dynamical systems, with natural applications in statistics, signal processing, and machine learning. Despite their importance in both theory and application, dynamical systems have proven difficult to incorporate in modern probabilistic programming languages (PPLs), making state-of-the-art methods less accessible to practitioners and introducing friction in following the "Bayesian workflow." We introduce dynestyx, a probabilistic programming library with first-class support for SSMs, including state-of-the-art methods in the estimation of both states and parameters. Through a single, unified interface, users may specify arbitrary priors for discrete-time or continuous-time dynamical systems, perform inference over mixed-effect data, and make state and parameter estimates with principled uncertainty quantification. We discuss problems, applications, and opportunities that dynestyx introduces.

Tuesday, November 3, 2026

2:30 PM – 3:30 PM

Building 2, Room 449