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Maximally Informative Next Experiments for nonlinear models

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Title: Maximally Informative Next Experiments for nonlinear models

Abstract: Mathematical modeling is a powerful tool in systems biology; we focus here on improving the reliability of model predictions by reducing the uncertainty in model dynamics through experimental design. Model-based experimental design is a process by which experiments can be systematically chosen to reduce dynamic uncertainty in a given model. We discuss the Maximally Informative Next Experiment (MINE) method for experimental design and present a convergence result for MINE with nonlinear models. As an application, we illustrate the method on polynomial regression and an ODE model for immune system dynamics. The MINE criterion sequentially determines experiments that can be conducted to best refine model dynamics.