ABSTRACT

(i) I will discuss work on measuring uncertainty in parameter estimation for dynamical systems. I will present "prediction deviation," a new metric of uncertainty that determines the extent to which observed data have constrained the model's predictions. This is accomplished by solving an optimization problem that searches for a pair of models that each provide a good fit for the observed data, yet have maximally different predictions. We develop a method for estimating (a priori) the impact that additional experiments would have on the prediction deviation, allowing the experimenter to design a set of experiments that would most reduce uncertainty.

(ii) In retail, there are predictable yet dramatic time-dependent patterns in customer behavior, such as periodic changes in the number of visitors, or increases in visitors just before major holidays (e.g., Christmas). The current paradigm of multi-armed bandit analysis does not take these known patterns into account which means that despite the firm theoretical foundation of these methods, they are fundamentally flawed when it comes to real applications. This work provides a remedy that takes the time-dependent patterns into account.

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