

STATISTICS COLLOQUIUM

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TALK: 4:00 PM — SCIENCE CENTER RM. 705

“Stepwise Signal Extraction via Marginal Likelihood”

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ABSTRACT

Modern knowledge of molecular kinetics is often gained by studying the information extracted from stepwise signals obtained by fluorescence spectroscopy. In this talk, we propose a new method to estimate the number and locations of change-points in stepwise signal, as a special case of multiple change-point models. Our approach treats each possible set of change-points as a single model and uses marginal likelihood as model selection tool. Under an independence assumption of the parameters between successive change-points, the computational complexity of this approach is at most quadratic in the number of observations using a dynamic programming algorithm. The asymptotic properties of the marginal likelihood are studied as well. We further discuss the impact of the prior on the estimation and provide guidelines in choosing the prior. Detailed simulation study is then carried out to compare the effectiveness of this method with other existing methods. We demonstrate this approach on DNA array CGH data and single molecule data. Our study shows that this method is capable of coping with a wide range of models and has appealing properties in application.