Abstract Submitted
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Inferring phenomenological models of Markov processes from data[1] CATALINA RIVERA, ILYA NEMENMAN, Emory Univ — Microscopically accurate modeling of stochastic dynamics of biochemical networks is hard due to the extremely high dimensionality of the state space of such networks. Here we propose an algorithm for inference of phenomenological, coarse-grained models of Markov processes describing the network dynamics directly from data, without the intermediate step of microscopically accurate modeling. The approach relies on the linear nature of the Chemical Master Equation and uses Bayesian Model Selection for identification of parsimonious models that fit the data. When applied to synthetic data from the Kinetic Proofreading process (KPR), a common mechanism used by cells for increasing specificity of molecular assembly, the algorithm successfully uncovers the known coarse-grained description of the process. This phenomenological description has been notice previously, but this time it is derived in an automated manner by the algorithm.

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