Abstract Submitted
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Dynamics of driven transitions between minima of a complex energy landscapes SAI TEJA PUSULURI, Department of physics, Ohio University, ALEX H LANG, Computational Neurobiology Laboratory, Salk Institute, PANKAJ MEHTA, Department of physics, Boston University, HORACIO E CASTILLO, Department of physics, Ohio University — We recently modeled cellular interconvertion dynamics[1] by using an epigenetic landscape model[2] inspired by neural network models. Given an arbitrary set of patterns, the model can be used to construct an energy landscape in which those patterns are the global minima. Here we study the transitions between stable states of the landscapes thus constructed, under the effect of an external driving force. We consider three different cases: i) choosing the patterns to be random and independendently distributed ii) choosing a set of patterns directly derived from the experimental cellular transcription factor expression data for a representative set of cell types in an organism and iii) choosing randomly generated trees of hierarchically correlated patterns, inspired by biology. For each of the three cases, we study the stability of the global minima against thermal fluctuations and external driving forces, and the dynamics of the driven transitions away from global minima. We compare the results obtained in the three cases defined above, and in particular we explore to what degree the correlations between patterns affect the transition dynamics.

References

[1] Pusuluri et.al (2015) arXiv:1505.03889.
[2] Lang et.al (2014) PLoS computational biology 10, e1003734.

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