Abstract Submitted
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Effect of correlations between minima on a complex energy landscape 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[3]. Given an arbitrary set of patterns, the model can be used to construct an energy landscape in which those patterns are the global minima. We study the possible stable states and metastable states of the landscapes thus constructed. We consider three different cases: i) choosing the patterns to be random and independently 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 energy landscapes. In particular we study the basins of attraction of both the stable states and the metastable states, we compute the configurational entropy as a function of energy, and we demonstrate how those results depend on the correlations between the patterns.

References

[1] Pusuluri et.al (2015) arXiv:1505.03889.
[2] Lang et.al (2014) PLoS computational biology 10, e1003734.
[3] Kanter et.al (1987) Physical Review A 35, 380392.

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