Visualizing the glass transition using unsupervised learning

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We study the solutions of two random boolean satisfiability problems 3-SAT and XORSAT using recently developed machine learning techniques. We use non-linear embedding techniques to learn the local manifolds in which the solutions organize. In particular we provide, to the best of our knowledge, the first visualizing of the so-called clustering transitions that are known to occur in those problems. Finally, using unsupervised clustering methods we are able to automatically extract quantities such as the entropy of clusters.

Landscape induces complexity, but not always : [1]

I. INTRODUCTION

Chris Moore discussion, etc. cite Mzard, stat. phys. and yourself.

II. MODEL & METHODS

XORSAT, 3-SAT. BP, SP and Gaussian elimination.

A. t-SNE

B. Density clustering

C. Results

a. Clustering XORSAT, 3-SAT

b. Entropy via density clustering Relation to complexity and broader applications in stat. mechanics.

III. CONCLUSION

Packages are available for t-SNE and efficient clustering available at alexandreday github

IV. ACKNOWLEDGEMENTS

Acknowlegements.—

[1] F. Ricci-Tersenghi, Science **330**, 1639 (2010).

Supplemental Material

V. COMPLEXITY OF OPTIMAL STATE PREPARATION