Review of: "Approach to Data Science with Multiscale Information Theory"

William S. Oates[1]

1 Florida State University

Potential competing interests: No potential competing interests to declare.

This paper expands upon a method known as “entropy dynamics” which is a generalized Bayesian statistical framework that accommodates time dependent Bayesian posterior densities. The method typically combines Shannon's entropy (or relative entropy using a prior density) with constraints on particle displacements.

This method can be extended beyond Bayesian posteriors by introducing a “phase”. This leads to a whole new class of problems that allow for quantum phenomena to be studied. The authors in this paper consider this avenue to evaluate problems ranging from complex physics to data science through the use of information theory (e.g., entropy dynamics).

The additional novel aspect of the authors work is the introduction of an independent scale in addition to particle positions. The authors discuss how this leads to a multiscale entropy. These variables appear to be arbitrary. Although interesting, I did not see where these scaling variables advanced knowledge. I was hoping to see more development along this line in the problems proposed. The scaling relations do appear in a nonlinear version of Schrodinger's equation, but how this is useful was not entirely clear to me either. There were some references to complex quantum particles where it may play a role. Given the references to data science, I was hoping to see how quantum processes may advance knowledge in quantum information science.

Nonetheless, I think entropy dynamics is an elegant and relatively simple methodology that leads to discovery of many conservation equations seen in physics and therefore I support the authors effort to push this methodology forward. I hope it will lead to more developments and discoveries of complex particle interactions and extensions to the field of data science.