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

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Potential competing interests: No potential competing interests to declare.

The paper titled "*Approach to Data Science with Multiscale Information Theory*" deals with the application of Information Theory and Statistical Mechanics framework to a large and intricate quantum mechanical system composed of particles. Results demonstrated that the dynamic and probabilistic nature of such systems can be effectively addressed using a Multiscale Entropic Dynamics approach, derived from the Boltzmann methods of Statistical Mechanics.

The paper is well-written and falls well into the scope of the journal.

Some minor suggestions:

- Authors are encouraged to include the Non-Extensive Statistical Mechanics (NESM) framework which was introduced by Tsallis based on the principle of non-additive entropy, and constitutes a generalization of the Boltzmann–Gibbs statistics and has been successfully applied to various Statistical Mechanics applications. Some relevant references to be included:

1. *C. Tsallis, Possible generalization of Boltzmann-Gibbs statistics, J. Stat. Phys. 52 (1–2) (1988) 479–487.*
2. *C. Tsallis, Introduction to nonextensive statistical mechanics: Approaching a complex world, Springer, Berlin, 2009.*
3. *M. Gell-Mann, C. Tsallis (Eds.), Nonextensive Entropy – Interdisciplinary Applications, Oxford University Press, New York, 2004, p. 26.*
4. *Kapusta, Joseph I. "Perspective on Tsallis statistics for nuclear and particle physics." International Journal of Modern Physics E 30, no. 08 (2021): 2130006.*
5. *Loukidis, A.; Stavrakas, I.; Triantis, D. Non-Extensive Statistical Mechanics in Acoustic Emissions: Detection of Upcoming Fracture in Rock Materials. Appl. Sci. 2023, 13, 3249.*
6. *Vinciguerra, Sergio C., Annalisa Greco, Alessandro Pluchino, Andrea Rapisarda, and Constantino Tsallis. 2023. "Acoustic Emissions in Rock Deformation and Failure: New Insights from Q-Statistical Analysis" Entropy 25, no. 4: 701.*

- Section 4, page 4, authors write "*With these taken into account we arrive at traditional generalized Boltzmann-like expression of entropy. representation of the entropy.* ". Obviously, this sentence needs to be rewritten.
- The Discussion section should be enriched or merged with the Conclusions section.