Characterizing Spatiotemporal Complex Patterns with Tsallis Permutation Entropy

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Complexity measures are important for understanding and analysing time series and one-dimensional profiles. However, the extension of these methods to two-dimensional data is still lacking. In the scope of physics, the problem of classifying complex 2D patterns is fundamental to some theoretical and applied fields, from quantum mechanics to cosmology. To achieve this objective, different tools can be used depending on the knowledge of the system and the quality and quantity of accessible data. In this work we selected different classes of structural patterns arising from 2D and 3D turbulent and chaotic processes to test the performance of Tsallis permutation entropy (TPE) [1] as a classifier of complex textures. The results show that TPE is a valuable technique for analysing complex 2D patterns and that it is computationally faster than other measurements such as BPPE [2] and GPA [3].

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