Special Issue

Dynamics and Information Theory in Phase Space

Message from the Guest Editors

Beginning with Boltzmann and Gibbs, phase space is where the incomplete specification of the initial conditions lives and where it is convenient to describe how the system evolves. We need to know how to infer the initial state and how to propagate it in time. As the equation of motion, Boltzmann used a kinetic scheme while Gibbs used classical mechanics. The exponential growth of activities in quantum technologies provides us with novel tools for exploring the sampling of the phase space of complex systems. As the number of degrees of freedom grows, computational aspects become of increasing importance. What is the holy grail? Most likely, it is to converge on the function (operator) that generates the time displacement on a reduced level of description. Thermodynamics tell us that under well-defined conditions this is the free energy. How do we generalize it?

- algebraic description of phase space
- maximal entropy formalism
- statistical mechanics of learning
- free energy landscape
- barrier crossing dynamics
- dynamics on networks
- coherent control
- dynamical groups
- Markov models
- computing with observables
- dimensionality reduction
- reduced descriptions
- clustering

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The concept of entropy is traditionally a quantity in physics that has to do with temperature. However, it is now clear that entropy is deeply related to information theory and the process of inference. As such, entropic techniques have found broad application in the sciences.

Entropy is an online open access journal providing an advanced forum for the development and/or application of entropic and information-theoretic studies in a wide variety of applications. *Entropy* is inviting innovative and insightful contributions. Please consider *Entropy* as an exceptional home for your manuscript.

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