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Keynote: Demystifying Entropy

Tuesday, March 5, 2024 1:30 PM (1 hour)

The term entropy was originally introduced by the physicist Rudolf Clausius as a quantity which describes the ability of a physical system to change its state in a thermodynamic process. But at least since the pioneering work of the mathematician Claude Shannon, entropy has also become a central concept in information theory. How are these two interpretations related? What exactly is entropy and how can we use it to understand thermodynamic quantities such as temperature? This lecture aims to provide an introductory overview of these questions in the area between computer science and physics. One focus will be the numerical estimation of entropy through sampling. As with any nonlinear estimation measure, systematic errors occur when estimating entropy, but these errors can be significantly reduced using suitable mathematical methods. The lecture also deals with the question of how these correction procedures can be implemented algorithmically.

Slot length

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