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Information Thermodynamics on Causal Networks Sosuke Ito¹ and Takahiro Sagawa² ... Characterizing nonequilibrium dynamics by causal networks (i.e., Bayesian networks), we obtain novel generalizations of the second law of thermodynamics and ... tween information and thermodynamics has been studied in several simple setups with the demon [15]–53 ...

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Characterizing nonequilibrium dynamics by causal networks (i.e., Bayesian networks), we obtain novel generalizations of the second law of thermodynamics and the fluctuation theorem, which include an informational quantity characterized by the topology of the causal network.

[1306.2756] Information Thermodynamics on Causal Networks

Information Thermodynamics on Causal Networks FSPiP 2013, July 12 2013. ... Causal networks are a probabilistic graphical model that represents ... mutual information using this networks (DAG). [HToucheNe, \hat{S} Lloyd \hat{X} Physica A, 2004] In this case, we call that are parents of .

Information Thermodynamics on Causal Networks

thermodynamics is only applicable to simple information processing that mainly consists of measurement and feedback control between only two systems (i.e., the engine and the demon). In this talk, I will discuss a much more general theory of thermodynamics of information processing: information thermodynamics on causal networks [6].

Information Thermodynamics on Causal Networks - KIAS

Unified framework of information thermodynamics
Fluctuation theorem for information exchanges
Generalization to causal networks
Entropy transfer (information flow) is crucial
Toward application to signal transduction
Thank you for your attention! S. Ito & T. Sagawa, arXiv:1406.5810. S. Ito & T. Sagawa, PRL 111, 180603 (2013).

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62 6 Information Thermodynamics on Causal Networks with $k > 2$. The former assumption indicates that the time evolution of the target system X is characterized by the sequence of edges $x_1 \rightarrow x_2 \rightarrow \dots \rightarrow x_N$. The latter assumption corresponds to the Markov property of the physical dynamics.

Chapter 6 Information Thermodynamics on Causal Networks

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Sosuke Ito Information Thermodynamics on Causal Networks and its Application to Biochemical Signal Transduction Doctoral Thesis accepted by The University of Tokyo, Tokyo, Japan

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Frontier of Statistical Physics and Information Processing 2013 Information Thermodynamics on Causal Networks Sosuke Ito¹ and Takahiro Sagawa² 1. Department of Physics, The University of Tokyo 2. Department of Basic Science, The University of Tokyo Nonequilibrium relations for small thermodynamic systems such as molecular motors

Frontier of Statistical Physics and Information Processing

Information thermodynamics on causal networks and its application to biochemical signal transduction. [Sosuke Ito] -- In this book the author presents a general formalism of nonequilibrium thermodynamics with complex information flows induced by interactions among multiple fluctuating systems. The author has ...

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Nominated as an outstanding contribution by the University of Tokyo's Physics Department in 2015 Presents studies of a novel generalization of the second law of thermodynamics for small subsystems on causal networks Focusses on stochastic thermodynamics with information applicable to a broad class ...

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Assessment of causal influences is a ubiquitous and important subject across diverse research fields. Drawn from consciousness studies, integrated information is a measure that defines integration as the degree of causal influences among elements. Whereas pairwise causal influences between elements can be

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