Sanjoy Mitter: Information and Entropy Flow in Estimation and Control

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Information, Control, and Learning: The Ingredients of Intelligent Behavior.

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Abstract:

There are two great theories in the Systems, Communications and Control field: Information Theory and Stochastic Control. In this talk, I discuss the role of Information in Estimation Theory and Stochastic Control. There are "dynamical" analogues of source coding and rate distortion theory, as well as channel coding in stochastic control theory, where the concepts of directed information and transfer entropy play a central role. I give an information-theoretic view of Kalman filtering and its nonlinear generalizations. I illustrate the role of directed information and transfer entropy in stochastic control by considering the problem of extracting the maximal amount of work from a noisy, electrical circuit acted upon by a Maxwell Demon. Joint work with Nigel Newton (University of Essex, UK), Henrik Sandberg (KTH, Sweden), JeanCharles Delvenne (UCLouvaine, Belgium) and Takashi Tanaka (KTH, Sweden)
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