Information theory based inference in the Bayesian context: applications for semantic image coding

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Abstract

Traditionally Information Theory focused to applications in communications, it refers mainly to coding, transmission, or compression of signals. However, implicitly, from its very beginning, information theory closely related to statistics and machine learning. Thus, many other fields like stochastic inference, estimation and decision theory, optimisation, communication or knowledge representation benefit from basic results from information theory. The goal of the tutorial is to overview new applications and new developments in information theory relevant to inference, as well as general methods for information processing and understanding.

The topics envisaged are: applications and extensions of Rate-Distortion theory, the methods of Information Bottleneck, The links to Bayesian, MDL and related methods, information and/or complexity based estimation, and inference.

The lecture will focus on specific methods for: image understanding, image semantic coding, image indexing and information mining. Proposing methods to distinguish, signs and symbols and understand significance.

The possible applications are search engines in large satellite image archives, picture archiving and communication systems (PACS) for use in medical science, or multimedia systems.

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