THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS AND STATISTICS

Information Beyond Shannon

By

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Abstract

Shannon's theory for source and channel coding (and the duality between capacity and rate-distortion) has been the hallmark for information science. Shannon entropy, and its associated exponential family of probability measures resulting from maximum entropy (MaxEnt) inference and the Kullback-Leibler divergence measuring the difference of any two probability densities, have found wide applications in statistical inference, machine learning, optimization, etc. Past research in Information Geometry has tied together the above concepts into a geometric structure called Hessian geometry, which is dually flat with biorthogonal coordinates.

Given the deep mathematical understanding of Hessian geometry and its elegant picture, it is natural to ask whether it can be generalized ("deformed", technically) to more broad settings that corresponds to generalize entropies and cross entropies (e.g., that is Tsallis and Renyi). This question has now been answered positively by a series of recent work on deformation theory. My talk will explain this recent development of information geometry, including the rho-tau deformation (which unifies the so-called phi-model and U-model known to information geometers) and the lambda-deformation theory (which unified Tsallis and Renyi deformation known to information theorists). This talk is intended for an audience with background in information theory and theoretical physics.

(Joint work with Jan Naudts in the former case and with TKL Wong in the latter case).

Date : 27 April 2024 (Saturday)
Time : 3:00pm
Venue : Room 2504 (near Lifts 25/26)

All are Welcome!