

Colloquium

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OBJECTIVE QUANTIFICATION OF PRIOR INFORMATION: A QUICK OVERVIEW OF THE GEOMETRIC THEORY OF IGNORANCE

Friday, December 6, 2024
3:00 p.m. in Massry BB010
(tea & coffee at 2:40 p.m.)

ABSTRACT. In recent decades, the Bayesian approach to statistical inference has become very popular, largely due to its success in addressing practical problems via Monte Carlo methods. However, the challenge of selecting appropriate priors remains unresolved, with no general theory available. This talk presents a novel geometrization of the concept of ignorance, offering a systematic theory for choosing priors in Bayesian inference. By leveraging Chentsov and Amari's δ -information deviations, we develop a framework that identifies the critical points of an invariant action to determine the most ignorant prior distributions. The theory not only offers new insights into the interpretation of data and prior information but also reimagines foundational aspects of probability as meaning itself. We will explore applications of this theory to the logistic regression model, showing how new targets and penalties derived from this geometric approach outperform standard methods in empirical studies. This work paves the way for a more rigorous and principled Bayesian inference that generalizes beyond subjective priors, with implications for improving model training in deep learning scenarios.