CREST - GENES
Cours doctoraux 2019 – 2020

Information-theoretic methods in computer science and statistics

Yuri POLYANSKIY
MIT

SCHEDULE	Tuesday	7th January 2020 14th January 2020	De 15h30 à 18h De 15h30 à 18h	Salle 3001 Amphi 250
	Thursday	9th January 2020 16th January 2020	De 10h à 12h30 De 10h à 12h30	Amphi 200 Amphi 250

Information-theoretic methods in computer science and statistics

Summary:
This course will overview how techniques and ideas originating in information theory have been used (classically and recently) for deriving sharp impossibility results in various disciplines.
We will start with a basic introduction of entropy, KL divergence and mutual information and see how their simple properties (convexity, chain rule, data processing) lead to impressive results in combinatorics and probability (e.g., counting subgraphs, bounding permanents and volumes of orthogonal projections in Euclidean spaces).
The main part of the course will be focused on studying the strong data processing inequality (SDPI), which bounds the amount of loss of the mutual information upon traversing through a noisy channel. As applications we will discuss: Ising and Potts models on trees, random colorings on tress, community detection, spiked Wigner model, Z_2-synchronization, fault-tolerant computing and distributed estimation. This wide range of domains can be treated in a surprisingly unified way via the concept of SDPI.

à l'ENSAE, - 5 Av. Henry Le Chatelier - Palaiseau (REB B Massy Palaiseau & bus 91.06 ou 91.10 arrêt Lozère)

Ces cours sont proposés aux étudiants de 3ème année de l'ENSAE, de l'ENSAI, ouverts aux étudiants de M2 ou inscrits en *thèse*. ***Une inscription préalable est demandée impérativement*** *pour tous les étudiants de l'ENSAE, de l'ENSAI, ou* extérieurs, à Lyza RACON : lyza.racon@ensae.fr ou par téléphone **au 0170266926 afin de pouvoir être admis dans les locaux de l'ENSAE et pouvoir être joints en cas de nécessité par les organisateurs du cours.**