ETICS 2025

École Thématique sur les Incertitudes en Calcul Scientifique
Research School on Uncertainty in Scientific Computing

https://www.gdr-mascotnum.fr/etics.html

October, 5-10, VVF Lac Léman Evian-les-Bains, France
https://www.vvf.fr/villages-vacances/vacances-evian-vvf-villages.html

Source: Pinterest

Objectives: The goal of this school is to develop the skills of researchers and engineers in the domain of uncertainty management of computer codes and machine learning techniques in support to engineering studies. Lectures will be followed by practical computer works. Discussions and poster sessions will promote exchanges between participants. The prerequisites to possess are the mathematical bases of the uncertainty quantification science.

Lecturers:

- Prof. Benjamin Guedj (INRIA, University College London): On generalisation and learning: PAC-Bayes, deep neural networks and frugal AI
- Prof. Erwan Scornet (Sorbonne Université): Learning with missing values: from estimation to prediction
- Dr. Olivier Zahm (INRIA, Laboratoire Jean Kuntzmann, France): Poincaré inequalities for dimension reduction and efficient sampling
- **Special talks (10th ETICS edition) from ETICS scientific committee members**

Warning: The language of this ETICS edition will be in French

Organization

Contacts: etics@ens-paris-saclay.fr
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Bertrand Iooss (EDF R&D) bertrand.iooss [at] edf.fr

Registration: https://uq.math.cnrs.fr/eticsregister25, Registration fees (935€, taxes included, 850€ without tax) include accommodation and meals.

Schedule

Sunday, October, 5th: 17:00 Bus from Bellegarde sur Valserine - 19:00 - Arrival at VVF

Monday, October, 6th:

09:00 - 9:15	Opening and Welcome speech	Bertrand Iooss & Claire Cannamela
09:15 – 12:30	Poincaré inequalities for dimension reduction and efficient sampling (Part 1)	Olivier Zahm
14:00 – 17:30	ETICS SC members talks	xxx
18 :30 – 20 :00	Apéritif	All

Tuesday, October, 7th:

09:00 – 12:30	Poincaré inequalities for dimension reduction and efficient sampling (Part 2)	Olivier Zahm
14:00 – 17 :30	Learning missing values (Part 1)	Erwan Scornet

Wednesday, October, 8th:

09:00 – 12:30	On generalisation and learning	Benjamin Guedj
14:00 – 20 :00	Social event or free	

Thursday, October, 9th:

09:00 – 12:30	Talks from PhD students	Xxx
14:00 – 17:30	Learning missing values (Part 2)	Erwan Scornet

Friday, October, 10th:

09:30 – 12:00	Talks from PhD students and ETICS SC members talks	Xxx
12:30	Bus to Bellegarde sur Valserine	

Coffee breaks of 30mn every day at 10:30 and 15:30

ABSTRACTS

Prof. Benjamin Guedj (INRIA, University College London): On generalisation and learning: PAC-Bayes, deep neural networks and frugal AI.

This three-hour course explores the interplay between generalisation and learning in modern machine learning. We begin by revisiting the PAC-Bayes framework, a powerful probabilistic tool for deriving generalisation guarantees. We then examine how these theoretical insights connect—often surprisingly—with the empirical behaviour of deep neural networks. Finally, we discuss the implications of these ideas for the design of frugal AI systems: models that are efficient, robust, and adapted to real-world constraints. Throughout, we highlight open questions and emerging research directions at the frontier of statistical learning theory and practical machine learning.

Prof. Erwan scornet (Sorbonne Univ.): Learning with missing values: from estimation to prediction.

Dans cette présentation, nous mettrons en évidence que le choix des méthodes de gestion des données manquantes dépend étroitement de l'objectif poursuivi : qu'il s'agisse d'estimer au mieux des paramètres, de reconstituer les données manquantes ou encore de prédire un outcome en présence de covariables incomplètes. Nous aborderons ensuite des résultats récents portant sur les mécanismes générateurs de données manquantes, ainsi que sur la recherche d'une méthode d'imputation idéale.

Dr. Olivier Zahm (INRIA, Laboratoire Jean Kuntzmann, France): Poincaré inequalities for dimension reduction and efficient sampling

Poincaré inequalities are fundamental tools in the analysis of many uncertainty quantification algorithms. The first part of this lecture explores their role in gradient-based dimension reduction techniques for function approximation problems. We demonstrate how Poincaré inequalities enable the development of an efficient majorize-then-optimize strategy to control the approximation error introduced by the dimension reduction step. Extensions to nonlinear dimension reduction and Bayesian inference are also discussed. The second part of the lecture focuses on sampling algorithms, particularly the analysis of Markov Chain Monte Carlo (MCMC) methods, where Poincaré inequalities play a central role. We introduce a Riemannian version of the Poincaré inequality, which offers the potential to significantly improve convergence rates. By computing the optimal Riemannian metric, we design more efficient sampling schemes that facilitate rapid exploration across multiple modes and tails of the target distribution.

Special talks (10th ETICS edition) from ETICS scientific committee members:

Sophie Ancelet (ASNR) : TBA

TBA (CEA/DAM) : TBA

Sébastien Da Veiga (ENSAI)

Merlin Keller (EDF R&D) : Une thèse née à Barcelonnette (ETICS #1) : OUQ sur une mesure de risque en simulation numérique

Guillaume Perrin (Université Gustave Eiffel) : Mieux comprendre pour mieux mesurer : défis et avancées en calibration de capteurs de pollution en environnement ouvert.

Gaël Poette (CEA/DAM) : ETICS#1: où j'ai compris des trucs sur l'analyse de sensibilité et sur le fait que je ne ferai pas carrière dans la chanson

Delphine Sinoquet (IFP Energies nouvelles) : TBA

Lectures from PhD students

TBA