

Etienne LASALLE

Ph.D. in Mathematics

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My research topics are statistics related to graph-structured data. During my thesis, I developed and studied tools for multi-scale graph comparisons based on heat diffusion and topological data analysis. The statistical guarantees obtained on these objects ensure the asymptotic validity of two-sample tests. Implementing these methods allowed me to confront them with more applied problems, particularly in the context of machine learning and neural network classifiers. Now, as a post-doc, I am working on graph inference via compressive learning methods.

Statistics Graphs Topological data analysis Compressive learning

🏛️ ACADEMIC POSITIONS

2023- *Post-doc*, ENS de Lyon (LIP) and Inria (Ockham).
On compressive learning and graph data.
Advisors : Rémi Gribonval and Paulo Gonçalves.

🎓 STUDIES

2019-2022 *Ph.D.*, Université Paris-Saclay and Inria Saclay, France.
Statistical foundations of topological data analysis for graph-structured data.
Supervision : Frédéric Chazal and Pascal Massart.

2015-2019 *Ecole Normale Supérieure Paris-Saclay*.
‣ 2019 *Graduated from ENS Paris Saclay*, France
‣ 2018 *MSc in Probability and Statistics*, Université Paris-Saclay, France

2012-2015 *Preparatory classes*, Lycée Faidherbe, Lille, France

“ PUBLICATIONS

Preprints

2023 *Compressive Recovery of Sparse Precision Matrices*. T. Vayer, E.L., R. Gribonval, P. Gonçalves.
[arxiv:2311.04673](https://arxiv.org/abs/2311.04673)

2023 *Eve, Adam and the Preferential Attachment Tree*. A. Contat, N. Curien, P. Lacroix, E.L., V. Rivoirard.
[arxiv:2303.04752](https://arxiv.org/abs/2303.04752)

Publications

2021 *Heat diffusion distance processes : a statistically founded method to analyze graph data sets*. Accepted in *J. of Applied and Computational Topology*.
[arxiv:2109.13213](https://arxiv.org/abs/2109.13213)

🏆 AWARDS

2021 *Winner of a Math-Company challenge (AMIES)*. With O. Hacquard and V. Lebovici.
Reconstruction of trajectories from noisy real life 3D detection of people.
[Challenge AMIES](#)

- Nov. 2023 **MIA Workshop : Dimension reduction for learning and visualization**, ENS de Lyon, France.
Compressive recovery of sparse precision matrices.
- Mai 2023 **Seminar of the DATA department**, LJK, Grenoble, France.
Statistical comparison of graph-structured data and its application to distribution shift detection.
- Jan. 2023 **Meeting of the EcoNet project**, Campus Agro Paris-Saclay, France.
Statistical comparison of graph structured data.
- Jan. 2023 **Workshop on Random Geometry**, CIRM, Luminy, France.
Finding Adam in the nearest-neighbor tree.
- Nov. 2022 **working group of the Probability-Statistics team**, LMO, Orsay.
Testing SBM vs Erdős-Renyi, [article]. With L. Martins-Bianco and Z. Naulet.
- June 2022 **Journées de Statistique de la SFdS**, Lyon, France.
Analyse statistique de graphes, via des processus de diffusion de la chaleur.
- June 2022 **Machine Learning and Signal Processing Seminar**, ENS, Lyon.
Heat diffusion distance processes for graphs and their application to distribution shift detection.
- June 2022 **Celeste team's seminar**, LMO, Orsay.
Heat diffusion distance processes for graphs, application to distribution shift detection.
- May 2022 **working group of the Probability-Statistics team**, LMO, Orsay, France.
Presenting *Density estimation from unweighted k-nearest neighbor graphs*, [article].
With A. Contat and N. Curien.
- May 2022 **Datashape team seminar**, Porquerolles, France.
Detecting distribution shifts using activation graphs from neural networks
- Mar. 2022 **working group of the Probability-Statistics team**, LMO, Orsay, France.
Presenting *Identifying the deviator*. [arxiv:2203.03744](https://arxiv.org/abs/2203.03744)
- Dec. 2021 **Forum des Jeunes Mathématicien.ne.s**, Besançon, France.
Statistical analysis of graph structured data, via heat diffusion processes.
- Oct. 2021 **Colloque Jeunes Probabilistes et Statisticiens**, Ile d'Oléron, France
Statistical analysis of graph structured data, via heat diffusion processes.
- Oct. 2021 **working group of the Probability-Statistics team**, LMO, Orsay, France.
Presenting *Finding Adam in random growing trees*. [arxiv:1411.3317](https://arxiv.org/abs/1411.3317)
- Oct. 2021 **Datashape seminar**, INRIA Saclay, France.
Statistical analysis of graph structured data, via heat diffusion processes.
- Mar. 2021 **Vulgarization seminar for Ph.D. students**, Université Paris-Saclay, France.
Gaussian approximations for random functions.

RESEARCH ACTIVITIES

Editorial Activities

- May 2023 *Review of a communication proposal*, 2023 edition of the GRETSI conference,
Special session : *Graph Learning and Learning with Graphs*.

Research Internships

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| <p>October 2018
-July 2019</p> | <p>Pre-doctoral Year, EPFL, Lausanne, Switzerland.</p> <ul style="list-style-type: none"> ➤ Probabilistic and statistical studies of topological features for random graph analysis, in the context of Neuro-science. <p>@ kathryn.hess@epfl.ch</p> |
| <p>April 2018
-July 2018</p> | <p>Master internship, INRIA-SACLAY, Palaiseau, France</p> <ul style="list-style-type: none"> ➤ Development of anomaly detection methods based on tools and features from topological data analysis. <p>@ frederic.chazal@inria.fr</p> |

April 2017 | Master (1st year) internship, SIMON FRASER UNIVERSITY, Vancouver, Canada
-July 2017 | > Bio-Informatics : unsupervised clustering on tuberculosis genomic data.
@ cedric.chauve@sfu.ca @ leonid@sfu.ca

January 2016 | Internship, ENS PARIS-SACLAY, Cachan, France
-June 2016 | > Numerical Hydrology : modeling water flow on elevation grids.
@ moreljeanmichel@gmail.com @ marc.lebrun.ik@gmail.com

TEACHING

At IUT d'Orsay

2019-2022 *Modélisation* (linear algebra, diagonalization, Python practicals)
2020-2022 *Probabilités/Statistiques* (usual discrete and continuous distributions, approximation theorems, central limit theorem, estimators, statistical tests)
2019-2020 *Mathématiques Discrètes* (logic, linear algebra basics)

Others

May 2023 *What does it mean to be a researcher in math?* A. Ribot High-School, Saint-Omer, France.
Presentation's content : studies, some fields of research (in statistics), a typical day/week.
Jan 2021 *Scientific mediation*, with la Maison d'Initiation et de Sensibilisation aux Sciences.
Construction and animation of "science/society" debate sessions for high-school students.
2017-2018 *Mentoring*, three students from the Villebon-Charpak institute, Orsay, France.

SKILLS

Code and IT

> Python Github R
> GUDHI (Python library for TDA)
> LaTeX ipe

Languages

French ● ● ● ● ●
English ● ● ● ● ○
German ● ○ ○ ○ ○

INTERESTS

> Climbing
> Hiking, skiing, paragliding.
> Music, photography.