Etienne LASALLE
Post-doctoral fellow in Mathematics
ENS de Lyon & Inria, France

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My work concerns the statistical analysis of graph-structured data using tools from topological data analysis (TDA). I work on developing and studying multiscale comparison tools for graphs. The resulting statistical guarantees ensure the asymptotic validity of two-sample tests. The implementation of these methods has allowed to confront them to practical questions, mainly in the framework of machine learning and neural network classifiers.

Statistics | Graphs | Topological data analysis | Two-sample tests

Current position

2023- *Post-doc,* ENS de Lyon (LIP) and Inria (Dante).
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

2021 *Heat diffusion distance processes : a statistically founded method to analyze graph data sets.*
arxiv: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

Talks

Nov. 2022 **Work group of the Probability-Statistics team**, LMO, Orsay.
Testing SBM vs Erdös-Renyi, [article].

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 and their application to distribution shift detection.

May 2022 **Work group of the Probability-Statistics team**, LMO, Orsay, France.
Prsenting *Density estimation from unweighted k-nearest neighbor graphs,* [article].

May 2022 **Datashape team seminar**, Porquerolles, France.
Detecting distribution shifts using activation graphs from neural networks

Mar. 2022 **Work group of the Probability-Statistics team**, LMO, Orsay, France.
Presenting *Identifying the deviator.* arxiv: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 **Work group of the Probability-Statistics team**, LMO, Orsay, France.
Presenting *Finding Adam in random growing trees.* arxiv: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 experience

October 2018 -July 2019 | **Pre-doctoral Year, EPFL, Lausanne, Switzerland.**
› Probabilistic and statistical studies of topological features for random graph analysis, in the context of Neuro-science.
@ kathryn.hess@epfl.ch

April 2018 -July 2018 | **Master internship, INRIA-Saclay, Palaiseau, France**
› Development of anomaly detection methods based on tools and features from topological data analysis.
@ frederic.chazal@inria.fr

April 2017 -July 2017 | **Master (1st year) internship, Simon Fraser University, Vancouver, Canada**
› Bio-Informatics : unsupervised clustering on tuberculosis genomic data.
@ cedric.chauve@sfu.ca @ leonid@sfu.ca

January 2016 -June 2016 | **Internship, ENS Paris-Saclay, Cachan, France**
› 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

January 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.