Etienne LASALLE
Ph.D. Student in Mathematics
Université Paris-Saclay & Inria Saclay, 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

Studies

2019- *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

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.**

- Statistical Tools for Neuro-Topology
- Probabilistic and statistical studies of topological features for random graph analysis, in the context of Neuro-science.

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Directed simplicial complex | Betti number | Erdös-Rényi graphs | Python | Flagser

April 2018 -July 2018 — **Master internship, INRIA-Saclay, Palaiseau, France**

- TDA for anomaly detection
- Development of anomaly detection methods based on tools and features from topological data analysis.

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Anomaly detection | Persistence diagrams | Python | GUDHI

April 2017 -July 2017 — **Master (1st year) internship, Simon Fraser University, Vancouver, Canada**

- Bio-Informatics
- Study and development of unsupervised clustering algorithms combining several types of tuberculosis genomic data..

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Clustering | Genomic data | SNPs | R

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

- Numerical Hydrology
- Study and development of algorithms modelling water flow on a large scale surfaces using elevation grids.

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Numerical models | PDE | elevation grids | C++

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.