Théo Lacombe

PhD Student - Inria Saclay - Datashape

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Research interests

Recent progress in Optimal Transport theory has opened the door for a wide number of applications in statistics and machine learning. My research is focused on leveraging these tools and linking them with Topological Data Analysis in order to provide a theoretically consistent and numerically efficient framework to perform statistics on topological descriptors.

Keywords: Statistics, Optimal Transport, Topological Data Analysis, Machine Learning.

Education

Since Sept. 2017 — **Inria Saclay**, *Datashape*, PhD Student.
- *Statistics for Topological Data Analysis via Optimal Transport*
- PhD under supervision of Steve Oudot (Inria Saclay) and Marco Cuturi (ENSAE)
- Grant from AMX.

2016-2017 — **ENS Cachan**, *MSc: Mathematics, Vision and Learning*.
- *Summa cum laude*
- Specialization on statistics, data analysis and geometry.

2013-2017 — **École polytechnique**, *Engineering track*, Palaiseau, France.
Formation in applied mathematics and computer science with focus on statistics, data analysis and algebra.

Publications

Work in progress.
Manuscript in preparation about Optimal Transport formulation of persistence diagram metrics and applications.

Talks and participation to workshops

Dec. 2017 — **Journée de Géométrie Algorithmique**, *Aussois, France*, Short Talk.
Smoothed optimal transport: fast computation of matching distances and other applications.

Feb. 2018 — **TAGS**, *Max Plank Institute, Leipzig, Germany*, Poster presentation.

May 2018 — **Bridging Statistics and Sheaves**, *IMA - Minneapolis, USA*, (upcoming).
TBA

May 2018 — **SFDS, Journées Statistiques**, *EDF Labs Paris-Saclay*, Talk, (upcoming).
TBA

June 2018 — **Curves and Surfaces**, *Arcachon, France*, Talk, (upcoming).
Invited speaker for Mini-Symposium *Topological Data Analysis and Learning* (MS9).
Talk title: *Statistical tools for TDA via Optimal Transport*

Research internships

April 2017-Aug 2017 — **ENSAE**, Paris-Saclay, CREST.
- *Wasserstein barycenters for persistence diagrams*
- Co-supervised by Marco Cuturi (Ensae, CREST) and Steve Oudot (Inria Saclay, Datashape)

March - Aug 2016 — **BNP Paribas**, Paris, Quantitative Research team.
- Modeling client behavior and building recommender systems.
- Collaborative filtering, classification (SVM, Random Forest), basics of neural networks (with Python - Tensorflow).

Teaching activity

Since sept 2017 — **École polytechnique**, *Teacher assistant*.
- INF556 - Topological Data Analysis, 3rd year course of engineering track (MSc equivalent).
- INF311 - Introduction to computer science, 1st year course of engineering track (last-year Bachelor equivalent).

Sept 2016 - March 2017 — **Lycée Condorcet**, Paris.
Oral examination for undergraduate students in classe prépa MP* (colles).

Programming skills

Languages
- Advanced : Python (numpy, scikit-learn, cupy, chainer...)
- Notions : Java, C++, Scilab/Matlab

Languages

English — C1 — *IELTS 7.5/9*

Japanese — Notions