Théo Lacombe

PhD Student - Inria Saclay - Datashape

22 Bd Edgar Quinet
75014 Paris
France
+33 (0) 6 76 30 95 80
theo.lacombe@inria.fr
tlacombe.github.io

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.
- *Statistical tools for Topological Data Analysis via Optimal Transport*
- PhD under supervision of Steve Oudot (Inria Saclay) and Marco Cuturi (ENSAE - Google Brain)
- Grant from AMX, École polytechnique.

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 & Preprint

2019 — **M.Carriere, F.Chazal, Y.Ike, TL., M.Royer, Y.Umeda**, (preprint, submitted).
PersLay: A Neural Network Layer for Persistence Diagrams and New Graph Topological Signatures.

2019 — **V.Divol, TL.**, (preprint, submitted).
Understanding the Geometry and Topology of the Persistence Diagram Space using Optimal Transport.

2018 — **TL., M.Cuturi, S.Oudot**, Advances in neural information processing systems (NIPS).
Large-scale computation of Means and Cluster for Persistence Diagrams using Optimal Transport.

Participation to workshops and Conferences

May 2019 — **SMAI**, *Guidel, France*, Talk, Mini-symposium *Geometrie dans les donnees*.
An introduction to Topological Data Analysis and Barycenters of Topological Descriptors.

Jan. 2019 — **Workshop of Applied Topology**, *Kyoto, Japan*, Poster presentation.
Large-scale computation of Means and Cluster for Persistence Diagrams using Optimal Transport.

Dec. 2018 — **NIPS Conference**, *Montreal, Canada*, Poster presentation.
Large-scale computation of Means and Cluster for Persistence Diagrams using Optimal Transport.

June 2018 — **Curves and Surfaces**, *Arcachon, France*, Talk.
Invited speaker for Mini-Symposium *Topological Data Analysis and Learning* (MS9).

May 2018 — **SFDS, Journées Statistiques**, *EDF Labs Paris-Saclay*, Talk.
Invited speaker for the Topological Data Analysis session.

May 2018 — **Bridging Statistics and Sheaves**, *IMA - Minneapolis, USA*, Poster presentation.

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

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

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*.
- CSE204 - Introduction to Machine Learning. Lecturer: Jesse Read.
- INF556 - Topological Data Analysis. Lecturer: Steve Oudot.
- INF311 - Introduction to computer science. Lecturer: François Morain.

Sept 2016 - March 2017 — **Lycée Condorcet**, Paris.
Oral examination for undergraduate students in classe preparatoires 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