Liam Toran

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Education

École Normale Supérieure de Lyon (ENS Lyon) **Lyon, France**

Master's Degree in Applied Mathematics *2016-2018*

- Studied courses include advanced statistics and machine learning, numerical methods, statistical physics, stochastic calculus, dynamical evolution equations, harmonic fluid dynamics and the Boltzmann gaz equation.

Bachelor's Degree in Computer Science & Mathematics *2014-2016*

- Graduated from junior level classes in Physics.
- Entered ENS through top 0.5% ranking in nation-wide competitive exams.

Experience

Université de Nice Côte d'Azur **Nice, France**

Research Assistant Intern *2019*

6 months at the J.A.Dieudoné Research Institute Team at the University of Nice.
My work was centered on the modelization and simulation of Dynamical Branching Networks, for instance social media networks or fungus growth.

- Learned about new models and uses of stochastic and partial differential equations in population dynamics.
- Implemented state of the art numerical fluid simulation techniques through Python;
- Solved the relationship between physical constants and wave speed for the model of dynamical branching networks.

Knight Lab, UCSD **San Diego, USA**

Machine Learning Research Assistant Intern *2017-2018*

5 months at the Knight Lab Microbiology team at the Biomedical Research Institute of UCSD.
My work was centered on analysing and understanding compositional microbiological datasets:

- Implemented several statistical and compositional analysis methods through Python and its scientific libraries while applying them to the Knight Lab compositional datasets;
- Co-authored a research article about the horseshoe effect, explaining how it arises in various datasets after SVD dimensionality reduction, and how to learn from it to **build a better metric for data sets with an underlying gradient**: See: *Uncovering the Horseshoe Effect, Morton - Toran* (11 citations).

Inria (National Institute for Research in Computer Science and Automation) **Grenoble, France**

Computer Science Research Assistant Intern *2016*

3 months at the BiPoP team. My work was centered on the modelization, simulation, control and optimisation of nonsmooth systems, applied on the example of cloth's move simulation with implicit contact and exact Coulomb friction:

- Solved examples of Coulomb friction problems in Python;
- Made an enumerative type solving of a new formulation of the Coulomb friction problem and implemented it using C and C++. The resulting solver was **ten times faster** than the previous one. It later led to the following research article: See: *An Implicit Frictional Contact Solver for Adaptive Cloth Simulation*

Miscellaneous

Math & Physics Tutoring for Undergraduate students *2018-2019*

Skills

Programming: Python (Jupyter, Pandas, Scikit-Learn, Keras, PyTorch, Matplotlib, Seaborn, ...), C, C++.
SQL, LaTeX, Git, Excel, MatLab.

Platforms: Linux, Windows, Android.

Languages: English & French: **Fluent** Japanese : Basic