Théo **Bourdais**

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Education

• *2022/Present* **PhD, California Institute of Technology**
PhD in Computing and Mathematical Sciences. Currently focusing on Gaussian Processes under the supervision of Houman Owhadi

• *2020/2021* **Master of Mathematics, University of Cambridge**

Master's degree in statistics. This master is intended as Cambridge's preparation to research in Mathematics. **Graduated with distinction (highest grade achievable).** Subjects studied: • Modern statistical methods (high dimensional, non parametric, kernel based statistics) • Theoretical guarantees of convergence of said statistical methods

- Practical considerations (application to real data, model selection, result interpretation)
- Theoretical work on neural networks for Machine Vision

• *2017/2021* **Master of Science, Ecole polytechnique, Paris**

Bachelor and master of science in Ecole polytechnique, one of the best French *Grande Ecole*. **Top of the list at polytechnique's competitive entrance exam, graduated in the top 10% of the cohort.** Subjects studied:

- Applied Mathematics: biology modelling, signal treatment, optimisation theory
- Computer Science: data structures, classical algorithms
- Theoretical Physics: Quantum field theory, General relativity, Quantum theory

• *2015/2017* **Preparatory class, Lycée Louis-le-Grand, Paris**

Intense preparation in Mathematics, Physics and Engineering Science for the highly competitive entrance exams to the French *Grandes Ecoles.* Benefits of the class:

- Rigorous Mathematical foundations
- Workload and stress management

Academic projects

• *2021 - 6 months* **Essay on deep nets for optical flow analysis, Cambridge**

Project aiming at gaining full understanding of the subject. Essay focused on practical aspects of optical flow estimation, as well as theory of group equivariance for more robust estimation. Studied

- Convolutional Neural Networks architectures
- Classical and modern optical flow estimation
- Group theory for deep learning

• *2020 - 6 months* **Analysis of debris entry in the atmosphere, Polytechnique**

Given a trajectory of an object entering the atmosphere, the aim of the project was to estimate robustly the characteristics of the object. Project at the Space Centre of Polytechnique involved:

- Physical modelling of the fall
- Bayesian regression of parameters
- Elaboration of surrogates through Gaussian processes
- Coding algorithm from scratch

Professional experience

- *2021 - 2022* **Junior Data engineer, Doc.ai (a ShareCare company), Remote**

Full time position following a research internship on keypoint detection. Worked on several Computer vision projects in the HealthTech industry.

•Myasthenia Gravis study

The project aims to quantify the measurement of eyelid drooping for Myasthenia Gravis patients, to create a digital tool for tracking of disease symptoms for remote clinical trials. • Use of state-of-the-art convolutional neural networks

- Design of training strategies of the networks
- Management of large datasets and the implications for input pipelines
- Design and labelling of new databases specific to Myasthenia Gravis

•Medication label reading

The project aims at creating a software (named pupil) that recognizes drugs based on a photo of their packaging. I arrived in the stage of production before integrating pupil to ShareCare's app

- Creation of robust, readable and tested code
- Cooperation and coordination with a team of 15
- Memory and computation cost optimisation

- *2020 - 5 months* **Research intern, INRIA Saclay Île-de-France**

Research internship on robust optimisation.

- Developed a method to speed up the learning of a quantile of a random quantity of interest (like the fuel efficiency of a plane)
- Implemented machine learning and Bayesian methods
- Proved mathematical guarantees for the method
- Showed significant improvements on synthetic data and demonstrated proof of concept

Additional information

- **Computer skills:**
  - Programming
    - Python:
      - standard algorithms: data structures, sorting algorithms, etc.
      - Data analysis: data treatment, pipelines.
      - TensorFlow with a focus on Deep Learning
    - LateX
    - Java
    - Golang
    - C++: bases
  - Cloud:
    - Use of Google cloud Virtual Machines
    - Novice use of AWS

- **Language**: French (native), English (complete proficiency), Spanish (B2-C1, practiced Spanish for 3 months in Chile)

- **Extra-curricular:** Rowing (Stroke of Polytechnique's rowing team in French national championship), sailing.