curriculum vitæ of
Sebastian Partarrieu

Master's student passionate about Applied Mathematics and Computer Science

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Education

Sep. 2019 – Jul. 2023 **M.S.** Applied Mathematics and Computer Science — Mines ParisTech | part of PSL University

The cycle ingénieur civil of Mines ParisTech is inherently multidisciplinary and one of the most prestigious[1] curriculums in France. Students enter after taking nationwide exams ranking them across scientific and literary disciplines. **GPA: 3.89/4.0.**

Major subjects: Mathematics, Physics and Computer Science. Specific modules: Stochastic, Integral and Differential Calculus, Optimization, Deep Learning for Image Analysis, Advanced Data Science, Signals Processing, Operations Research, Databases & Networking, Mobile application development, Computer Architecture. Miscellaneous: Quantum Physics, Statistical Physics, Microeconomics, Industrial Economics, Sociology.

Sep. 2017 – Jul. 2019 **B.S. equivalent** Mathematics, Physics and Chemistry — Lycée Privé Sainte-Geneviève

Two year multidisciplinary, intense and competitive curriculum in preparation for nationwide exams ranking France's top students[2] for entrance into the top graduate schools. **GPA: 3.91/4.0.**.

Major subjects include Mathematics, Physics, Chemistry and Computer Science.

Research & Work Experience

Oct. 2021 – Apr. 2022 **Visiting Graduate Researcher** — Cornell University

Advisor: Prof. Dan Landau (Landau lab is part of Weill Cornell Medicine and the New York Genome Center). Projects :

- Data analysis of single-cell multi-omics to address cancer evolution with a focus on gliomas. Extensive use of python, R, bash & slurm and a High Performance Computing (HPC) environment to deal with very large datasets.

Mar. 2021 – Aug. 2021 **Visiting Researcher** — Harvard University

Advisor: Prof. Jia Liu. Projects (corresponding publications are listed further below):

- Signal processing and statistic analysis of neural signals from mesh electronics Brain-Machine Interfaces in lifespan recordings of behaving mice using python (and all relevant scientific computing libraries) in a HPC environment.
- Self-supervised deep neural networks for multi-modal analysis of single-cell data. Extended use of pytorch and Ray for distributed execution and parallel hyperparameter tuning.

Jul. 2020 – Aug. 2020 **Research Intern (Summer)** — National Physical Laboratory (NPL)

Advisor: Dr. Jenny Venton.

- Deep learning for supervised detection of cardiac conditions from raw multi-channel electrocardiogram timeseries in tensorflow. Testing was performed on public datasets such as PTB Diagnostic ECG Database or PTB-XL, with a focus on the diagnostic classes, and showed average class-wise (macro) AUC of 0.9 (>= state-of-the-art at the time).

Nov. 2019 **Data Analyst Intern** — Prüftechnik group | CRC Laboratory Mines ParisTech

- Developed a Machine Learning (ML)-based predictive maintenance platform prototype for both early warning and health prognostics. Developped primarily in python and trained on years of windfarm accelerometer data (sklearn, tensorflow, Flask for REST API).

Projects, Skills & Activities

Projects[3] include:

- Using style transfer powered by deep learning (CycleGAN) to create a Virtual Reality (VR) application with Unity & C# plunging the user into the immersive worlds of Van Gogh, Monet and many others...
- Developped a mobile application linking small store owners with nearby customers. Front-end was written using React Native and back-end in Python - Flask (REST API), PostgreSQL.
- Worked with E-Cube to improve the valuation accuracy of Natural Gas (NG) storage facilities. Three complementary python modules can (1) webscrape (Selenium) relevant data , (2) generate scenarios of spot and forward prices of NG markets (just numpy for efficiency) and (3) solve the optimization problem of optimal buying/selling strategy (scipy).

[1] Generally ranked #2 or #3 Grande Ecole d'Ingénieur in France whilst PSL ranked 21st worldwide in CWUR 2021
[2] Ranked #1 Classes Préparatoires aux Grandes Ecoles in France
[3] For a complete overview of the different projects: sebastianpartarrieu.github.io and https://github.com/SebastianPartarrieu

Technical skills: Advanced knowledge of Python and its scientific libraries/deep learning frameworks (pandas, scipy, sklearn, tensorflow, keras, pytorch, ...), Flask, Git, R, bash. Comfortable programming in a *nix environment. Knowledge of HTML, CSS/Sass, JS and React Native, PostgreSQL, LaTeX, Arduino and C#.

Linguistic skills: French (native), English (native - TOEFL 119/120), Spanish (advanced), Chinese (beginner).

Activities: Tennis team of Mines ParisTech, Ski, Philosophy, Writing, Hiking and lots and lots of Reading.

Publications

Authors who contributed equally to a publication are marked by †. Corresponding authors are marked by *.

Journal Publications

1. Siyuan Zhao†, Xin Tang†, **Sebastian Partarrieu**†, Shiqi Guo, Ren Liu, Jaeyong Lee, Zuwan Lin, Jia Liu*. Tracking neural activity from the same cells during the entire adult life of mice. Manuscript under review by Nature Neuroscience, preprint available, doi: https://doi.org/10.1101/2021.10.29.466524

2. Paul Le Floch†, Siyuan Zhao†, Nicola Molinari, Eder Medina, Junsoo Kim, Hao Sheng, **Sebastian Partarrieu**, Chanan Sessler, Guogao Zhang, Xiao Wang, Katia Bertoldi, Boris Kozinsky, Jia Liu*. Fluorinated elastomers for scalable single-cell brain electrophysiology. Manuscript under review by Nature, preprint coming soon.