

Rémy Torro

PH.D., DATA SCIENTIST

Marseille, France

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Physicist with applied experience in programming, data analysis, and deep learning (AI). Leveraging a strong scientific and technical foundation to solve complex problems through creative approaches.

Experiences

Post-doctoral researcher

Marseille, France

Centre Interdisciplinaire de Nanosciences de Marseille (CINaM)

06/2024 - 07/2024

- Development of appropriate benchmarks to test segmentation, classification, and regression performance of traditional methods and AI models on test data, validating model performance before production
- Internship supervision (M2 bioinformatics) in software development, designing cell pair descriptors and an intuitive viewer/annotation tool

Ph.D. candidate (view thesis)

Marseille, France

Laboratoire Adhésion & Inflammation (LAI) and CINaM

10/2020 - 04/2024

- **Data analysis:** quantified and modeled the kill rate of immune cells boosted by new therapeutic products from multi-channel optical microscopy movies, showing cell density dependence and interindividual variations
- **Scientific discovery:** described and measured the spreading decision rate of immune cells on surfaces mimicking the surface of cancer cells that correlates with the kill rate
- **Collaborations:** assembled Celldetective, a versatile software developed organically with and for my collaborators, often foreigners (assist. engineer, master, Ph.D. students, post-docs) to perform the studies above autonomously. Delivery of image analysis/time series pipelines (local and international collaborations). Internship supervision (M1 physics) to simulate dynamic cell populations

Project highlights

Celldetective (Source code | Preprint)

04/2023 - today

- **Goal:** allow experimentalists to test biological/therapeutical conditions by measuring cell interactions from microscopy images with single-cell resolution
- **Challenges:** mixed cell populations, high density, heterogeneous and partial fluorescence marking, imaging and experimental conditions varying regularly, important data volume, users not expected to code
- **Delivery:** Python package featuring an intuitive and complete graphical interface (PyQt) to automatize segmentation, tracking, and cell measurements, cellular event detection for one or two populations in co-presence, in batch over many movies. Software is very versatile thanks to graphical (no-code) annotation and training of AI models. Currently the engine for data analysis in 4 different projects.

Traction force microscopy image alignment (Source code | Preprint)

12/2020 - 02/2021

- **Goal:** alignment of images to detect tiny bead motion (cells pulling on gels)
- **Techniques:** bead tracks analysis to estimate the image-to-image drift (often subpixel), correction in Fourier space
- **Delivery:** a user-friendly Jupyter notebook alongside a Python package; the precise alignment led to the discovery of previously undetectable immune cell traction activity patterns

Education

Ph.D. in Physics

Université Aix-Marseille, 2020 - 2024

MSc in Physics

Université Aix-Marseille, 2018 - 2020

BSc in Physics

University of Calgary, Canada, 2017 - 2018

Certifications

2023	Machine learning in Python with scikit-learn	En ligne
2021	FIDLE	En ligne
2014	University of Cambridge ESOL Examinations - Advanced Certificate in English	Luynes, France

Programmation	Python3 (tensorflow/keras, pandas, numpy, scipy, scikit, PyQt, unitary tests, versioning) ImageJ/Fiji macro, GitHub/ReadTheDocs, Mathematica, HTML (basic), Javascript (basic), C++ (basic)
Languages	French, English (expert), Italian (basic)