Mayalen Etcheverry

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Research Interests

Machine Learning • Complex systems • Artificial Curiosity • Collective Intelligence • Scientific Discovery

Education

INRIA, Flowers team | Poietis company — Bordeaux, FR
Ph.D. in Machine Learning, Advisors: Dr. Pierre-Yves Oudeyer, Dr. Clément Moulin-Frier, Dr. Marc Nicodeme — 2020–Current

- Thesis: "Automated Discovery of Self-Organized Structures in Morphogenetic Systems"

Tufts University, Allen Discovery Center The Levin Lab — Boston, USA
Visiting scholar, Advisor: Dr. Michael Levin — aout –dec 2022

- Development of tools to simulate and explore the behavior of gene regulatory networks
- Application of curiosity algorithms to study forms of proto-cognitive navigational skills in these systems, and to deduce possible interventions to guide the system towards target states

University College of London (distinctions, GPA: 4.0) — London, GB
M.Sc. in Computer Vision, Computer Graphics and Imaging — 2016–2017

- Thesis: "Making parametric models of buildings easier to edit by predicting future edit patterns in the Open3D platform", Thesis Supervisor: Dr. Paul Guerrero

Télécom Paris, Top-ranked French school in digital technologies **(GPA: 3.6)** — Paris, FR
M.Eng. in Computer Graphics (major) and Data Science (minor) — 2014–2017
B.Sc. in Computer Science

Engineering School Preparatory Classes (GPA: 3.8) — Bordeaux, FR
Undergraduate program in mathematics and physics to prepare the national competitive entrance exams to the *Grandes écoles* — 2012–2014

R&D Work Experience

INRIA, in the Flowers project-team — Bordeaux, FR
Research Engineer, Supervisor: Dr. Pierre-Yves Oudeyer — 2019 –2020

- Unsupervised Representation Learning for Intrinsically-Motivated Exploration of Complex Systems.
- Development of a modular and dynamic network architecture where a hierarchy of behavioral characterization spaces is progressively constructed, allowing flexible representations and intuitive guidance during the discovery process.

Siemens Healthineers — Princeton, USA
Research Scientist Intern, Supervisor: Dr. Bogdan Georgescu and Dr. Sasa Grbic — 2017-2018

- Deep Learning for organ segmentation in 3D CT Scans: responsible for implementing the preprocessing/training/evaluation pipeline for 10 organs. Practical Experience with Large Databases.
- Research and development of a deep reinforcement-learning algorithm for localizing anatomical structures in 3D images.

Publications

Conferences

[1] **M. Etcheverry**, C. Moulin-Frier, and P.-Y. Oudeyer, "Hierarchically organized latent modules for exploratory search in morphogenetic systems", *Neural Information Processing Systems (NeurIPS)*, 2020, [link].

[2] C. Reinke, **M. Etcheverry**, and P.-Y. Oudeyer, "Intrinsically motivated discovery of diverse patterns in self-organizing systems", *International Conference on Learning Representations (ICLR)*, 2020, [pdf].

[3] **M. Etcheverry**, B. Georgescu, B. Odry, T. J. Re, S. Kaushik, B. Geiger, N. Mariappan, S. Grbic, and D. Comaniciu, "Nonlinear adaptively learned optimization for object localization in 3d medical images", in *Deep Learning in Medical Image Analysis and Multimodal Learning for Clinical Decision Support*, [link], Springer, 2018, pp. 254–262.

Workshops

[6] E. Plantec, G. Hamon, **M. Etcheverry**, P.-Y. Oudeyer, C. Moulin-Frier, and B. W.-C. Chan, "Flow lenia: Mass conservation for the study of virtual creatures in continuous cellular automata", *WIVACE Workshop - International Workshop on Artificial Life and Evolutionary Computation*, 2022, [link].

[7] **M. Etcheverry**, P.-Y. Oudeyer, and C. Reinke, "Progressive growing of self-organized hierarchical representations for exploration", *ICLR Workshop - Beyond "Tabula Rasa" in Reinforcement Learning (BeTR-RL)*, 2020, [link].

[8] **M. Etcheverry**, B. Georgescu, B. Odry, T. J. Re, S. Kaushik, B. Geiger, N. Mariappan, S. Grbic, and D. Comaniciu, "Nonlinear adaptively learned optimization for object localization in 3d medical images", *NeurIPS Workshop - Medical Imaging Meets NeurIPS (MED-NeurIPS)*, 2018, [link].

Blogposts

[9] G. Hamon, **M. Etcheverry**, B. W.-C. Chan, C. Moulin-Frier, and P.-Y. Oudeyer, *Learning Sensorimotor Agency in Cellular Automata*, 2022. [Online]. Available: https://developmentalsystems.org/sensorimotor-lenia/.

[10] **M. Etcheverry**, B. Wang-Chak Chan, C. Moulin-Frier, and P.-Y. Oudeyer, *Meta-Diversity Search in Complex Systems, a Recipe for Artificial Open-Endedness ?*, 2021. [Online]. Available: https://mayalene.github.io/evocraftsearch/.

[11] **M. Etcheverry**, *Intrinsically Motivated Discovery of Diverse Patterns in Self-Organizing Systems*, 2020. [Online]. Available: https://developmentalsystems.org/intrinsically_motivated_discovery_of_diverse_patterns.

Patents

[12] **M. Etcheverry**, B. Georgescu, S. Grbic, D. Comaniciu, B. L. Odry, T. Re, S. Kaushik, B. Geiger, and M. S. Nadar, "Adaptive nonlinear optimization of shape parameters for object localization in 3d medical images", 2019, [US Patent App. 16/270,918].

Talks

- Invited talk - From Cells to Societies, Collective Learning across Scales - ICLR Workshop [vidéo] — april 2022
- Interview with Dr. Nicholas Guttenberg about my work [transcripts] — feb 2022
- Oral presentation and poster, NeurIPS 2020 [vidéo] [poster] — dec 2020
- Oral presentation - Beyond 'tabula rasa' in reinforcement learning - ICLR 2020 Workshop [vidéo] — april 2020
- Poster - Deep Learning in Medical Image Analysis - MICCAI 2018 Workshop [poster] — sep 2018

Competitions and Awards

- Jean Walter Zellidja Mobility Research Scholarship, given by French Academy 2022
- UBGRS Mobility Research Scholarship, given by Bordeaux University 2022
- Runner-up prize at the Minecraft open-endedness challenge holded at GECCO 2021 [blogpost] 2021
- "Coup de coeur" prize for poster submission at stereotype busters national competition 2016

Open-source Projects

- Automated Discovery Tool: interactive software for automated discovery of patterns in the exploration of complex systems
- EvoCraftSearch: source code fo my participation to the MineCraft open-endedness challenge in GECCO 2021
- HOLMES: source code fo the NeurIPS 2020 paper, together with the associated webpage
- Automated Discovery of Patterns in Lenia: source code for the ICLR 2020paper, together with the associated webpage

Academic Projects

- Open-Innovation Program (FIRST, 2016)
  Selected and coached by BNP-Parisbas, Orange and Nokia. Interdisciplinary team of engineers, designers and managers. Designed and implemented an interactive Runner Game in C++/OpenGL. Tracking of the player's finger with infrared LED. Project was displayed at Paris Center for digital creation.
- M.Sc. Final Research Project (Jun-Aug 2017)
  Learning edit patterns of a procedural model's parameters to assist in modeling buildings in the Open3D plaform.
- M.Sc. main projects (2017)
  - Vision: Segmentation, panoramas, tracking systems, dense stereo, 3D reconstruction, visual SLAM (Matlab)
  - Image/Video: Poisson Editing, NLM, restoration of old films, multiview video textures (Matlab)
  - 3D Geometry: ICP, Smoothing (C++/Eigen/OpenGL)
- Inverse Kinematics (Team of 4, June 2016)
  IK system to predict the most likely 3D body pose given a set of constraints and visualization tool (QT/OpenGL).

Skills

- **Programming:**
  - Python, PyTorch, Jax
  - C++, OpenGL, Matlab, Qt
  - Flask, HTML, CSS, JavaScript
  - Bash, Slurm
  - Git
- **Typesetting:** LaTex
- **Operating Systems:** Linux / macOS

Languages

- **French:** native speaker
- **English:** advanced
  - **TOEFL:** score of 102/120
- **Spanish:** advanced
  - **OIB:** International Option Baccalaureate with Honors
- **Croatian:** elementary

Mentorship

- Scientific mediation and mentoring for high-school student girls
- Co-supervisor of 6-months research internships (Gautier Hamon, Erwan Plantec)
- Co-supervisor of 3-month research internships (Marion Schaeffer, Lucie Galland)