Tom Marty

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Github | LinkedIn | Twitter

Education

Ph.D. in Machine Learning — Jan. 2024 –
MILA - Montréal Institute of Learning Algorithms - GPA 4.00 — *Montréal, Canada*

M.Sc. in Machine Learning — Sep. 2021 – Jun. 2023
Polytechnique Montréal - GPA 3.91 — *Montréal, Canada*

B.Sc. in Computer Science, minor in Applied Mathematics — Sep. 2018 – Jun. 2021
***X 2018**, Ecole Polytechnique - GPA 3.84* — *Palaiseau, France*

Lycée Jean-Baptiste Say — Sep. 2016 – Jun. 2018
"Classe préparatoire" Intensive multi-disciplinary preparation - GPA 4.00 - Top 0.1% national — *Paris, France*

Research Interest

- **Broad interest** : Artificial intelligence, Machine Learning, Generative AI and Operational Research
- **Methodological interest** : **Causality**, Bayesian Statistics, OOD Generalization, Information Theory
- **Applications** : Fairness, Robust Machine Learning, Open-Ended Decision Making, AI for video-games

Industry and Academic Experience

Visiting Researcher — Apr. 2023 – Sept. 2023
ServiceNow Research — *Montréal, Canada*
- Developped WorkArena (ICML2024): an open-source Benchmark and Gym environment for evaluating Agent at solving common-knowledge tasks on a Web Browser

Research Supervisor — Jan. 2022 – Sept. 2022
Corail Research Group — *Montréal, Canada*
- Supervised five interns on the development of the open-source project SeaPearl
- Teaching Assistant for the course INF8215 given by Quentin Cappart in Fall 21 and Fall 22

Research Engineer Intern — Jan. 2021 – Sept. 2021
Corail Research Group — *Montréal, Canada*
- Developped *SeaPearl* : an open-source RL-driven generic Constraint Programming solver
- Used Deep Q-networks and Heterogeneous GNNs to approximate optimal decision process

Software Engineer Intern — Jun. 2020 – Sept. 2020
Dronisos, drone light show company — *Bordeaux, France*
- Developed *Harmony*, a Physics based meta-heuristic that secures massive drone swarms
- *Harmony* - currently in use - reduced the allocated securing time from 2 weeks (handmade) to 2 seconds
- Achieved automatic securing on the company first 1000 drones choreography (+500k$ show)

Publications

Learning a Generic Value-Selection Heuristic Inside a Constraint Programming Solver
Tom Marty*, Tristan François, Pierre Tessier, Louis Gautier, Léo-Boisvert, Louis-Martin Rousseau, Quentin Cappart (extended version)
Constraint Journal, 2024 — **under review*

WorkArena: How Capable Are Web Agents at Solving Common Knowledge Work Tasks?
Alexandre Drouin, Maxime Gasse, Massimo Caccia, Issam H Laradji, Manuel Del Verne, **Tom Marty**, Léo Boisvert, Megh Thakkar, Quentin Cappart, David Vazquez, Nicolas Chapados, Alexandre Lacoste
International Conference on Machine Learning (ICML). 2024. Project Code PDF

The Unsolved Challenges of LLMs as Generalist Web Agents: A Case Study
Rim Assouel*, **Tom Marty***, Massimo Caccia, Issam H. Laradji, Alexandre Drouin, Sai Rajeswar, Hector Palacios, Quentin Cappart, David Vazquez, Nicolas Chapados, Maxime Gasse, Alexandre Lacoste
Foundation Models for Decision Making Workshop (NeurIPS). 2023. PDF

Learning a Generic Value-Selection Heuristic Inside a Constraint Programming Solver
Tom Marty*, Tristan François, Pierre Tessier, Louis Gautier, Louis-Martin Rousseau, Quentin Cappart
Constraint Programming (CP). 2023. Code PDF

Other Projects

Leveraging Information Theory to create better optimizers | *Python, Pytorch Lightning* May. 2024 –
- Work in progress...

On the Necessity of Human Insight and Causality to Improve Adversarial Robustness Mar. 2024 –
- Work in progress...

WorkArena : an Open-Source Benchmark for evaluating Web Agents | *Python* Apr. 2023 – Mar. 2024
- Paper accepted at ICML 2024 Vienna, presented at NVIDIA GTC 2024

SeaPearl : an Open-Source RL-driven Constraint-Programming Solver | *Julia* Fev. 2021 – Jul. 2023
- Paper accepted at CP2023, Toronto

Adversarial Attacks on Sentiment Classification models | *Python, HuggingFace* Fev. 2022 – May. 2022
- Adversarial fine-tunning on large NLP models : Eleuther AI GPT 125M/1.3B/2.7B/6B parameters
- Evidence of a correlation between scaling and robustness against increasingly subtle Adversarial Attacks

Diffusion Geodesic distance for non-linear dimensionality reduction | *Python* Oct. 2021 – Jan. 2022
- Approximated the geodesic distance using a diffusion process over the manifold
- Proposed a new data visualization algorithm based on Multi-Dimentionnal Scaling and Diffusion Geodesic

Autonomous Drone Swarm Deployment - DGA contest | *Python, PyTorch* Nov. 2020 – Mar. 2021
- Multi-agent Q-Learning method for deployment optimization
- Density-Based Spatial Clustering for point of interest detection

Realtime 3D Deep Motion Capture | *C++, OpenCV, PyTorch* Oct. 2020 – Dec. 2020
- Implemented a method of inferring a full character's 3d pose using only a camera as an input
- Inspired by a EECV 2020 research paper to implement the algorithm

Sketch-based Shape Retrieval | *Python, C++, OpenGL* Sep. 2020 – Dec. 2020
- Implemented a method to find any specific 3d model in a database using a drawing as an input
- Succeeded to faithfully retrieve several simple 3D shapes by using a single drawing given by a user

Visit my website to delve into these projects...

Honors and Awards

Distinguished Paper Award at CP2023, Toronto Sept. 2023
MITACS Accelerate scholarship of two units for my internship at ServiceNow Research Mar. 2023
Oustanding Investment Mention, Ecole Polytechnique de Paris Jul. 2022
Vallet Fondation scholarships for outstanding CPGE students 2018

Teaching Experience

Teaching Assistant Fall 2022
INF8215, Artificial Intelligence : Algorithms and methods
Teaching Assistant Fall 2021
INF8215, Artificial Intelligence : Algorithms and methods
Teaching Assistant Nov. 2018 – Mar. 2019
Ministry of National Education *France*
- Responsible for a group of up to 20 undergraduate students during scientific workshops
- Worked alongside the academic team to prepare students for entrance exams

Reviewing and Community service

Reviewer, Montréal Artificial Intelligence Symposium — MAIS2024 Sept. 2024

Reviewer, Constraint Programming — CP2023 August. 2023

Student Association

Public Speaking Club: Rethorix Oct. 2019 – Oct. 2020

- Organization of an eloquence contest between the schools of the Plateau de Saclay

President of Nuit du Styx Nov. 2020

- General organization and logistic of an electronic music festival gathering more than 2000 peoples

Skills & Hobbies

Languages: French : Native | English : Fluent | Russian : Primary
Developer Toolbox: Git, Pytorch, Lightning, Hydra, WandB, VScode, SLURM, CI testing
Programming Languages: Python, Julia, C++, R

Remote Controlled UAV: Conception, Building, Programmation, Testing, Adjustment
Activities: Outdoor climbing, river surf, ski, montain hiking

Reference

Prof. Dhanya Sridhar (Ph.D. advisor)
Assistant Professor at UdeM, Core academic member at MILA - AI CIFAR Chair holder
Email : dhanya.sridhar@mila.quebec

Dr. Alexandre Lacoste
Staff Research Engineer, ServiceNow Research
Email : alexandre.lacoste@servicenow.com

Prof. Quentin Cappart (M.Sc. advisor)
Assistant Professor at Polytechnique Montréal
Email : quentin.cappart@polymtl.ca