Mauricio Tec

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US work authorization: No sponsorship required

Work Experience

Harvard University, Computer Science, Research Scientist, 2024–date

1. Developed a new LLM agent framework for sequential resource allocation problems in public health and industry, using RL to improve the environment reward and an LLM-judge interpretability reward.
2. Researching novel online RLHF methods to better utilize weak LLM judges.
3. Conducting analysis and experiments to quantify the impact of token vs. action level RL strategies on reasoning and generalization in interactive environments for LLM agents.

Harvard University, Harvard Data Science Initiative (HDSI), Research Scientist, 2022–date

1. Worked with domain experts from the NSAPH lab to develop new AI methodology driven by environmental and public health problems.
2. Created an AI team within the HDSI developing methods on RL, GenAI, causal modeling, and GNNs, achieving publications in top conferences (e.g. ICLR, AAAI, KDD), and securing $1.5M writing grant proposals.
3. Designed a 3-hour workshop on LLMs as Autonomous Agents with excellent attendent feedback.
4. Investigating a new guidance-based transfer learning method for generative discrete diffusion-based LLMs.
5. Designing an agentic software stack to reduce the data processing workload of the HDSI data team.

Facebook AI Research (FAIR), Research Intern, 2020

Implemented model-based reinforcement learning baselines for the MuJoCO robotic simulator, performing code optimizations and algorithmic improvements to outperform the original Dreamer algorithm.

Intel, AI Intern, 2019

Benchmarked the corruption of neural network predictions in edge hardware systems without error correction code. Developed a mitigation strategy to increase resiliency. Tested on ResNet ImageNet benchmarks.

CIEstrategias, Data Scientist, 2016–2017

Implemented a software stack for daily portfolio optimization used in production by the asset management team. This stack combined machine learning from the Bank's historical and real-time databases with expert forecasts, resulting in effective stable risk-controlled investment recommendations.

CIDAC Think-tank, Data Analyst, 2013–2014

Prototyped a fraud detection toolkit (R, Python) for the National Health System in Mexico (IMSS), using empirical number laws (Benford's law) to detect fraud in insurance claims. Assisted in data analysis across teams.

Education

Ph.D. in Machine Learning, The University of Texas at Austin, USA, 2017–2022

1. Conducted research at the Learning Agents Research Group and published RL and robotics research at top-tier ML conferences.
2. Competed in the international Robocup competition working on vision and behavior, achieving fourth and fifth place in the SPL league.
3. Collaborated on multiple cross-disciplinary projects developing statistical machine learning applications.
4. Led the development of a critical statistical model that UT Austin used to issue policy recommendations to the city of Austin during the early Covid-19 pandemic.

M.Sc. in Mathematics, University of Cambridge, UK, 2014–2015
B.Sc. in Applied Mathematics, ITAM, Mexico, 2007–2012

Top Skills

- Reinforcement Learning: RL for LLM-based policies, off-policy learning, imitation learning, active learning, etc.
- LLM Training & Agents: Reasoning and prompting techniques, finetuning (SFT, RLHF), efficient training (LORA, quantization, gradient accumulation, distributed training), RL through the chain of thought.
- Generative model training: Diffusion models (DDPM, DDIM), autoencoders, diffusion-based LLMs, GANs.
- Deep learning & LLM training libraries: PyTorch, HuggingFace, OpenAI Gym, scikit-learn, numpy, Pandas, etc.
- Programming languages: Python (proficient); C++ (working knowledge).
- Software development: Github (PRs, issues), containers, pipelines, clusters, advanced debugging.
- Statistics: hypothesis testing, Bayesian inference, uncertainty estimation, causal modeling, A/B testing.

Languages

English (proficient), Spanish (native), French (advanced), Japanese (learning).

Example Projects

📜 **Rule-Bottleneck RL: Learning to Decide and Explain for Sequential Resource Allocation via LLM Agents** (2025)
Developed RBRL [Paper], a framework for LLM agents in interactive environments that generates prioritization strategies via an LLM, refines them with a trainable RL policy, and uses selected rules to guide the actions of an LLM agent. In benchmarks from real-world motivated use cases, RBRL achieves higher reward and interpretability than baseline RL finetuning methods for LLM agents in interactive environment (e.g., PPO + LORA).

👩‍🏫 **LLM as Autonomous Agents Workshop @ The Harvard Data Science Initiative** (2025)
Designed a hands-on workshop on LLM agent training, covering agentic frameworks, memory, planning, reasoning, and ReAct tool-using implementations. Demonstrated LLM training techniques, including supervised fine-tuning (SFT) and RL using low-rank adaptation (LORA) using various examples [Video, Materials].

🤖 **Competing in Robotics and Language Agent Challenges** (2019, 2021, 2022)
(1) Competed in the international RoboCup SPL league for autonomous soccer robots, finishing in top five (2021, 2022). Developed a lightweight real-time vision model trained in PyTorch and deployed in C++/TFLite [Paper].
(2) Placed 10th at TextWorld Competition (2019) with a language agent using Monte Carlo Tree Search and attention-based memory query mechanism.

Selected Publications

* indicates shared first authorship; ** indicates senior authorship.

1. **Tec M***, Xiong G*, [...], and Tambe M. *Rule-Bottleneck RL: Learning to Decide and Explain for Sequential Resource Allocation via LLM Agents*. Under review. https://arxiv.org/abs/2502.10732. 2025
2. Considine E [...] and **Tec M****. "Optimizing Heat Alert Issuance with Reinforcement Learning". In: *AAAI*. 2025
3. Battiloro C*, Karaismaglou E*, **Tec M***, Dasoulas G*, [...], and Dominici F. "E(n) Equivariant Topological Neural Networks". In: *ICLR*. 2025
4. Mauricio Tec. "LLM Policies for Text-based Reinforcement Learning: An Interactive Tutorial". In: *Workshop on Training Agents with Foundation Models RLC*. 2024
5. **Tec M**, Duan Y, and Müller P. "Bayesian Sequential Design and Reinforcement Learning: A Comparative Tutorial". In: *The American Statistician* (2022)
6. Narayanaswami S, **Tec M**†, ..., and Stone P. "Towards a Real-Time, Low-Resource, End-to-end Object Detection Pipeline for Robot Soccer". In: *Robot World Cup XXV Proceedings*. 2022
7. Durugkar I, **Tec M**, Niekum S, and Stone P. "Adversarial Intrinsic Motivation for Reinforcement Learning". In: *NeurIPS* (2021)
8. Holman B, Anwar A, Akash S, **Tec M**, Hart J, and Stone P. "Watch where you're going! Gaze and head orientation as predictors for social robot navigation". In: *IEEE ICRA* (2021)

Open-source Projects

- `weather2alert` (2024) ☀️. A Python simulator for training reinforcement learning (RL) agents to optimize the issuance of heat alerts to minimize health impacts. Companion to the AAAI 2025 paper. URL: `https://github.com/NSAPH-Projects/weather2alert`.
- `SpaCE` (2023) 🚀. A Python package providing the first benchmarking toolkit for spatial causal inference. Companion to the ICLR 2024 paper. URL: `https://github.com/NSAPH-Projects/space`.
- `weather2vec-app` (2022). Provides access to trained self-supervised embeddings for weather variables capturing spatial patterns for causal studies. Users can specify locations and time points. Companion to the AAAI 2023 paper. URL: `https://huggingface.co/spaces/mauriciogtec/w2vec-app`.
- `AdaptiveRejectionSampling.jl` (2018) Julia Package for super-fast sampling of log-concave densities, handy in efficient Bayesian inference. Currently used as a component of other community Julia packages. URL: `https://github.com/mauriciogtec/AdaptiveRejectionSampling.jl`

Workshop Organization

- 👾 Organization chair (2024). The Training Agents with Foundation Model Workshop @ RLC. 🏗️
- ⚽ Organizing committee (2023). Robocup: Standard Platform League. 🤖
- Organizing committee (2022). WCB @ ICML Workshop.
- Co-organizer (2021). RL in Statistics Reading Group.

Peer-review Service

RLC (2025), ICML(2025), KDD(2024), NeurIPS (2023), AAAI (2023), WCB@ICML (2022), IEEE (2022), AISTATS (2023, 2021).