Tamás Madarász - CV

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Experienced machine learning researcher with a background in both fundamental and applied research, and a track record of successfully productionizing impactful NLP and reinforcement learning models.

Research Interests

• Reinforcement Learning • Natural Language Processing • Causality • Generative Models • Continual & Meta Learning • Bayesian Statistics • Combinatorial Optimization • Model-Based Planning • Computer Vision

Application Domains

• LLMs for customer service, data analytics and digital assistants • Predictive analytics and optimization in finance • RL for chip design • Compiler Optimization • Drug discovery

Programming Languages and Libraries

• Python • Tensorflow • Pytorch • Keras • Theano • Spark • Matlab • C++ • Pandas

Work experience

Machine Learning Lead (VP), JPMorgan Chase Oct 2022 -
Overseeing the International Consumer Bank's **NLP initiatives** as team lead.
Developing, fine-tuning, and deploying **language models and LLM-based applictions**:

• **Client Intelligence** model for topic and sentiment analysis and summarization
• **Quality Assurance** to ensure in real-time that customer service follows proper guidelines
• **Agent Assist**, an internally facing digital assistant using RAG
• using **multi-agent reinforcement learning** for improving the veracity of LLMs.

Staff Research Scientist/Deep Learning Researcher Dec 2021 - Oct 2022
Mediatek Research
Led applied research **automating chip design using reinforcement learning**, and fundamental research in the domains of responsible decision making and continual reinforcement learning [1].

ML Researcher, AI Theory Group, Huawei UK R&D Dec 2020 -Dec 2021
As part of the AI Theory team in Noah's Ark lab, I developed solutions using **RL and planning** for applied problems in **combinatorial optimization/compiler optimization**, and contributed to a new compositional **transfer learning** algorithm for computer vision [2].

AI/ML fellow, GlaxoSmithKleine Jun 2020 -Dec 2020
At GSK I worked on reinforcement learning algorithms to assist scientists in the **drug discovery process**, by learning about and leveraging human expertise from databases of past experimentation cycles.

Postdoctoral fellow, University of Oxford &UCL Mar 2018 - May 2020
Developed sample-efficient deep reinforcement learning algorithms that quickly adapt to solve new tasks in a continual and multi-task learning setting [4], and by decomposing complex task structures into subtasks [3].

Postdoctoral fellow, University of Geneva Oct 2015 - Dec 2017
Researched reinforcement learning and planning algorithms for partially observable decision problems and developed a dynamical systems model of representation learning for sensory systems in the brain [6].

Education

PhD	Center for Neural Science, New York University Advisors: Joseph E. LeDoux and Joshua P. Johansen.
BA (Hons.)	Mathematics, Trinity College, University of Cambridge.
Diplôme Superieur d'Enseignement	Ecole Normale de Musique de Paris (Master's M2, Cello)
Diplom	Robert-Schumann-Academy, Düsseldorf Master of Music in Performance (Cello)

Awards

2019 NeurIPS travel award
2015 RLDM travel fellowship
2015 COSYNE travel grant
2014-2015 Samuel J. and Joan B. Williamson Dissertation Fellowship
2014 NYU Dean's Dissertation Fellowship
2014 NYU Dean's Travel Grant award
2009-2014 MacCracken Graduate Fellowship
• Cambridge Overseas Trust and Trinity College full undergraduate scholarship
• Scholar of the French Government and the Île-de-France Regional Council

Publications

Liu R*, **Madarasz TJ***
Planning into the fog of uncertainty: when to observe in partially observable planning tasks.
Under review

[1] **Madarasz TJ** (2022)
LPI: Learned Positional Invariances for Transfer of Task Structure and Zero-shot Planning.
***ICML**, 39th International Conference on Machine Learning, Workshop on Responsible Decision Making in Dynamic Environments.*

[2] Parisot S, Esperanca PM, McDonagh S, **Madarasz TJ**, Yang Y, Li Z (2022)
Long-tail Recognition via Compositional Knowledge Transfer.
***CVPR**, 2022 IEEE Conference on Computer Vision and Pattern Recognition .*

[3] **Madarasz TJ** , Behrens TEJ (2020)
Learning transferable task schemas by representing causal invariances.
***ICLR**, Eighth International Conference on Learning Representations, Causal learning for decision making workshop.*

[4] **Madarasz TJ**, Behrens TEJ (2019)
Better transfer learning with inferred successor maps.
***NeurIPS**, 33rd Conference on Neural Information Processing Systems, Vancouver, Canada.*
Spotlight oral presentation *(<3% of submissions).*

[5] **Madarasz TJ**, Behrens TEJ (2019)
Inferred predictive maps in the hippocampus for better transfer learning. **RLDM**, *Multidisciplinary Conference on Reinforcement Learning and Decision Making, Montreal.*

[6] Yamada Y*, Bhaukaurally K*, **Madarasz TJ,** Pouget A, Rodriguez I, Carleton A (2017)
Context- and output layer-dependent long-term ensemble plasticity in a sensory circuit.
***Neuron**, Volume 93 , Issue 5 , 1198 - 1212.*

[7] **Madarasz TJ,** Diaz-Mataix L, Akhand O, Ycu EA, LeDoux, JE, Johansen JP (2016)
Evaluation of ambiguous associations in the amygdala by learning the structure of the environment. ***Nature Neuroscience** 19, 965–972.*

[8] **Madarasz TJ**, LeDoux JE, Johansen JP (2015) Evaluating predictive variables by a dual system of structure and parameter learning. **RLDM**, *Multidisciplinary Conference on Reinforcement Learning and Decision Making, Edmonton.*

Conference Presentations

Madarasz, TJ, Behrens TEJ (2019) Flickering hope? Inferred hippocampal maps and splitter cells support multi-task learning COSYNE: *Computational and Systems Neuroscience.*

Fink AE, **Madarasz TJ**, LeDoux JE (2015) Short-term plasticity as a homeostatic mechanism in the lateral amygdala. *Society for Neuroscience.*

Madarasz TJ, Diaz-Mataix L, Akhand O, LeDoux JE, Johansen JP (2015) Evaluating ambiguous associations in the amygdala by learning the structure of the environment. COSYNE: *Computational and Systems Neuroscience, Salt Lake City, Utah.*

Madarasz TJ, Johansen JP, LeDoux JE (2013) Causality and its neural underpinnings in active and passive aversive learning. *Society for Neuroscience.*

Madarasz TJ, Diaz-Mataix L, Boyden SE, LeDoux JE, Johansen JP (2012) Temporally specific optogenetic inactivation of lateral amygdala pyramidal neurons reverses the effects of contingency degradation on fear learning. *Society for Neuroscience.*

Madarasz TJ, Roy SS, Boyden ES, LeDoux JE, Johansen JP (2011) Making predictions in a complex world: mechanisms of contingency degradation in fear conditioning. *Society for Neuroscience.*

Gervan P, Berencsi A, **Madarasz TJ,** Kovacs I (2010) Development and plasticity of primary visual and motor function in humans. *II. Dubrovnik Conference on Cognitive Science.*

Reviewing

Science, Nature Neuroscience, Biological Cybernetics,
IBM Journal of Research and Development, CVPR,

Mentorship

David Ireland, PhD Intern, MediaTek Research
Antonin Vidon, Intern, Huawei R&D UK
Frank Catuela, Undergraduate Researcher, NYU.
Omar Akhand, Undergraduate Researcher, NYU.
Samit Roy, Undergraduate Researcher, NYU.

Internships

RIKEN Brain Science Institute 2012, 2013