

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, fine-tuning, developing and deploying language models and **LLM-based** algorithms, including
• **Client Intelligence** model for topic and sentiment analysis and summarization (*selected as a long talk at the 2023 JPMorgan AI summit*)
• **Quality Assurance** for call center quality monitoring
• **Agent Assist** digital assistant to help call center specialists.
Built **causal forecasting and optimization** models that guided leadership's decision-making in setting rewards program conditions and interest rates for the bank.

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 for applied problems in the domains of **combinatorial optimization and planning for compiler optimization**, and a new compositional **transfer learning** algorithm for computer vision [2].

AI/ML fellow, GlaxoSmithKline

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 Supérieur 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