Lazar Valkov

Curriculum Vitae

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lazarvalkov.github.io/

My research focuses on enhancing the learning efficiency of neural networks to reduce their reliance on large data sets, by developing principled Continual Machine Learning and Neurosymbolic methods.

Education

2016–2021 **PhD**, *ANC: Machine Learning*, University of Edinburgh, UK
Thesis: "Modular Lifelong Machine Learning" under Charles Sutton

2015-2016 **MSc**, *Computer Science*, University of Oxford, UK
Thesis: "Paper Recommendation for Scientific Conferences" under Yee Whye Teh

2011-2015 **BSc**, *Computer Science w Ind Placement*, Newcastle University, UK, 82.5 (First)
Thesis: "Automated Organ Segmentation in Images of Pig Red Offal" under Thomas Ploetz

Experience

Sep 2021 – Present **Postdoctoral Researcher**, *MIT-IBM*, Cambridge, MA
Working on continual pretraining of foundation models.
PI on two research grants with collaborators from MIT, focusing on Continual Learning and addressing the position bias of LLMs for Retrieval Augmented Generation (RAG).
Advised MIT students and an IBM intern.

Jun – Oct (2019) **Research Intern**, *Meta AI*, London
Developed a generative objective for finetuning transformers on textual entailment datasets.
Advisors: Vassilis Plachouras, Guillaume Bouchard, Sebastian Riedel

Jun – Oct (2018) **Applied Science Intern**, *Core ML, Amazon*, Berlin
Developed a new method for Bayesian hyperparameter optimisation using sampling aided by transfer learning, which achieved state-of-the-art results.
Supervisor: Rodolphe Jenatton

Jan 2017 – May 2020 **Tutor**, *School of Informatics*, University of Edinburgh
- Probabilistic Modelling and Reasoning (MSc)
- Machine Learning Practical (MSc)

Jul 2017 **AI Summer School**, *Microsoft Research*, Cambridge

Jul 2015 – Aug 2015 **Research Intern**, *Geek Talent*, Sunderland
Developed an ontology-based approach to matching online profiles across social networks.

Jul 2013 – Jul 2014 **Software Development Intern**, *Waterstons*, Durham
Collaborated with an international team on a European file hosting service.

Grants

PI **MIT-IBM: Towards a Complete Lifelong Learning Algorithm**, *1 Year*
In collaboration with Navid Azizan (MIT)

Co-PI **NSA: Towards neural-symbolic AI systems for improving security of information technology systems**, *1 Year*
In collaboration with Masataro Asai (IBM), Subhro Das (IBM), Erik Hemberg (MIT), Una-May O'Reilly (MIT)

Scholarships and Awards

2018 NeurIPS 2018 Travel Award
2016 EPSRC - PhD Scholarship
2014 Major Hacking League - Hackathon medal for "Most Impressive Solution"
2013 Newcastle University - Highest Year 2 marks in Computing Science
2012 Netcraft - Award for top 5 high-performing Year 1 Computing Science students
2011-2015 Newcastle University - Excellence Scholarship

Publications

Lazar Valkov, Akash Srivastava Charles Sutton, and Swarat Chaudhuri. *A Probabilistic Framework for Modular Continual Learning.* ICLR 2024

Lazar Valkov, Dipak Chaudhari, Akash Srivastava Charles Sutton, and Swarat Chaudhuri. *HOUDINI: Lifelong Learning as Program Synthesis.* NeurIPS 2018

Akash Srivastava, **Lazar Valkov**, Chris Russell, Michael U. Gutmann and Charles Sutton. *VEEGAN: Reducing Mode Collapse in GANs using Implicit Variational Learning*. NeurIPS 2017.

Workshop Papers

James Seale Smith, **Lazar Valkov**, Shaunak Halbe, Vyshnavi Gutta, Rogerio Feris, Zsolt Kira, Leonid Karlinsky. *Adaptive Memory Replay for Continual Learning*. Workshop on Efficient Large Vision Models, CVPR 2024 (**Spotlight**)

Lazar Valkov, Rodolphe Jenatton, Fela Winkelmolen, Cédric Archambeau. *A simple transfer-learning extension of Hyperband.* Workshop on Meta-Learning, NeurIPS 2018

Lazar Valkov, Dipak Chaudhari, Akash Srivastava Charles Sutton, and Swarat Chaudhuri. *Synthesis of Differentiable Functional Programs for Lifelong Learning*. NAMPI Workshop, ICML 2018

Under review

Ethan Garza, Erik Hemberg, Subhro Das, Masataro Asai, **Lazar Valkov**, Una-May O'Reilly. *Probing Context Relevance and Input Position in Retrieval Augmented Generation.* 2024

Iris Kremer, Ethan Garza, Erik Hemberg, Subhro Das, Masataro Asai, **Lazar Valkov**, Una-May O'Reilly. *A Mechanistic Interpretability Study of Position Bias in GPT-2* 2024

Academic Service

Reviewer for ICLR, ICML and NeurIPS (top 50% highest-scoring reviewer in 2019)