Annik Yalnizyan-Carson MSc, PhD

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Creative solutions-oriented AI/ML product manager, driven to continually expand my skillset. Passionate about building AI products making use of human wisdom to tackle real-world problems. 8 years experience developing AI solutions across industry and academic research. Specialization in in deep reinforcement learning, intelligent tutoring systems, and adaptive learning for aerospace and defense. Skilled communicator able to distill complex concepts to fundamental intuitions for all stakeholders, helping to foster collaboration within diverse teams.

Key Skills

Tools and Languages	Python – PyTorch, Tensorflow, scikit-learn, NumPy, SciPy, matplotlib, pandas MATLAB, R, SQL, Unix/bash, Git, LaTeX
Quantitative Research	Computational modelling, mathematical optimization, statistical analysis, neural network architecture design, graph theory, partial differential equations
Communication	Project management, technical writing, data visualization, scientific communication

Relevant Experience

Adaptive Learning Product Lead | AI Redefined   **Oct 2022 – Present**

Building AI products using AIR's software Cogment, an orchestration platform for human in the loop AI training

- Led team of 7 developers to build Cogment Adaptive Learning, an AI-based training tool for personalized assessment, feedback, and targeted adjustment of simulation-based learning content. Drove planning, design, and implementation of AI roadmap aligned with company's vision and objectives
- Managed projects from POC to deployment for clients in aerospace and defense, totalling over 1M in revenue
- Continued product evangelism through public speaking engagements, written communications, and presentations, including ICAO Innovation Fair (Mar 2024), World Summit AI Americas (April 2024)

Research Associate | Montréal Institute for Learning Algorithms (MILA)   **Sep 2019 – Dec 2021**

Continuation of doctoral research making reinforcement learning agents more efficient using caching systems

- Designed and implemented automated end-to-end data pipeline to manage parallel simulations collecting 100s GB of data on SciNet high performance computing cluster
- Created analysis toolkit for large synthetic data sets using Python (pandas), including programmatic error detection and reporting, and data visualization tools with Python, ElasticSearch, and Kibana
- First author publication in *Frontiers in Computational Neuroscience*
- Implemented peer mentorship initiative within larger lab group. Held weekly mentorship meetings with junior graduate students to discuss navigating academia, flesh out research goals and progress, and provide feedback on written and oral presentation materials.

Research Assistant | University of Toronto   **Jan 2016 – Dec 2021**

Doctoral research exploring similarities and differences between learning in machines and the brain

- Developed algorithms improving data efficiency of reinforcement learning with data retrieval mechanisms patterned after biological memory systems. Created Python code base to solve tasks within the OpenAI gym (now Gymnasium) framework with deep neural networks (Pytorch/Tensorflow)
- Secured over $65,000 in funding from fellowships, grants, and merit-based awards
- Fostered collaborative projects with both industry (Mightex Systems) and research (Netherlands Institute for Neuroscience) partners, both leading to publications
- Created GradOverflow, a graduate level workshop series on using computational tools in biology research

Writer | AsapSCIENCE   **Oct 2014 – Feb 2018**
Science communication videos for a general-audience YouTube channel with 10M subscribers
- Worked independently and in teams to pitch topics, source primary research material, and storyboard videos.
- Researched, wrote, and edited scripts on topics within biology, nutrition, and neuroscience

EDUCATION

University of Toronto
- Doctor of Philosophy | Computational Neuroscience   **2022**
  Dissertation: Episodic Control - The Role of Memory in Decision Making (Supervisor: Blake Richards)
- Master of Science | Cell & Systems Biology (Neuroscience)   **2015**
  Thesis: Modeling Regulation of KCC2 Phosphorylation as a Mechanism for Inhibitory Synaptic Plasticity
- Honours Bachelor of Science | Mathematics and Neuroscience   **2013**
  Thesis: Characterizing Epileptiform Neural Activity - Time Series Analysis of Neurophysiologyical Recordings

PRESENTATIONS & SPEAKING ENGAGEMENTS

Training the Next Generation of Pilots with AI-Assisted Simulator Tools | World Summit AI   **2024**
Innovation Fair - Startup Round Table | International Civil Aviation Organization   **2024**
Improving Model-Free Control with Episodic Caching | Reinforcement Learning & Decision Making Conference   **2019**
Episodic Caching in RL Tasks with Changing Rewards | Society for Neuroscience   **2018**
Nanosymposium: Animal Cognition & Behaviour - Learning & Memory: Cortical-Hippocampal Interactions
Spatiotemporal Changes to Efficacy of KCC2 in Inhibitory STDP | Canadian Association for Neuroscience   **2016**

PUBLICATIONS

- **AI-Powered Adaptive Learning: Simulator-based Training of Skilled Operators in Aviation**
  Annik Yalnizyan-Carson, Bernard Slede, Clodéric Mars. Whitepaper with AI Redefined, 2023.
- **Forgetting Enhances Episodic Control with Structured Memories**
  Annik Yalnizyan-Carson, Blake A. Richards. Published in Frontiers in Computational Neuroscience, 2021.
- **Activity-Dependent Regulation of Mitochondrial Motility in Developing Cortical Dendrites**.
  Catia A.P. Silva, *Annik Yalnizyan-Carson*, M. Victoria Fernández Busch, Mike van Zwieten, Matthijs Verhage, Christian Lohmann. Published in eLife, 2021.
- **Patterned Illumination Systems for Optogenetics in Neuroscience**.
  Annik Yalnizyan-Carson, Blake A. Richards, Dominic Krakowski. Whitepaper with Mightex Systems, 2015.

VOLUNTEERING & OUTREACH

Faculty Member | IBRO-Simon's Computational Neuroscience Imbizo   **Jul 2019 – Jan 2024**
Intensive month-long training course in computational neuroscience for top-tier African & international scientists
- Participated in organization & execution of course, including applicant selection and academic content creation, focus on reinforcement learning, fundamentals of neural networks, and foundational math for machine learning
- Supervised 24 short-term graduate-level research projects for students interested in machine learning, neural network optimization and reinforcement learning

Co-Op Supervisor | Toronto District School Board   **Feb 2021 – May 2021**
8-week program for high school students to learn about work of a research scientist
- Supervised student to complete research project using deep reinforcement learning in a gridworld environment

Reviewer | NeurIPS Biological and Artificial Intelligence Workshop   **2019 – 2020**
Series Creator and Organizer | Grad Overflow Workshop   **2016 – 2019**
- Organized tutorials and peer mentorship for graduate students on theory and use of computational tools
- Covered topics such as basics of Python, R, plotly, databasing

Ladies Learning Code Technical Mentor | Canada Learning Code   **2019**
Coach | Harbord Collegiate Institute Coding Team   **2019**
Mentor | Scadding Court Community Centre Youth Science Program   **2013 – 2016**

Workshops & Conferences

Neural Information Processing Systems Biological and Artificial Intelligence Workshop | Vancouver, BC   **2019**
Computational Systems Neuroscience (COSYNE) Workshop | Lisbon, Portugal   **2019**
Deep Learning & Reinforcement Learning (DLRL) Summer School | Montréal, QC   **2017**
IBRO-Simons Computational Neuroscience Imbizo (ISICNI) | Cape Town, South Africa   **2017**
Computational Systems Neuroscience (COSYNE) Workshop | Salt Lake City, UT   **2016**
Toronto Computational Neuroscience Workshop | Krembil Research Institute   **2016**
Connaught Summer Institute on Synthetic Biology | University of Toronto   **2014**
Comprehensive Course on Fluorescence Microscopy | Advanced Optical Microscopy Facility, MaRS Centre   **2014**
NEURON Summer Course | University of California San Diego   **2013**

Awards

Doctoral Completion Award | University of Toronto   **2019 – 2020**
Doctoral Fellowship Award | University of Toronto   **2015 – 2019**
VCC Graduate Award in Zoology | Department of Cell & Systems Biology   **2018**
ISICNI Scholarship Award | IBRO-Simons Computational Neuroscience Imbizo   **2017**
Mentorship Grant (with Blake Richards) | Computational Systems Neuroscience (COSYNE) Meeting   **2016**
Frederick P. Ide Graduate Award | Department of Cell & Systems Biology   **2015**
Masters Fellowship Award | University of Toronto   **2013 – 2015**