Eric Elmoznino

Cognitive Neuroscience Artificial Intelligence

Contact

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Websites









Education –

PhD | Computer Science Université de Montréal 2022-Now

MA | Cognitive Science Johns Hopkins University 2019-2020

BASc | Computer Engineering University of Toronto 2014-2019

DCS | Health Sciences Dawson College 2012-2014

Skills -

Languages/Frameworks

Python, Matlab, C++, C, C#, Swift/iOS, PyTorch, TensorFlow, JavaScript, HTML, CSS, Flask, LaTeX

Subjects/Techniques

Machine learning, MVPA, Computational modeling, Human vision, Linguistics, Full-stack web

Spoken Languages

English, French (Fluent in both)

Interests -

Mind, Brain, and AI

Consciousness, Causal reasoning, Knowledge representation, Rapid OOD generalization, Lifelong learning, Modularity/compositionality, Vision

2020

2018-19

2017

2017

Public Speaking

Technical presentations, Teaching

Other Disciplines

Data Science, Genetics, Astrophysics, Philosophy of mind, Epistemology

Hobbies

Reading, Piano, Snowboarding, Tennis, Basketball, Ice hockey

Researc	n Positions & work experience
2022-Now	AI Researcher Université de Montréal, Montreal, QC Development of AI with inductive biases from conscious high-level cognition, supervised by Profs. Guillaume Lajoie and Yoshua Bengio
2020-Now	Data Science Instructor Teach lectures on machine learning topics at a full-time data science bootcamp to students with no coding background
2019-2022	Cognitive Science Researcher Johns Hopkins University, Baltimore, MD Research on information representation and algorithms in the visual system of the human brain with Prof. Michael Bonner
2021	Computational Neuroscience TA Neuromatch Academy, Remote Lead groups of students through tutorial exercises ○ Review lecture material and answer student questions
2017-19	Machine Learning Researcher ModiFace, Toronto, ON Work on computer vision machine learning models for the beauty industry ∘ Research papers on makeup rendering and skin condition diagnostics using deep learning
2018	Computer Vision Contractor Work on computer vision machine learning models related to facial perception for a mobile app that automatically makes photo albums of babies for new parents
2016	Software Developer Intern Orbis Investments, Vancouver, BC Full-stack web development using Angular JS, Angular Material, ASP.NET MVC, Web API, and SQL Server in order to improve internal workflow efficiency for financial reporting
2012-14	Private, Infantry Division Canadian Armed Forces (Reserves), Valcartier, QC Discipline and weapons training o Participation in combat and reconnaissance exercises
Projects	
2021-Now	Dimensionality and Manifold Geometry of Visual Representations Quantifying the relationship between a) the geometry of representations in a CNN and b) its similarity to visual cortex
2020-21	Multiplicative Feature Interactions as Neural Computations Investigation into multiplicative interactions between features as a canonical neural computation o Use in models of neural data
2019-20	Computational Modeling of Human Scene Representation Design of deep neural networks to model how humans represent environments o Comparisons to behavioural and neural data
019-20	Stimulus Synthesis for Brain Region Manipulation

Generative model of images that would elicit a desired pattern of

Language Model With Compositional Grammar Inductive Bias

Tree-RNN provided part-of-speech tags and sentence parses in order

Mobile app and algorithms to record, transcribe, and store your conversations, as well as later retrieve their content through search

Music generating machine learning model that uses DBN's conditioned on the state of LSTM's to probabilistically play different notes

Machine learning model that uses CNN's to predict it's own position

and orientation, trained using synthetic data from my ray tracer

brain activity in a given region o Behavioural experiments

to learn compositional representations of language

The History of You (human memory augmentation)

Music-Generating AI

Spatially-Aware AI

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Publications

Visual representations derived from multiplicative interactions. Elmoznino E., & Bonner M. F. NeurIPS Workshop SVRHM

A new procedure, free from human assessment that automatically grades some facial skin structural signs. Comparison with assessments by experts, using referential atlases of skin ageing. Jiang R., Kezele I., Levinshtein A., Flament F., Zhang J., Elmoznino E., Ma J., Ma J., Coquide J., Arcin V., Omoyuri E., Aarabi P. International Journal of Cosmetic Science

Conference Talks & Posters

- 2022 (Talk) Latent dimensionality scales with the performance of deep learning models of visual cortex. Elmoznino E., & Bonner M. F. Vision Sciences Society
- 2021 (Talk) Model dimensionality scales with the performance of deep learning models for biological vision. Elmoznino E., & Bonner M. F. *Neuromatch 4.0*
- 2021 (Poster) High-performing computational models of visual cortex are marked by high effective dimensionality. Elmoznino E., & Bonner M. F. Vision Sciences Society

Invited Talks

- 2020 How does the brain work? Cognitive science research SABES
- 2020 Introduction to Programming with Python UofTHacks

Patents

- Image-to-image translation using unpaired data for supervised learning. Elmoznino E., Kezele I., Aarabi P. U.S. Patent Application No. 17096774. Washington, DC: U.S. Patent and Trademark Office
- System and method for augmented reality using conditional cycle-consistent generative image-to-image translation models. Elmoznino E., Ma H., Kezele I., Phung E., Levinshtein A., Aarabi P. *U.S. Patent Application No. 20200160153(A1)*. Washington, DC: U.S. Patent and Trademark Office
- 2020 Machine image colour extraction and machine image construction using an extracted colour.

 Elmoznino E., Aarabi P., Zhang Y. U.S. Patent Application No. 16854975. Washington, DC: U.S. Patent and Trademark Office
- Automatic image-based skin diagnostics using deep learning. Jiang R., Ma J., Ma H., Elmoznino E., Kezele I., Levinshtein A., Charbit J., Despois J., Perrot M., Antoinin F., Flament R.S., Parham A. *U.S. Patent Application No. 20200170564(A1)*. Washington, DC: U.S. Patent and Trademark Office

Other Activities

- 2018 Instructor for ECE1780 University of Toronto, Toronto, ON Taught lectures for a graduate course on DNNs deployed to mobile devices under Prof. Parham Aarabi
- 2015-16 Finance Chair Electrical and Computer Engineering Club, Toronto, ON

Elected by peers at the University of Toronto to manage the club budget and plan social activities

2014-15 Class Representative Electrical and Computer Engineering Club, Toronto, ON

Elected by peers at the University of Toronto to represent student interest at faculty meetings

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Advising

2021-22 Atlas Kazemian
Masters (Cognitive Science)

2020-21 Adyant Balaji
Undergraduate (Computer Engineering & Cognitive Science)

Maro Maged Doce
Undergraduate (Neuroscience)

Johns Hopkins University, Baltimore, MD
University, Baltimore, MD
University, Baltimore, MD

Honors & Awards

2021	Elsevier/Vision Research Virtual Travel Award
2016	Class of 4T3 Engineering James Ham Award
2015	Class of 5T6 Award of Merit
2013	First Choice Science Award
2012	Quebec English Public Speaking (Provincial Finals) — Bronze Medal
2012	Governor General of Canada Academic Medal
2012	McGill Science Award and Scholarship
2012	A.J. Grant Shield and Scholarship
2012	Royal Bank of Canada Shield
2012	Davies Family Shield
2012	Eakeley Shield
2011	Quebec French Public Speaking (Provincial Finals) — Silver Medal