

Mathieu Tuli

✉ tuli.mathieu@gmail.com

🌐 MathieuTuli

☎ (613) 867-2372

EDUCATION

MSc in Computer Science

University of Toronto (Vector Institute affiliate)

Supervised by Sheila McIlraith and Scott Sanner

Toronto, Canada

Graduated: June 2022

GPA: 4.0/4.0

BASc in Computer Engineering with Honours

University of Toronto

Completed a 16-month Co-op

Toronto, Canada

Graduated: 04/2020

GPA: 3.61/4.0

AWARDS

Fellowships for Excellent Academic Standing (MSc)

All four terms of my degree

Tuition Fellowships (MSc)

All four terms of my degree

Dean's Honour List (BASc)

Fall 2016, 2017, 2019 | Winter 2016, 2018

President's Entrance Scholarship (BASc)

Fall, 2015

WORK EXPERIENCE

MSc Research

My Master of Science is the culmination of my five years of research and engineering in deep learning. For my thesis I studied the ability of deep learning agents to follow instructions in natural language environments. I also improved the state-of-the-art using temporal logic (from the AI planning field) in combination with deep learning techniques to build a framework where text-based reinforcement learning agents can better understand the text in their environment and complete their tasks. My work was applied to text-based games but has applications to other natural language environments, such as task-oriented dialogue, and in particular to environments where instruction following, interpretability, control, and successful completion of tasks is important.

University of Toronto | Multimedia Lab

Toronto, Canada

Machine Learning Researcher (Deep Learning Optimization)

05/2020 - 08/2020

- NSERC-CRD funded machine learning researcher, supervised by Mahdi Hosseini and Konstantinos Plataniotis.
- Researched adaptive optimizers, hyper-parameter optimization, and neural architecture search.
- Was responsible for model optimization and maintaining the end-to-end training/testing pipeline for the group.
- Co-authored a paper on hyper-parameter optimization, introducing an automatic optimization algorithm that outperforms existing state-of-the-art (Published at a NeurIPS 2021 Workshop).
- Co-authored a paper introducing a new adaptive optimizer based on new explainability metrics that quantify the quality of Neural Network training (Published at CVPR 2022).
- Co-authored a paper on neural architecture search, introducing a novel algorithm (Published at ICCV 2021).

IMRSV Data Labs

Ottawa, Canada

Machine Learning Engineer (Language and Vision)

05/2018 - 08/2019

- Machine Learning engineer at IMRSV Data Labs, a startup specializing in Natural Language Processing (NLP) and constructing highly organized and analyzable content for clients with unstructured data.
- Contributed to various NLP projects covering topics such as speaker diarization and speech-based word embeddings (for more efficient call center analysis).
- Independently designed and built a multi-camera object detection and tracking system for a large retail store that analyzed customer traffic in real time across various video streams.
- Researched image-to-image translation and procedural approaches (shape grammars) to automatically generate interior building floor plans from sparse exterior footprints.
- Consulted on client projects to evaluate their feasibility (from a business perspective) and propose plans of action.
- Aided in writing responses to numerous NLP and Computer Vision related Request for Proposals.

PUBLISHED WORK

Instruction Following in Text-Based Games. M. Tuli, A. Li, P. Vaezipoor, T. Klassen, S. Sanner, S. McIlraith (2022). Conference of the North American Chapter of the Association for Computational Linguistics (NAACL). (**Wordplay Workshop**).

Exploiting Explainable Metrics for Augmented SGD. M. Hosseini*, M. Tuli*, K. Plataniotis (2022). Conference on Computer Vision and Pattern Recognition (CVPR). (**Main Conference**).

Towards Robust and Automatic Hyper-Parameter Tuning. M. Tuli*, M. Hosseini*, K. Plataniotis (2021). Neural Information Processing Systems (NeurIPS). (**Optimization for Machine Learning Workshop**).

CONet: Channel Optimization for Convolutional Neural Networks. M. Hosseini, M. Tuli, F. Zhang, Z. Liu, A. Fu, J. Su, S. Hosseini, A. Kadakia, H. Wang, K. Plataniotis (2021). 2021 International Conference on Computer Vision (ICCV). (**Neural Architectures: Past, Present and Future (NeurArch) Workshop**).

PROJECTS & LEADERSHIP EXPERIENCE

Predicting the Effect of Urban Infrastructure on Climate Change

09/2019 - 04/2020

🔗 MathieuTuli/uhinet

- Led a team of engineers to innovate on an open-source tool that used satellite imagery to predict the effect of urban infrastructure on climate change.
- Built and trained the deep learning model, which is capable of predicting the effect of infrastructure development on temperature increases within 1 degree Celcius.
- Utilized semantically-rich RGB satellite imagery combined with semantic layouts such as building height and energy maps to predict a heat map of a region using image-to-image translation.

University of Toronto Hyperloop Team (UTHT) Chief Software Engineer

09/2019 - 08/2020

🔗 utht/pod1-software-core

- Led a team of 30 software engineers to collaboratively design and build a software communication and control system for our vehicle for SpaceX's Hyperloop student competition.
- Employed industry-style project management to give the team a sense of what software development is like outside of the classroom and what programming collaboratively in large groups is like.
- Taught various concepts, including object-oriented software design and collaborative programming.
- Maintained our large-team GitHub repository.
- Acted as the primary designer and programmer of our system.
- Implemented drivers for various hardware and built an onboard ethernet communication system.

RELEVANT COURSEWORK

MSc: Structured Learning and Inference, Computational Linguistics, Topics in Knowledge Reasoning and Representation, Neural Networks and Deep Learning, Algorithms for Collective Decision Making.

BASc: Computer Graphics, Natural Language Computing, Inference Algorithms and Machine Learning, Probability and Applications, Probabilistic Reasoning, Algorithms and Data Structures.

SKILLS

Spoken Languages: Native fluency in English and French.

Programming Languages: Proficient in Python, SQL, C, & C++. Experience in Solidity & MatLab. Some CUDA.

Deep Learning Frameworks: Proficient in PyTorch, TensorFlow, & Hugging Face. Proficient in Keras & JAX.

Deep Learning: Excellent understanding of deep learning techniques including Transformers, CNNs, RNNs, LSTMs, GRUs, attention models, deep learning methods (e.g. Reinforcement Learning), and optimization methods.

Other: Proficient in Docker, Git & Linux Terminal.