

Mathieu Tuli

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👤 MathieuTuli

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EDUCATION

MSc in Computer Science

University of Toronto (Vector Institute affiliate)

Supervised by Sheila McIlraith and Scott Sanner

Task-Oriented Dialogue | Machine Learning x Model-Based AI/Planning

Toronto, Canada

Expected Graduation: 01/2022

BASc in Computer Engineering with Honours

University of Toronto

Completed a 16-month CO-OP

GPA: 3.61/4.0

Toronto, Canada

Graduated: 04/2020

SUMMER SCHOOLS

ICAPS Online Summer School on Automated Planning & Scheduling

Online, 2020

RESEARCH EXPERIENCE

University of Toronto | Multimedia Lab

Machine Learning Researcher and Engineer (Optimization)

Toronto, Canada

05/2020 - 08/2020

- NSERC-CRD funded machine learning (ML) researcher supervised by Mahdi Hosseini and Konstantinos Plataniotis.
- Conducted research on adaptive optimizers, hyper-parameter optimization, and neural architecture search.
- Co-authored a paper on hyper-parameter optimization, introducing a fully automatic algorithm and new analytical response surface (to be submitted to ICLR 2021).
- Co-authored a paper introducing a new adaptive optimizer and explainability metrics that quantify the quality and predict generalization characteristics of neural networks (to be submitted to NeurIPS 2021).
- Co-authored a paper on neural architecture search (NAS), introducing a novel approach and algorithm for channel size selection (submission made to ICCV 2021).
- Co-supervised summer undergraduate students in NAS projects as well as in dataset curation for digital pathology.

IMRSV Data Labs

Machine Learning Researcher and Engineer (Language and Vision)

Ottawa, Canada

05/2018 - 08/2019

- ML researcher and engineering intern 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-to-vec (for more efficient call center analysis).
- Investigated the use of stacked light gradient boosting machines for scalable multi-label classification of feature represented videos (from the YouTube-8M dataset).
- Independently built an object detection and tracking system for a retail store that analyzed customer traffic across 5 video streams in real time. It generated insights including customer traffic in and outflows and cash-line wait times utilizing a pipeline of ML modules, such as object-detection and object-tracking.
- Researched the automatic generation of interior building floor plans given sparse exterior footprints using image-to-image translation and procedural approaches (shape grammars).
- Consulted on client projects to evaluate their feasibility and aided in responding to Request for Proposals.

PAPERS

Adas: Adaptive Scheduling with Low-Rank Factorization. M. Hosseini*, M. Tuli*, K. Plataniotis (2021). To be submitted at the 35th Conference on Neural Information Processing Systems (NeurIPS). **(Main Conference)**

Toward Robust and Automatic Tuning of Hyper-Parameters in Deep Learning. M. Tuli, M. Hosseini, F. Zhang, Z. Liu, A. Fu, J. Su, S. Hosseini, A. Kadakia, H. Wang, K. Plataniotis (2021). To be submitted at the 9th International Conference on Learning Representations (ICLR). **(Main Conference)**

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). Under review at the 2021 International Conference on Computer Vision (ICCV). **(Main Conference)**

A Study of Constrained Beam Search for Dialogue State Tracking. M. Tuli (2021). A conference-style paper completed as part of a course: Topics in Knowledge, Reasoning, and Representation.

Evaluating Sequence-to-Sequence Modelling for Dialogue State Tracking. M. Tuli, Sarvagya Agrawal (2021). A conference-style paper completed as part of a course: Neural Networks and Deep Learning.

PROJECTS & LEADERSHIP EXPERIENCE

Predicting the Effect of Urban Infrastructure on Climate Change

09/2019 - 04/2020

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- Led a team of engineers to innovate on an open-source tool that used satellite imagery to predict the effect of urban infrastructure development on climate change.
- Responsible for building and training the AI model, which is capable of predicting the effect of infrastructure development on temperature changes 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.
- Implemented the Pix2Pix image-image-translation model using Tensorflow 2.0.
- Built a clean command-line interface for training and testing.

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 programming and collaborative programming.
- Maintained our large-team GitHub repository.
- Acted as the primary designer and programmer of our system.
- Implemented drivers for various hardware, including onboard ethernet communication between different computers and Arduinos.

Relevant Coursework

Natural Language Computing, Computational Linguistics, Neural Networks and Deep Learning, Topics in Knowledge Reasoning and Representation, Algorithms for Collective Decision Making, Inference Algorithms and Machine Learning, Probability and Applications, Probabilistic Reasoning

SKILLS & INTERESTS

Spoken/Written Languages: English and French.

Programming Languages: Fluent in Python, C, & C++. Proficient in MatLab & Bash. Experience in CUDA.

Python Frameworks: Fluent in PyTorch, Numpy, Pandas, Tensorflow, HuggingFace, Fairseq, & Scikit-Learn.