

Muhammad Adil Asif

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EDUCATION

University of Toronto

September 2019 – June 2023

Honours Bachelor of Science in Computer Science

Toronto, Canada

Last Two Years GPA: 3.96/4.00 Overall GPA: 3.89/4.00

Dean's List 2022 - 2023 / 2021-2022 / 2020-2021. New College In-Course Scholarship 2022

PAPERS

- Matthew Choi, **Muhammad Adil Asif**, John Willes, David Emerson. FlexModel: A Framework for Interpretability of Distributed Large Language Models. In *Advances in Neural Information Processing Systems (NeurIPS) SoLaR Workshop*, 2023. **Spotlight**.
- Maria Attarian, **Muhammad Adil Asif**, Jingzhou Liu, Ruthrash Hari, Animesh Garg, Igor Gilitschenski, and Jonathan Tompson. Geometry Matching for Multi-Embodiment Grasping. In *Conference on Robot Learning (CoRL)*, 2023.

WORK EXPERIENCE

Associate Applied Machine Learning Specialist

May 2023 – Current

Vector Institute, LLM Infrastructure Team | PyTorch · Bash · Git · SLURM

Toronto, Canada

- I developed **VectorLM**, an open source package for optimized **distributed training** of LLMs up to **13B parameters** in resource-constrained environments. This tool is now being used by **~50 researchers**. Our tests showed that **VectorLM** can achieve a **20x** training throughput improvement using the same hardware, improving from **180 tokens/GPU/s to 3,750 tokens/GPU/s**.
- Contributed to developing **FlexModel**, a tooling software package for the interpretability of distributed LLMs. **FlexModel** received a **spotlight at the SoLaR Workshop, NeurIPS 2023**.

Deep Learning Student Researcher

May 2022 – September 2023

Vector Institute & UofT, Igor Gilitschenski's Group | PyTorch · Bash · Git · SLURM

Toronto, Canada

- I researched techniques to predict **grasp poses on novel objects using robot arm end-effectors**. This project was done in collaboration with **Google DeepMind** resulting in a paper accepted to **CoRL 2023**.

Applied Machine Learning Intern

January 2022 – September 2022

Vector Institute | PyTorch · JAX · Flax · Optax · Bash · Git · SLURM

Toronto, Canada

- I benchmarked models in different deep learning domains using PyTorch's benchmarking suite on several GPUs (e.g. A100s, A40s, etc.). The results were used to make an informed decision regarding the upgrade of **~150 of Vector's GPU machines**, determining the most cost-effective GPU options.
- Setup a synthetic datasets bootcamp for Vector's sponsors that consisted of providing support for **14 sponsor companies**.

Deep Learning Student Researcher

May 2021 – December 2021

Vector Institute & UofT, Roger Grosse's Group | PyTorch · W&B · Bash · Git · SLURM

Toronto, Canada

- Researched how overparameterization interacts with network pruning and generalization capabilities.
- I was responsible for running empirical experiments using different pruning algorithms such as IMP, SynFlow, and SNIP where we were able to get models like VGG-11 and ResNet-20 to perform nearly **4% better** than their baselines on CIFAR-100 with **98% of the weights pruned**.

Data Science Intern

September 2020 – March 2021

G42 | PyTorch · scikit-learn · Ray Tune · pandas · Bash · Git · SLURM

Abu Dhabi, UAE

- I developed the training/testing pipeline for a CNN model by tuning the fully connected layers of a ResNet model to detect Pulmonary Embolism in the lungs using CT scans.
- I lead a project to predict the onset of Sepsis in patients up to 6 hours before using an XGB model to achieve **0.85 AUROC/0.95 accuracy** scores on the test dataset.

TECHNICAL SKILLS

Languages/Tools: Python · C · Bash · SQL · L^AT_EX · Git · SLURM

Libraries: PyTorch · JAX · NumPy · pandas