**Anikait Lakhotia**

**Bachelor of Mathematics (Year 3)**

University Of Waterloo

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**LinkedIn:** https://www.linkedin.com/in/anikaitlakhotia

**GitHub:** https://github.com/AnikaitLakhotia

**Core competencies:**

* **ML / Data Science libraries and tools**: TensorFlow, Keras, PyTorch, Pandas, NumPy, Matplotlib, Scikit Learn and TensorBoard.
* **ML / Data Science Competencies**: Computer Vision, Natural Language Processing (NLP), Generative Adversarial Networks (GAN), Time Series, Structured Data, Reinforcement Learning (RL), Principal Component Analysis (PCA), Transfer Learning,

Random Forests, Support Vector Machines (SVM), Decision Trees, Ensemble Learning, Artificial Neural Networks (ANN), Dimensionality Reduction, Unsupervised Learning, Semi-Supervised Learning, Multivariate Regression, Classification, Linear Regression, Data Analysis, Feature Engineering and Selection, Data Cleaning.

* **Other technologies**: Unity engine, Jupyter notebook, Google Colab, .NET, Git, GitHub, Linux, PowerShell, VS Code, MS Excel, MS PowerPoint, MS Word.
* **Programming Languages**: Python, C, C++, C#, MATLAB, JavaScript, SQL, Typescript, Racket.
* **Programming Concepts**: OOP, Data Structures and Algorithms, Asynchronous Programming, Static Analysis, Command-line Scripting, Testing, Source Code Management, UI/UX, Version Control, REST API, Database design.

**Work Experience:**

**National Security Centre of Excellence (NSCOESN)**

**Research Intern**

**(May 2024 - Sept. 2024)**

Led a research project focused on developing innovative parallel algorithms for Explainable AI (xAI). The project aimed to enhance model efficiency, transparency, interpretability, and scalability, ultimately improving the performance and usability of AI systems.

# Georgia Institute of Technology

**AI Researcher - Part Time**

**(Jan. 2024 - Apr. 2024)**

Led a research project conceptualizing and developing programs for proving/disproving indistinguishability/equivalence of neural networks, which is currently an open problem in neural network verification.

# Waterloo Artificial Intelligence Institute

**AI Researcher - Intern - Full Time**

**(Sept. 2023 - Jan. 2024)**

Led a research project at the intersection of artificial intelligence and computational mathematics, collaborating with esteemed advisors from Georgia Tech, University of Windsor, and IIT Bombay. The focus was on discovering optimal matrix multiplication algorithms through the innovative utilization of SAT Solvers, Computer Algebra Systems and pseudo-Boolean Solvers.

**Key Achievements:**

* Spearheaded the project, conceptualizing and implementing innovative approaches to solve complex challenges in matrix multiplication algorithms.

* Developed, rigorously tested, and maintained an end-to-end pipeline built using Python and C++, ensuring seamless integration of diverse components and technologies.

* Formulated and executed plans for optimal project execution, effectively allocating tasks among co-authors, fostering a collaborative and productive team environment.

* Presented findings and progress updates to a diverse audience, showcasing the project's advancements and insights at various stages.

* Incorporated advanced mathematical concepts from Group Theory, Combinatorics, Graph Theory, Tensor Algebra, Commutative Algebra, and Mathematical Logic into the research, elevating the project's theoretical foundation.

* Conducted numerous experiments utilizing high-performance computing resources, demonstrating a commitment to empirical validation and real-world applicability.

This internship experience at the Waterloo Artificial Intelligence Institute not only deepened my knowledge and understanding of artificial intelligence but also honed my skills in project management, collaboration, and interdisciplinary problem-solving.

**AI Researcher - Part Time**

**(Dec. 2022 - Sept. 2023)**

Led a project centered around reverse simulations of Conway’s Game of Life (GoL) through the application of advanced Satisfiability Modulo Theories (SMT) Solvers. Engaged in the exploration of novel methodologies and techniques to enhance the efficiency and accuracy of the simulation process.

**Projects:**

## Computer Vision

1. Built an image-classification model on the CIFAR-10 dataset with 90% validation accuracy and less than 0.63 validation loss using learning rate scheduling, data augmentation, dropouts, batch normalization, hyperparameter tuning.
2. Built an image-classification model on the Fashion MNIST dataset with 94% validation accuracy and less than 0.38 validation loss using a custom-built CNN, L2 weight decay, hyperparameter tuning and various regularization techniques.

## Natural Language Processing

3. Built an IMDB movie-review-classification problem with 87% validation accuracy and 0.34 validation loss using LSTMs, Embedding, L2 weight decay, recurrent regularization, dropouts, hyperparameter tuning and various other regularization techniques.

## Generative Adversarial Networks

1. Built two face-generation models using Wasserstein GAN-GP framework for one and a Variational Autoencoder for the other.
2. Built two artwork-generating models using Neural Style Transfer technique for one and CycleGAN for the other.