Chris Cai

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Education

University of Wisconsin-Madison Expected June 2024
B.S in Computer Science and Mathematics, **GPA: 4.00/4.00**, **Dean's List** Madison, WI
Coursework: Mathematics Analysis, Algorithm, Object-Oriented Programming, Database, Linear Algebra, Differential Equations, Machine Learning, Probability, Combinatorics, Cryptography, Coursera Deep Learning Series from Andrew Ng
Achievement: National Gold Award in Canadian Open Mathematics Challenge, Second Prize in China Mathematical Olympiad Province, First Prize in Australian Mathematics Competition

Experience

Machine Learning Research Assistant with Professor Frederic Sala June 2022 - present

- Tune **GAN** model together with weak supervision to improve performance on data set CIFAR10 .
- Use fine tuned **Diffusion Model** to generate Breast Cancer image with **PyTorch** and **DreamBooth**.
- Implement an Optimizing Data Collection Algorithm that help to decrease the cost of data collecting, tested with **ResNet**.

Undergraduate Mathematics Research with Professor Caglar Uyanik Jan. 2022 - Sep. 2022
Madison Experimental Mathematics Lab

- Collaborated with a group of 4 to research on given two random elements of $SL_2(Z)$, what is the **probability** that they generate a free group.
- Use knowledge in Hyperbolic Geometry, Ping-Pong lemma, Group theory to develop theoretical support for the conjecture that most matrix in $SL_2(Z)$ are loxodromic .
- I implement an algorithm in **Python** to show that most matrices are loxodromic.

Projects

Java, C, and HTML

- Use **Java** and Dijkstra to implement a program that find the shortest highway between cities in U.S
- Using **Bootstrap 5**and **HTML** to build a personal website at clrt19.com
- Use **C** to implement a memory allocator that can initialize, allocate memory dynamically, and free.

Neutral Network

- Created and trained a model to recognize number from images using a data set from **MNIST** which consists of handwritten digits from 0 to 9.
- Implementation of **LeNet-5** convolution neural network model using **PyTorch** for the Mini Places detest.Training the LeNet-5 model in different configurations and evaluating it on a validation set of 10K images.

Skills

Programming Languages: C++/C, Java, Python, SQL, HTML, CSS, JavaScript, R
Mathematics Skills: Analysis, Linear Algebra, Differential Equation, Multi-Variable Calculus, Abstract Algebra, Probability, Combinatorics, Cryptography
Technologies and Tools: TensorFlow, PyTorch, Bootstrap 5, Git