

Neil He

(646) 617-5101 | [Email](#) | [Linkedin](#) | [Personal Website](#)

Introduction

I'm a senior at Yale university pursuing a joint BS/MS degree in mathematics and a minor in computer science, advised by Prof. Rex Ying. With over 5 years of theoretical and applied research experiences, I'm interested in pursuing graduate school in computer science, focusing on machine learning. My current research is in representation learning on structured datasets. Often times, a dataset (such as events on earth, which is approximately a sphere) exhibit the geometric and topological structure. I work on developing algorithms and deep learning models that effectively and efficiently learn on datasets that have additional geometric constraints, especially those that do not live in Euclidean space. I'm especially interested in hyperbolic spaces, where the negative curvature of the manifolds facilitates exponential growth in volume with distance from the origin, making them particularly suitable for processing hierarchical data. I'm also interested in HPC-enabled learning for science, with methods grounded in properties of the natural sciences.

Education

Yale University

Combined 4 years B.S./M.S. in Mathematics; minor in Computer Science

New Haven, CT

Expected May 2025

Research Experience

Graph and Geometric Learning Group at Yale

Undergraduate Researcher, Advised by Prof. Rex Ying

April 2023 - Present

New Haven, CT

- Design and create an end-to-end residual network that operates entirely on the Lorentzian ball model of hyperbolic space, with the goal of creating a novel hyperbolic learning model based on the Lorentz model for ResNet
- Creating a comprehensive library and benchmark for hyperbolic deep learning models to investigate often neglected effects contributed by properties such as hyperbolicity, curvature, etc

High Power Computing REU

Undergraduate Researcher, advised by Prof. Yu Liu and Prof. Ming-Cheng Cheng

May 2024 - July 2024

Potsdam, NY

- Designing and implementing a GPU-accelerated program that uses mathematical modeling grounded in physical properties to accurately and efficiently simulate temperature behavior on chips with tens of thousands of cores, to predict hotspots in real time for task management on GPU and CPU chips, [GitHub Link](#)

Efficient Computing Lab

Undergraduate Research Assistant

May 2022 - August 2022

New Haven, CT

- Use Rust and surface code to create a comprehensive research tool for quantum error correction simulation
- Create a user friendly Python interface for the quantum error correction simulator written in Rust, [GitHub Link](#)

Michaelson Lab at Harvard Medical School

Research Assistant

December 2018 - September 2021

Remote

- Collected data of human cellular allometry to study human growth and development
- Analyzed the data using Excel and Python; co-author on published paper
- Collected and analyzed data of Drosophila embryos to study the geometry of cell division

Industry and Work Experience

Scale AI

LLM Consultant

Feb 2024 - Sept 2024

- Oversee the training and deployment of large language models (LLMs) by providing strategic solutions and correction to over 5 large-scale training projects to meet customer needs.

Yale University

Teaching Assistant

Sept 2022 - Dec 2023

- Hold office hours and grade problem sets for the Data Structure, Set Theory, and Real Analysis courses at Yale

Publications/Preprints

papers can be found in links in my personal website

Neil He, Menglin Yang, Rex Ying. Lorentzian Residual Neural Network. *Full Paper accepted to **SIGKDD 2025**,
Extened abstract at **2024 ICML GRaM Workshop**. [Full PDF Link](#), [Extended Abstract Link](#)*

Neil He, Ming-Cheng Cheng, Yu liu. PyPOD-GP: Using PyTorch for Accelerated Chip-Level Thermal Simulation of the GPU. *submitting to SoftwareX Journal [Arxiv Link](#)*

Chodrow, P., Su, J., Lee, D., Ahmed, T., **He, N.**, Ruben, D. M., Tiwari, A., Mannherz, W., Citi, L., DiCorpo, D., Michaelson, J. S. (2021). How our cells become our selves: The Cellular Phylodynamic Biology of growth and development.