

Abel Gurung

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Education

Purdue University West Lafayette, IN
PhD in Computer Science

University of Southern Mississippi Hattiesburg, MS
Major: **Mathematics** **Summa Cum Laude**
Minor: *Computer Science and Biological Sciences*

Research Experience

Purdue University West Lafayette, IN
Machine Learning Research Assistant

Project: HyperAdaptation: Efficient Subspace Fine-Tuning of Large Language Models April 2024 – Present

- Developed a novel method for finetuning LLMs with significantly fewer parameters compared to LoRA

University of Southern Mississippi Hattiesburg, MS
Machine Learning Research Assistant

Project: Hybrid PDE-Deep Neural Network Model for Calcium Dynamics August 2022 – April 2024

- Built a deep neural network that models the Calcium ion channels as accurately as traditional ODE models

Chan Zuckerberg Biohub, San Francisco San Francisco, CA
Theory and Data Science Intern May 2023 – November 2023

- Studied the developmental trajectories of single cells using Single-cell RNA sequencing and RNA velocity
- Developed a novel method to find the transition path of developmental trajectories

Baylor College of Medicine Houston, TX
Biomedical Research Intern June 2022 - August 2022

- Studied how the Integrator complex regulates gene expression
- Compared the efficacy of CRISPR-based cytosine base editors (CBEs) to introduce stop codons within genes encoding Integrator subunits and analyzed effects on expression of Integrator regulated genes.

Bioinformatics Research Assistant

Project: Post-translational gene regulation through small regulatory RNAs February 2022 – June 2022

- Collected single-nucleus RNA (snRNA) genomic data of crop pests to study the role of RNA interference (RNAi)

Project: Global Gene Regulation of Virulence Staphylococcus Aureus September 2021 - February 2022

- Studied the effects of antimicrobial agents in different media for Staphylococcus Aureus

Work Experience

Telenutrition Center Hattiesburg, MS
Full-Stack Engineer November 2021- December 2023

- Maintain and upgrade health application used by researchers to collect data from participants
- Utilized Vue.js for front-end development and Ruby on Rails for back-end services

Publications

- Abel Gurung** and Joseph Campbell. HyperAdaptation: Efficient Subspace Fine-Tuning of Large Language Models. In submission for ICML, 2025
- Abel Gurung** and Qingguang Guan. Hybrid PDE-Deep Neural Network Model for Calcium Dynamics in Neurons. [Journal of Machine Learning for Modeling and Computing, 6\(1\), 1–21](#), 2024
- Sarah Ancheta^{1 *}, Leah Dorman¹, Guillaume Le Treut¹, **Abel Gurung**¹, Loïc A. Royer¹, Alejandro Granados^{1,2 *}, Merlin Lange^{1*}. Challenges and Progress in RNA Velocity: Comparative Analysis Across Multiple Biological Contexts. bioRxiv preprint <https://doi.org/10.1101/2024.06.25.600667>, 2024

Presentations

Gurung, Abel; “Modelling the Open Probability of Ion Channels using Deep Neural Network” (2024) Oral presentation presented at Mathematical Association of America (**MAA**) LA-MS

Gurung, Abel; “Investigating Cell Fate Trajectories Using Kinetic Monte Carlo” (2023) Oral presentation presented at Chan Zuckerberg Biohub Internship Symposium

Gurung, Abel; “Modelling the Open Probability of Ion Channels using Deep Neural Network” (2023) Oral presentation presented at University of Southern Mississippi and University of Southern Alabama

Gurung, Abel; “Testing the efficacy of cytosine base editors for making targeted mutations in the Integrator complex” (2022) Oral presentation presented at Baylor College of Medicine Smart Program

Honors & Awards

- University of Southern Mississippi Undergraduate Research Symposium – **1st Place** April 2024
- University of Southern Mississippi Business Pitch Competition April 2024
 - Received **\$1000** for CleanLabel
- Mathematical Association of America (**MAA**) LA-MS – **3rd Place – Student Paper Competition** March 2024
- Eagle SPUR Research Grant November 2023
 - Received **\$1000** research grant for Modeling Ion Channels using Machine Learning
- USM + VOXO Hackathon - Tech for Social Impact – **1st Place** November 2023
 - Created an application to better inform consumers about the food they consume
 - Received **\$2500** CleanLabel
- Wright W. Cross Fellowship
 - Competitive Scholarship awarded to students doing research in Mathematics August 2023
- University of Southern Mississippi Undergraduate Research Symposium – **1st Place** April 2023
 - Title: “Modelling the Open Probability of Ion Channels on Cell/Organelle’s Membrane”
- 3rd Annual VJ Canizaro, MD Health Summit Research Abstract – **1st Place** March 2023
 - Title: “Modelling the Open Probability of Ion Channels on Cell/Organelle’s Membrane”
- Wright W. Cross Fellowship
 - Competitive Scholarship awarded to students doing research in Mathematics August 2022
- Academic Excellence Scholarship – Merit based scholarship that covers full-tuition August 2021

Open-Source Contributions

[PlateParser](#) – Parse semi-structured microplate data

[PlateChain](#) – LLM for parsing semi-structured microplate data

[CellRank](#) – Dynamics from multi-view single-cell data

Projects

CleanLabel November 2023 - April 2024

- App to better inform consumers about the food they consume
- Built using Fastify/Node.js and Swift

Fine-tuned GPT-2 June 2020 - December 2020

- Fine-tuned GPT-2 model to mimic literature authors

Skills & Interest

- | | | |
|--------------|-----------------------|--------------------|
| • Python | • Stochastic Modeling | • Machine Learning |
| • C++ | • TensorFlow | • Pytorch |
| • JavaScript | • Hugging Face | • Keras |
| • SQL | • React | • Ruby on Rails |