Abel Gurung

abelgurung.ree@gmail.com | abelgurung.github.io | LinkedIn

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*

Internship

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.

Research Experience

Purdue University   West Lafayette, IN
Machine Learning Research Assistant
Project: HyperHyper: Parameter Efficient Fine-tuning   April 2024 – Present
- Developed an alternative approach for finetuning LLMS using lower rank matrices

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

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 Qingguang Guan. Hybrid PDE-Deep Neural Network Model for Calcium Dynamics in Neurons. arXiv preprint arXiv:2407.15364**,** 2024
- Sarah Ancheta[1] *, Leah Dorman[1], Guillaume Le Treut[1], **Abel Gurung[1]**, Loïc A. Royer[1], 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 Zuckerburg 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
- C++
- JavaScript
- SQL
- Stochastic Modeling
- TensorFlow
- Hugging Face
- React
- Machine Learning
- Pytorch
- Keras
- Ruby on Rails