Abel Gurung

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Education

University of Southern Mississippi   Hattiesburg, MS
Major: *Mathematics*   Expected Graduation: May 2024
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 (scRNA-seq) and RNA velocity
- Developed a novel method to find the transition path of developmental trajectories with defined initial and final states
- Pioneered a method to compute macrostate transition probabilities based on microstate transitions

Baylor College of Medicine   Houston, TX
Biomedical Research Assistant   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.
- Performed DNA extraction from E. coli, transfection of HEK293FT cells, total RNA extraction, cDNA preparation, qPCR, western blot, and KLD cloning

Research Experience

University of Southern Mississippi   Hattiesburg, MS
Machine Learning Research Assistant
Project: Modelling the Open Probability of Ion Channels on Cell/Organelle's Membrane   August 2022 – Present
- Built a deep neural network that models the probability of ion channels opening as accurately as traditional ODE models with less information
- Improve the model's performance by fine-tuning the neural network architecture and hyperparameters

Bioinformatics Research Assistant
Project: Post-translational gene regulation through small regulatory RNAs   *February 2022 – June 2022*
- Collected genome data of organisms to study the role of RNAi in crop pests
- Developed an algorithm to identify adapter sequences in unfiltered RNA datasets
- Preprocessed genome data for further analysis and interpretation

Project: Global Gene Regulation of Virulence Staphylococcus Aureus   September 2021 - February 2022
- Studied the effects of antimicrobial agents in different media for Staphylococcus Aureus
- Performed RT-PCR, gel-electrophoresis, and preparation of growth media

Work Experience

Telenutrition Center   Hattiesburg, MS
Full Stack Engineer   November 2021- May 2023
- Maintain and upgrade health application used by researchers to collect data from participants
- Built features to make interaction between researchers and participants more accessible
- Utilized Vue.js for front-end development and Ruby on Rails for back-end services, integrating USDA API to enhance the application with comprehensive nutritional information.

Presentation

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 on Cell/Organelle's Membrane" (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

- Cross-Scholar – 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
- Cross-Scholar – Competitive Scholarship awarded to students doing research in Mathematics — August 2022
- Academic Excellence Scholarship – Merit based scholarship that covers full-tuition — August 2021

Personal Project

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
- Vue
- React

- Machine Learning
- Pytorch
- Keras
- Ruby on Rails