Shaurya Goyal

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Education

Indian Institute of Technology (IIT), Kharagpur **2020 - 2025**
BS - MS in Economics CGPA: 8.8
Minor: Mathematics and Computing
Micro-Specializations: Optimization Theory, Artificial Intelligence

Grade 12 (HSC), score: 92% **2020**
Grade 10 (ICSE), score: 95% **2017**

Honors and Awards

Top 10% grade across students in the department at the end of 3rd semester 2021
Selected for the ICTP-ICTS graduate-level Winter School in Quantitative Systems Biology 2021
Top 10% grade across the institute at the end of 1st year and secured a department change 2021

Research Experience

Indian Institute of Science (IISc), Bangalore **November 2021 – Ongoing**
Cancer Systems Biology — Prof. Mohit Kumar Jolly

- Used machine learning and gene expression data to model the effect of ELF3 and GRHL2 on epithelial(E)-mesenchymal(M) transition as a result of their network topology. **Paper in draft**.
- Conducting analysis into the link between hybrid E/M phenotype cancer cells and stemness

IIT Kharagpur **April 2021 – Ongoing**
Evolution of Eukaryotes — Prof. Riddhiman Dhar On Hold

- Conducting a phylogenetic analysis of cells to understand whether an inside-out or outside-in model is favourable and to understand how mitchondria originated in eukaryotic cells
- Sampled proteomes from ortholgous groups of LUCA using python, used MUSCLE for multiple alignment and generated maximum likelihood phylogenetic trees using MEGA

IIT Kharagpur **July – October 2021**
Graph Fourier Transform — Prof. Sanand Athalye

- Suggested a faster implementation for the parallel approximate graph fourier transform
- Compared running time of single and parallel approximate graph fourier transform for small graph networks
- Conducted a theoretical analysis for a faster exact graph fourier transform by Haar unit and Givens rotation factoring of graph laplacian eigenspace and reconstructing the graph network

Relevant Coursework

Machine Learning in Genomics[2], Algorithms[2], Reinforcement Learning[1], Deep Learning[3], Probability, Statistics, Numerical Analysis, Partial Differential Equations, Linear Programming, Ordinary Differential Equations, Data Analysis Lab, Introduction to Biology, Introduction to Psychology
Ongoing: Systems Biology [4], Cancer Biology [4], Molecular and Cell Biology, Econometrics (with lab)
[1] *Stanford,* [2] *MIT-OCW,* [3] *CMU,* [4] *Postgraduate level course*

Selected Projects

Neuron Model Simulation **February 2022**

- Simulated the leaky integrate and fire (LIF) model and the Hodgkin-Huxley model for a range of parameters

Reinforcement Learning to Play Pong **October 2021**

- Built a reinforcement learning agent that uses deep Q-learning and learns from pixel data to play Pong

Conditional GANs (Guided Reading Project) **July - August 2021**

- Conducted a literature review on the theory of cGAN models in recent papers with an emphasis on face generation and other imaging purposes

Modelling Global Warming **June 2021**

- Used machine learning to model how the temperatures have changed and used it to predict future changes

Robot Simulation **May 2021**

- Simulated a system of floor cleaning vacuum robots in a room with obstacles

Technical Skills

Programming: Python, MATLAB, C, LaTeX
Libraries: NumPy, PyTorch TensorFlow, OpenAI Gym, SciPy

Workshops / Conferences Attended

Sensorimotor Control **6-17 December 2021**
Winter School in Quantitative Systems Biology organized by ICTP-ICTS Online

Neuromatch 4.0 **1-2 December 2021**
Conference Online

High Performance Computing and AI for Computational Biology **29-30 October 2021**
Workshop organized by IIT Kharagpur and Tezpur University Online

Volunteer Work

Academic Mentor **Jan 2022 – Ongoing**
UG Council, IIT Kharagpur

- Mentoring 6 students in their 1st year to ensure they have a smooth integration to online university life and assisting with academic and non-academic matters

Teacher(Independent) **October 2019 – December 2020**

- Taught 2 under privileged kids in my locality of grade 5 (to grade 6) math, science and English.
- Led to improved understanding and skill and their grade also improved by nearly 20 percent.

Leadership / Extracurricular

- Active member of Biotechnology Reading group at IIT Kharagpur
- Represented institue at various national level debate tournaments as a member of the Debating Society, IIT Kharagpur
- Represented institute in the Inter-IIT Scrabble Tournament
- Selected as Times Scholar (2019) by Times of India Group from 300,000+ students across India
- Silver Medal in National Taekwondo Championship (2017) and 1st Dan Black Belt

Other Interests: Guitar, Piano, Trekking (reached 13120 ft), Running, Rock music, Star Wars