Shaurya Goyal

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Education

Indian Institute of Technology (IIT), Kharagpur **2020 - 2025**
BS-MS in Economics Minors : Math, Biology, Artificial Intelligence CGPA: 8.89 Rank: 2/62

Grade 12 (HSC): 92% **Grade 10 (ICSE)**: 95%

Awards and Scholarships

NGSF Summer Research Intern, Next Gen Scientists Foundation 2022
International Research Fellowship, IIT Kharagpur Foundation 2022
Selected for the graduate-level inStem workshop on Stem Cell research [funded] 2022
Selected for the ICTP-ICTS graduate-level Winter School in Quantitative Systems Biology 2021
Top 10% grade across all students in the institute at the end of 1st year & department change 2021
Science and Engineering Undergraduate Merit Scholarship 2021

Preprints

Subbalakshmi, A.R.*, Sahoo, S.*, Manjunatha, P., **Goyal, S.**, . . . , Somarelli, J.# and Jolly, M.K.#, 2022. The ELF3 transcription factor is associated with an epithelial phenotype and represses epithelial-mesenchymal transition. bioRxiv. doi: https://doi.org/10.1101/2022.08.19.504435

Research Experience

Neuro Inspired Reinforcement Learning **February 2022 – Ongoing**
Brown University — Prof. Michael J. Frank Remote

- Developing an actor-critic deep reinforcement learning model motivated by striatum dopamine circuitry
- Comparing performance with A2C on Breakout and Pong (Atari games)

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

- Used machine learning and gene expression data to model the effect of ELF3 on epithelial-mesenchymal plasticity and the resulting drug resistance and immune evasion by ER+ breast cancer.
- Working on white-grey-opaque plasticity in Candida Albicans

Evolution of Eukaryotes **April 2021 – March 2022**
IIT Kharagpur — Prof Riddhiman Dhar Remote

- Conducted a phylogenetic analysis of proteomes to understand whether an inside-out or outside-in model of eukaryote cell evolution was favourable

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

- 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
- 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

Selected Projects

Simulation & Classification of Theta-Gamma Oscillations **May – June 2022**

- Simulated LFP signals with multiple slow and fast components corresponding to theta-gamma frequencies
- Identified distinct phase - frequency coupled states using machine learning and signal processing

Computational Neuroscience Mini-Projects **March - May 2022**

- Analyzed epilepsy - normal EEG data, Analyzed tuning curve of visual neurons, Estimated auditory receptive field, Perceptron classification, Dimensionality reduction and decoding activity, Simulated a LIF neuron

Do bike lanes increase bike commuter rates ? **March-April 2022**

- Used two-stage multivariate regression and error testing to find the impact of bike lanes

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

Relevant Coursework

CS: Machine Learning[2], Artificial Intelligence[1], Reinforcement Learning[2], Signals and Systems[2]
Math: Probability, Statistics, Non-Linear Dynamics[2], Numerical Analysis, Linear Algebra
Biology: Systems Biology[1], Computational Biology[2], Molecular and Cell Biology, Cancer Biology[1]
Neuroscience: Neural Computation[2], Computational Cognitive Neuroscience[2], General Psychology
Other: Econometrics 1 & 2, Data Analysis Lab, Linear Programming, Network Science[2]

1 *PhD level course,* 2 *Online from Stanford, MITOCW etc*

Skills

Programming: Python, MATLAB, PyTorch, Linux/Windows, High Performance Computing, C
Wet Lab (Beginner): (iPSC) Cell Culturing, RNA Isolation, RT-PCR, Immunocytochemistry

Workshops / Conferences Attended

Computational Neuroscience **11-29 July 2022**
Neuromatch Academy Online

Essential Stem Cell Lab Techniques **16-20 May 2022**
Workshop organized by inStem and NCBS Bangalore, India

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 **January 2022 – Ongoing**
UG Council, IIT Kharagpur

- Mentoring 6 students in their 1st year (now 2nd) to ensure they have a smooth integration to university life and assisting with academic and non-academic matters

English Mentor **January – July 2022**
Student Welfare Group, IIT Kharagpur

- Guided 4 students who struggled with English to learn and get better by providing feedback and solving doubts based on weekly exercises

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, 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, Cooking, Running, Star Wars, Making memes