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

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

Awards and Scholarships

MITACS Globalink Summer Internship [Declined] 2023
Summer Research Award, Next Gen Scientists Foundation 2022
International Research Fellowship, IIT Kharagpur Foundation 2022
Selected for the graduate-level inStem workshop on Stem Cell research [funded by Govt. of India] 2022
Selected for the ICTP-ICTS graduate-level Winter School in Quantitative Systems Biology 2021
Top 5% grade across batch of 1800 students in the institute at the end of 1st year 2021
Merit-Cum-Means (MCM) Scholarship, IIT Kharagpur [full tuition + stipend] 2020-Ongoing
Top 1% in JEE Advanced from 150,000 selected students across India 2020
Top 0.4% in JEE Mains from over 1 million students across India 2020

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

Place Field Remapping and Memory Stabilization **October 2022 – Ongoing**
University College London — Prof Dan Bendor In-Person/Remote

- Developed a novel bayesian decoding model to study place field remapping
- Applying it to processed data to understand place field remapping during awake and sleep
- Processing spiking data using Kilosort and KlustaKwik to analyze memory stabilization

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

- Developed an actor-critic deep reinforcement learning model motivated by striatum dopamine circuits
- Created a base deep learning architecture using CNNs and RNNs and implemented the model and A2C
- Compared performance with A2C on Atari games sparse rewards and varying reward statistics

White-Grey-Opaque Plasticity in Candida Albicans **June 2022 – Ocotber 2022**
Indian Institute of Science (IISc), Bangalore — Prof Mohit Kumar Jolly Remote

- Constructed gene network controlling white-grey-opaque plasticity in Candida Albicans using literature
- Using non-linear differential equations and machine learning to identify critical links controlling grey state
- Analzyed switching dynamics and multistability using bifurcations and stochastic simulations

Epithelial-Mesenchymal (EMT) Plasticity in Cancer **November 2021 – June 2022**
Indian Institute of Science (IISc), Bangalore — Prof Mohit Kumar Jolly Remote

- Examined the effect of ELF3 gene on EMT and compared the MET capacity with KLF4 and GRHL2
- Investigated the clinical outcome of ELF3 expression in ER+ breast cancer and tamoxifen resistance
- Found increased PD-L1 induced immune evasion that was driven by increasing ELF3 levels
- Used Gaussian Mixture Modelling, K-Means Clustering, UMAP, PCA, Regression etc

Phylogenetic Analysis of Eukaryote Evolution **April 2021 – May 2022**
IIT Kharagpur — Prof Riddhiman Dhar Remote

- Conducted a phylogenetic analysis of proteomes to test the inside-out and outside-in cell evolution models
- Developed the analysis pipeline and used information criterion and bootstrapping for selecting best fit

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

- More efficient implementations, running time comparisons and theoretical analysis of graph laplacian

Skills

Programming: Python, MATLAB, Linux (Bash), HPC (SLURM), PyTorch
Wet Lab (Beginner): Cell Culturing, RT-PCR, Immunocytochemistry, Gel Electrophoresis

Relevant Coursework

Neuro: Computational Neuroscience[1], Computational Cognitive Neuroscience[2], General Psychology
CS: Machine Learning[2], Artificial Intelligence[1], Deep Learning[2], Signals and Systems[2], Algorithms 1[2]
Math: Probability, Statistics, Non-Linear Dynamics[2], Numerical Analysis, Linear Algebra
Bio: Systems Biology[1], Molecular and Cell Biology, Cancer[1]
Other: Econometrics 1 & 2, Data Analysis Lab, Linear Programming, Schizophrenia[3]

1 *PhD level course,* 2 *Online from Stanford, MITOCW etc,* 3 *Coursera*

Selected Projects

Simulation & Classification of Theta-Gamma Oscillations **2022**

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

Do bike lanes increase bike commuter rates ? **2022**

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

Computational Neuroscience Mini-Projects **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

Reinforcement Learning to Play Pong **2021**

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

Workshops / Conferences Attended

Neuromatch Conference 5.0 2022
Alzheimer's Disease (Biology, Pathology & Clinical Treatments) - IIT Kharagpur 2022
Computational Neuroscience - Neuromatch Academy 2022
Essential Stem Cell Lab Techniques - inStem and NCBS, Bangalore, India 2022
Sensorimotor Control - ICTP & ICTS 2021
Neuromatch Conference 4.0 2021
High Performance Computing and AI for Biology - IIT Kharagpur 2021

Volunteer Work

Academic Mentor to 3 students **November 2022 – Ongoing**
Student Welfare Group, IIT Kharagpur

Academic Mentor to 6 students **January – September 2022**
UG Council, IIT Kharagpur

English Mentor to 4 students **January – July 2022**
Student Welfare Group, IIT Kharagpur

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, Hiking, Cooking, Running, Star Wars, Making memes