Swapnil Keshari

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EDUCATION

University Of Pittsburgh And Carnegie Mellon University   Pittsburgh, PA
Ph.D. Candidate, The Joint CMU-UPitt. **Computational Biology** (CPCB) Ph.D. Program | GPA: 3.55/4   *Aug '21 – May '26*

Indian Institute Of Technology Bombay   Mumbai, India
Bachelor of Technology in **Chemical Engineering** with Minors in Biology | GPA: 8.34/10   *July '17 – May '21*

RELEVANT COURSEWORK, INTERESTS AND EXPERTISE

Coursework
- **Prob. & Stats.,** Calculus, Diff. Eqn., Intro to ML, **Scalable ML**, Numerical Methods, **Economics**, Marketing

Interests
- **HighFrequency ML**, NLP, **Data Science**, **Quant. Analysis**, Graph & Diffusion model, **Algorithm Dev.**, FinTech.

Experience
- **HPC**, **cuda**, Linux, bash, **Python**, R, MATLAB, C++, huggingface, dask, spacy, BERTopic, **pytorch**, pyG, scipy

GRADUATE EXPERIENCE

Comprehensive Geo-Temporal Analysis of Co-Authorship Networks across domains using DISCo-Net *†
- Blazing fast **data retrieval & processing (∼100G/hr)** using remote **SQL**, **distributed, interpretable** and **GPU** computing [Git]
- Created **pip installable package** housing **NLP, LLM (sBERT), GAT & TF-IDF** to infer trends for guiding **science research policies**

Decoding and Modulating Gene Regulatory Networks governing Human B Cell Fate Transitions. †
- Analysed **high dimensional multimodal data** using **multivariate statistics**, dim. reduction (UMAP/PCA) and Leiden clustering
- Inferred **graphs** using **Bayesian Ridge** (gaussian priors); modelled **disruption** via **1st order PDE** yielding $\rho(pred, exp) \approx 0.6$

Uncovering Novel Cellular Programs underlying Human B Cell States *†
- Identified latent factors using **non-linear interpretable ML** showing advanced **feature engineering** & high predictive accuracy
- Constructed **dynamic networks via stochastic PDEs** to simulate time-series, leveraging **linear formulation & Brownian noise**

Immune BioGraphy: a tale of Graphical Networks-Based Approaches in Systems Immunology *†
- **Invited perspective** on formulating **multimodal, multiscale graph ML** architectures to model **heterogenous temporal data**

Agonism of the Glutamate Receptor Gluk2 suppresses Dermal Mast Cell Activation & Cutaneous Inflammation ‡
- Analysed **transcriptomics data** for potential therapeutic compound SYM2081 to treat mast cell driven **inflammatory diseases**
- Performed **quantitative analysis** and **statistical enrichment** to reveal novel cellular program regulated by Gluk2 agonism

Modelling Inter-Cellular Crosstalk and Transcription Factor Perturbation in Mast and Immune Cells
- Finding **cellular interactions** driving MC deactivation; exploring cell-cell communication inference using **quantum computing**

[* First/ Co-First ,† Manuscript in Preparation, ‡ Accepted in Principle]

UNDERGRADUATE EXPERIENCE

Bizongo | BUSINESS INTELLIGENCE (Intern)
Mumbai, India   *June '19 – July '19*
- **Categorized 84%** of **B2B** payment failure in **18** root causes **(<0.6%)** using **NLP,** ↓ held payments and ↑ partner experience
- Provided **high-frequency analysis** of payment settlements via **regression**, quantifying employee and partner performance

University of Rochester Medical Center | ALGORITHMS (Researcher)
Prof. Juliee Thakar | NY, USA   *Apr. '20 – May'21*
- Analyzed **high-dimensional** datasets using **clustering, correlation**, PCA to infer pathways **conserved across datasets** on **HPC**
- Developed algorithms to reformulate **network topology** to extend Boolean rules analysis **python** package BONITA [Git]

IIT Bombay | MODELLING (B.Tech. Thesis)
Prof. Ganesh Viswanathan | Mumbai, India   *Nov '19 – May '21*
- **Mechanistic network modelling** using Boolean rules to identify **central network nodes** governing programmed cell death
- Simulated **temporal** network updates to **predict** steady-state transition probabilities across **300+ nodes** network in **MATLAB**

LEADERSHIP POSITIONS

- **Admissions Committee,** Member – screened **500+ Ph.D. applications** for CPCB to recommend admits for next cohort   '23
- **GSA, CPCB** & **BGSA, UPitt.,** Grad. Student Rep. – advocated for student issues with leadership, conducted activities   '22
- **Vice President**, Pittsburgh Chapter IITB – Revamped alumni network after 10 yrs., fostering **international community**   '24
- **Grad. Global Ties,** OIS UPitt. & BGSA, UPitt., Mentor – Guided mentees for transitioning to UPitt., ↑ **global reputation**   '22
- **Overall Coordinator**, NSS IITB - **Led 50+** driving **volunteer services** (mental health, e-learning) **for 300+** undergraduate   '21

SCHOLASTIC ACHIEWMENTS, AWARDS AND EXTRACURRICULARS

- Biomedical Image of the Year, BGSA, UPitt.   '24
- NCWIT **Educator Award**   '23
- Best Research Poster Award, CSI, UPitt.   '22
- **Open Source Simulation Model**, DWSIM   '20
- Undergraduate Research Awards **(URA 01-02)**   '20-'21
- **0.25%ile of 1.2M** in JEE, in **top 10%** first-years at IITB   '17-'18
- **KVPY** (one of ∼1k), **NTSE** scholarship (one of ∼800)   '14-'16
- **0.1%** in Computer Science across India in AISSCE   '16

Extracurricular: **Student Private Pilot, Part 61** | Travelling | Digital Designing | Swimming | Cricket | Poetry | Music | Painting