AKHIL KUMAR

Jammu, India 180002 · ○ · in · 🐦 · iamakhilverma.github.io · akhil.kumar@alumni.iitd.ac.in · +91-9797523768

RESEARCH EXPERIENCE

Perumal Lab: *Research Fellow, School of Biological Sciences, Indian Institute of Technology Delhi*   **Feb '21-Current**
- Investigated the changing dynamics of CpG depletion in SARS-CoV-2 genomes over time and role of various selection pressures
- Led the computational work, clearly defined the objectives beforehand, advocated the use of best-programming practices
- Successfully tested all custom written functions, classes by designing exhaustive test-cases for unit testing before using them
- Single-handedly refactored the code repository for our project to enhance execution speed, improve code design and readability
- Mastered the use of Python, attained proficiency in the use of regular expressions, version control, and test-driven development
- Identified the highly conserved stretches in the SARS-CoV-2 genome to improve our current widely used diagnostic assays
- Investigating the role of CpG dinucleotides and zinc-antiviral finger protein binding motifs in the evolution of influenza virus
- Lead-author on a publication, author for 2 more manuscripts in preparation (lead author on 1)

Multiscale Modeling Group: *Undergraduate Researcher, Indian Institute of Technology Delhi*   **Fall '19**
- Assisted with the in-silico design of small ligand molecules to inhibit early-stage insulin aggregation nucleation
- Identified EGCG and polyoxometalates as the putative ligands through extensive literature review, programmed their structures
- Performed targeted docking of EGCG into a partially folded intermediate of insulin using Gray lab's ROSIE server

Perumal Lab: *Undergraduate Researcher, School of Biological Sciences, Indian Institute of Technology Delhi*   **Fall '19**
- Inspected temporal evolution of mono- and dinucleotides in human mtDNA by analysing sequences dated back to 50k BC
- Developed boxplots for samples from earliest-, middle- and latest-period; conducted statistical tests to compare their medians
- Our findings suggested that lighter strand is becoming heavier, and a slight bias toward GC-rich sequences in ancient reads

Biomolecular Computational Group: *Research Intern, Indian Institute of Science Bangalore*   **Summer '19**
- Investigated existing kinetic modelling approaches to translate metabolic networks of interest into a dynamic model
- Designed a convenience kinetics based dynamic model comprising 92 reactions, 110 species using complex pathway simulator
- Distributed the reactions across 4 compartments and simulated its dynamic characterstics; examined robustness of the model

Srinivas Group: *Research Intern, University of Oxford*   **Summer '18**
- Analysed single-cell transcriptomic data collected from early mouse embryo mutant carrying a mutation in ASPP-2 gene
- Processed sequence data files, mapped sequence reads, performed quality control on the individual cells, normalized the data
- Identified cell sub-types using an unbiased hierarchical clustering algorithm and expression values for biological marker genes

EDUCATION

Indian Institute of Technology Delhi: **Class of 2020**
- Awarded Bachelor of Technology in Chemical Engineering, GPA: 6.738/10 (First Class)
- Relevant coursework: Statistics, Epigenetics, Structural Biology, Computer science, Linear algebra and Differential equations, Calculus, Bioprocessing and Bioseparations, Industrial biotechnology, Numerical methods, Introduction to Biology for engineers

PUBLICATIONS

Kumar, A., Goyal, N., Saranathan, N., Dhamija, S., Saraswat, S., Menon, M. B., and Vivekanandan, P. (2022). The Slowing Rate of CpG Depletion in SARS-CoV-2 Genomes Is Consistent with Adaptations to the Human Host. Molecular Biology and Evolution, 39(3). msac029

AWARDS, HONORS, & FELLOWSHIPS

2021 Supported by an intramural grant (MI01798G) to conduct research on SARS-CoV-2 as a research fellow

2019 Award for outstanding contributions to SAC which is the apex student body of Indian Institute of Technology Delhi

2015 Kendriya Vidyalaya special recognition for best all round performance amongst the graduating batch of 300 students

2013 Award of Honor for scoring 10/10 CGPA in All India Secondary School examination

2013, 2012 Winner in Quizzing contests at regional and sub-regional level KVS Social Science Exhibition

SKILLS AND LANGUAGES

Technical	Python, R, bash, LaTeX 2$_\varepsilon$, package management systems, Markdown, unix, version control with git, regex
Fun	Chess, Badminton, Tennis, Poker, Foosball, Ping Pong, Cricket, Watching movies and series, Reading, Music