Udit Kumar

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Summary

Data scientist with interdisciplinary expertise in computational biology, bioinformatics, and computational neuroscience, skilled in managing and analysing large-scale multi-modal datasets. Experienced in preparing, preprocessing, and analysing fMRI data (1114 subjects) using fMRIprep and tools (ANTs, FSL, FreeSurfer, MRIQC, Nilearn). Proficient in genomics data analysis (FASTQC, SAM/BAM processing, Bowtie, motif discovery with DANPOS-2 & TOMTOM) and molecular dynamics simulations (AMBER, PyMOL, Pyrex, AlphaFold-2, DSSR, X3DNA). Strong background in machine learning, network and topology and statistical modelling & analysis applied to various problems (social, Genomics and Neuroimaging data). Skilled in Python, R, Bash, Linux, HPC Cluster servers, Cloud computing and adept at using containerised pipelines with Docker.

Education

Jawaharlal Nehru University — **New Delhi, India**
(M.Sc. Percentage: 71.20) — ***2023–2025(expected)***
Computational and Integrative Sciences
(Major in Computational Biology & Bioinformatics)
Thesis titled: *Topological analysis of Brain Functional Network in autism to explore altered connectivity.*
Supervisor: Prof. R. K. Brojen Singh (Dean SC&IS, 2024–now)

University of Allahabad — **Prayagraj, India**
B.Sc., Percentage: 84.6 % — *2019–2022*
Physics, Geology, Mathematics

Research Interests

- Development and evaluation of statistical methodologies for biomedical data
- Reproducible data-analytics pipelines in R and Python
- Database design and quality-control for clinical and omics datasets
- Biostatistical analysis of neuroimaging and omics modalities
- Computational neuroscience: neurodevelopmental disorders and neurodegenerative diseases
- Brain computer interface (BCI).
- Sleep disorders.

Course Projects

Selected coursework projects include:

- Analyzing structural and functional diversity of transmembrane (TM) proteins.
  Supervisor: Prof. Shandar Ahmad.
- assess the effectiveness of different clustering methods.
  Supervisor: Prof. Shandar Ahmad.
- Protein-Ligand Docking & Interaction Analysis.
  Supervisor: Prof. Naidu Subbarao

Skills

- Proficient in Python (Numpy, Pandas, Scipy, Seaborn, Statsmodels: Matplotlib), Bash, R (dplyr, tidyr, ggplot2, plotly), and SQL and data base management with LAMP enviornment.
- Extensive experience in Linux filesystem.
- High performance computing facility (HPCF). (cluster).
- VIM, Pymol, AMBER, GROMACS, Pyrex.
- Containerization technologies like Docker and Schrödinger.
- Specialized in large scale fMRI data (ABIDE) preprocessing and analysis, utilizing tools such as FSL, ANTs, FreeSurfer, and fMRIPrep.
- Hands-on experience with ChIP-seq and MNase data.
- Strong communication skills to effectively interact with colleagues and present scientific content to specialized and general audiences.

Training and Workshop

I have attended workshops in 'Enabling Technology Training (ETT) workshop series'

- Gene Enrichment and Biological Pathway Analysis. ETT workshop (2024)
- NGS data analysis with DNA shape and dynamics. ETT workshop (2024)
- How to Calculate Accurate Binding Free Energy for Drug Design? ETT workshop (2024)
- Molecular Modelling and Drug Design. ETT workshop (2024)
- Prediction of Drug Resistance in Tuberculosis from Whole-Genome Sequencing. ETT workshop (2024)

I have also volunteered for workshops focused on molecular dynamics simulations,

- Advances in Computer Simulations in Structural Biology and Biophysics. Symposium and Workshop (2025)

Reference(s)

Prof. R. K. Brojen Singh
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