

Raktim Mitra

University of Southern California, Los Angeles, CA, 90089, USA

✉ raktimmi@usc.edu

🐙 GitHub

☎ +1(213)284-2748

Education

Year	Degree/Objective	Institute	GPA/%
2024	PhD, Computational Biology and Bioinformatics	USC	4.0/4.0
2019	B.Tech, Computer Science and Engineering	IIT Kanpur	9.4/10.0
2015	Higher Secondary	RKMV Narendrapur	97.2%
2013	Madhyamik (10th)	RKMV Narendrapur	95.6%

Publications

- Geometric deep learning of protein-DNA binding specificity** USC
Nature Methods, in press (see preprint) (see webserver) April 2024
Raktim Mitra, Jinsen Li, Jared M. Sagendorf, Yibei Jiang, Ari S. Cohen, Tsu-Pei Chiu, Cameron J. Glasscock, Remo Rohs
- RNAscape: Geometric mapping and customizable visualization of RNA structure** USC
Nucleic Acids Research, in press (see webserver) March 2024
Raktim Mitra, Ari S. Cohen, Remo Rohs
- Probing the role of the protonation state of a minor groove-linker histidine in Exd-Hox-DNA binding** USC
Biophysical Journal, Volume 123, Issue 2, 2024, Pages 248-259 Jan 2024
Yibei Jiang, Tsu-Pei Chiu, Raktim Mitra, Remo Rohs
- RVAgene: Generative modeling of gene expression time series data** USC
Bioinformatics, Volume 37, Issue 19, 1 October 2021, Pages 3252–3262 Oct 2021
Raktim Mitra, Adam L. MacLean
- PNAbind: Structure-based prediction of protein-nucleic acid binding using graph neural networks** USC
Nature Computational Science, under review (preprint) April 2024
Jared M. Sagendorf, Raktim Mitra, Jiawei Huang, Xiaojiang S. Chen, Remo Rohs
- Tejaas: reverse regression increases power for detecting trans-eQTLs** MPIMS
Genome Biology volume 22, Issue 1, Article number: 142 May 2021
Saikat Banerjee, Franco L Simonetti, Kira E Detrois, Anubhav Kaphle, Raktim Mitra, Rahul Nagial, Johannes Söding

Mentorship

- Mentored QCB undergraduate Hiran Hosseini and QCB post bacc. Ari S. Cohen in building RNAproDB: an interactive and comprehensive database of protein-RNA interactions and updating DNAProDB (ongoing).
- Mentored QCB undergraduate Andrew Wilk to build a data driven model of predicting transcription factor family based on given binding site data (ongoing).

- Mentored QCB post bacc. Ari S. Cohen to build a modern interactive web server to achieve wide accessibility of the RNAscape algorithm and the DeepPBS model (2023-24).
- ACA-IITK project mentor - Reinforcement Learning, 2018 - guided a group of 1st year students.
- ACA-IITK project mentor - Android Applications, 2017 - guided a group of 1st year students.

Teaching

- Teaching Assistant - Structural Bioinformatics from Atoms to Cells (QBIO481) course - fall 2023, QCB USC
- Teaching Assistant - Database Management Systems (CS315) course - spring 2019, CSE IITK
- Academic Mentor, 2016-17, Counselling Service, IIT Kanpur
 - Provided personal tutoring to academically weak students for their courses.

Community service

- QCB retreat organization and session chair 2021-2023, USC
- Organization and session chair for “algorithms in computational biology” session- QCB symposium in honor of Michael S. Waterman’s 80th birthday, 2022, USC
- Organization of QCB commencement ceremony 2022, USC
- Student recruitment volunteer, QCB, USC
- Student Guide, 2016-17, Counselling Service, IIT Kanpur - Assisted 6 freshmen students in adjusting to the college environment.
- Secretary, Fine Arts Club, Student Gymkhana, IIT Kanpur, 2016-17
- Secretary, Association of Coding Activities, CSE, IIT Kanpur, 2016-17

Awards and achievements

- Andrew Viterbi Fellowship, Quantitative and Computational Biology, USC, 2019-2022
- Academic Excellence Award, IIT Kanpur, 2018
- DAAD-WISE fellowship, The German Academic Exchange Service, 2018
- Student Guide Award, Counselling service, IIT Kanpur, 2017
- Academic Mentorship Award, Counselling service, IIT Kanpur, 2017
- Academic Excellence Award, IIT Kanpur, 2016
- Mamraj Agarwal Rashtriya Puraskar, by Governor, West Bengal, 2015
- 2nd in Engineering and 16th in Medical joint entrance examination, West Bengal, 2015
- Top 1% in National Standard Examination in Physics, 2014
- Top 10% in National Standard Examination in Chemistry, 2014
- Fellowship, Kishore Vaigyanik Protsahan Yojana, IISc Bangalore, 2013-14

Presentation/talks

- Short talk, conference on Visualizing Biological data (VizBi), 2024, USC
- QCB research reports, 2024, QCB, USC
- Poster presentation, QCB retreat, 2023, Ventura, CA
- Short talk, Southern California Systems Biology (SoCalSysBio) conference, 2023, USC

- Short talk, Protein DNA interaction conference (PDI2022), 2022, Weizmann institute of science, Israel.
- Invited speaker on protein-DNA binding prediction using deep learning, 2022, Bar-Ilan University, Israel
- Poster presentation, Southern California Systems Biology (SoCalSysBio) conference, 2023, UCLA
- Poster presentation, QCB retreat, 2022, Ventura, CA
- Poster presentation, QCB symposium, 2022, USC
- Research talk, QCB retreat, 2021, Ventura, CA

Research internships

Max Planck Institute for Multidisciplinary Sciences (Biophys. Chem.) **Göttingen, Germany**
Machine Learning in Human Genetics, DAAD-WISE Internship *May 2018 – July 2018*
 Quantitative and Computational Biology group, led by Dr. Johannes Söding.
Project Title: Highly sensitive detection of trans-eQTLs by joint analysis of gene expression levels

Indian Institute of Science **Bangalore, India**
Rank Estimation of Matrix Spaces, Narendra Summer Internship *May 2017 – June 2017*
 Department of Computer Science and Automation, mentored by, Dr. Chandan Saha

Ongoing projects

RNAproDB: A database and UI portal of protein-RNA interactions. **USC**
Raktim Mitra, Ari S. Cohen, Hira Hosseini, Remo Rohs *2024*

- As a next step from RNAscape, we are working on a database and interactive exploitation platform for protein-RNA interactions.

Predicting transcription factor family based on binding data. **USC**
Andrew Wilk, Raktim Mitra, Remo Rohs *2024*

- Exploring the possibility of solving the reverse problem to the one that DeepPBS aims to solve.

DNAproDBv3 **USC**
Raktim Mitra, Ari S. Cohen, Remo Rohs *2024*

- Updating the widely used legacy tool DNAproDB, to achieve modern UI, automatic database updates and user friendliness.

Other projects

CNN Model for classification of Paintings by Artists **IIT Kanpur**
Machine Learning Course, Mentored by, Dr. Purushottam Kar *Aug 2017 – Nov 2017*

- Developed a deep CNN for classifying popular paintings according to their artists. ([github](#))

Library Management System **IIT Kanpur**
Database Management Course, Instructor: Dr. Medha Atre *Jan 2018 – Apr 2018*

- Developed a web application written primarily with PHP and MySQL, for managing a multi-branched library, where library employees and users have their separate accounts to facilitate

various library activities like keeping track of books, issuing and returning, transaction history keeping etc. ([github](#))

A Java to X86 Compiler Written in Python

IIT Kanpur

Compiler Course Project, mentored by, Dr. Subhajit Roy

Jan 2018 – Apr 2018

- Implemented a Java to X86 compiler as part of a 3 person group.

A GRAS Based Stemmer Specific for Bengali

IIT Kanpur

Information Retrieval Course, mentored by, Dr. Arnab Bhattacharya

Jan 2018 – Apr 2018

- Created a stemmer specific for Bangla by using a GRAS implementation and language specific components. ([github](#)).

One Shot Learning

IIT Kanpur

Data Mining Course, mentored by, Dr. Arnab Bhattacharya

- We studied and implemented the state of the art methods of one shot learning and analyzed them, specifically using siamese networks and matching networks on the Omniglot dataset.

Question-Answering in non-English language, Bengali

IIT Kanpur

Undergraduate Project, mentored by, Dr. Arnab Bhattacharya

- QnA strategies for information retrieval in sparse unicode encoded dataset typical to native languages (Bengali).

Gaming over Messaging

IIT Kanpur

Topics in Internet Technologies, mentored by, Dr. TV Prabhakar

- A Tic-Tac-Toe app, where the communication between the devices of two players is done over slack messaging instead of using a traditional server. ([github](#))

Relevant coursework

Data Science: Introduction to Machine Learning, Information Retrieval, Principles of Database Management, Data Mining, Probability and Statistics, Topics in Probabilistic Modeling and Inference, Visual Recognition, Mathematical Statistics

Computer Science: Data Structures and Algorithms, Advanced Algorithms, Operating Systems, Compiler Design, Topics in Internet Technologies, Scientific Computing and Visualization.

Others: Bioinformatics and Computational Biology, Neurobiology, Computational Cognitive Science, Functional Genomics, Computational Molecular Biology.

Skills

Programming

C • Python • Octave • SolidWorks • Git • Bash • Android and Ionic • \LaTeX • Java • HTML • CSS • JavaScript • GNUPlot • Javascript

Extracurriculars

Football • Painting using oil and water based medium • Harmonium • Violin

Languages Known.....

Bengali • English • Hindi • French (Level-A1)

Online courses

- Machine Learning, Coursera online course by Andrew Ng, May 2017 – July 2017
- Bioinformatics 1, Finding Hidden Messages in DNA 2017, on Coursera, Organized by, UC San Diego.