Raktim Mitra

Computer Science and Engineering, IIT Kanpur, India

home.iitk.ac.in/~raktim | raktim@iitk.ac.in | my github | +919453994914

Education

Year	Degree	Institute	CPI/%
2015-2019(expected)	B.Tech, CSE	IIT Kanpur	9.4/10.0
2015	Higher Secondary Exam	RKMV Narendrapur	97.2%
2013	Madhyamik Exam(10th)	RKMV Narendrapur	95.6%

Awards and Achievements

- DAAD Scholarship, Working Internships in Science and Engineering, DAAD-WISE fellowship, 2018
- 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

Internship Experience

Max Planck Institute for Biophysical Chemistry **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

- The proposed model performs regression in a direction reverse to the current state-of-the-art models of trans-eQTL detection, canceling out the effect of gene expression correlations in the data, giving a much lower false positive rate.
- Implemented the software "Trans-Eqtls from Joint Association AnalysiS", TEJAAS (in python,C). Heavy data intensive computing required use of parallelization in large computing clusters.
- Parameter optimization for the model using type II maximum likelihood estimation.
- Created validation pipeline for the software to be applied on genotype and gene expression data from Cardiogenics and GTEx project.
- The project is still a work in progress and will soon be publication ready.

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

- Studied algorithms for rank estimation of Matrix Spaces given basis matrices.
- Worked on Wong Sequences and a recently developed Deterministic PTAS for the problem.
- Solved one intermediate but natural case of one Rank R matrix and rest rank 1 matrices . Gave a talk on the PTAS and did a poster presentation.

Major 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.
- Worked on a dataset consisting of nearly 50,000 training images of 300 different artists. Trained the CNN from scratch over a period of 9 days.
- Obtained a commendable top-5 accuracy of 75.53% and top-20 accuracy of 87.90% on test set of 13712 paintings from the same 300 artists. `https://github.com/Abhipanda4/CNNpainter`

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. `https://github.com/timkartar/cs315Proj`

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.
- Important features of Java that were implemented includes Basic Arithmetic Operations If-Else(Nested If-Else), Simple and Nested for, while, do while loop,Switch Cases, Local Scoping, Functions(Recursive functions too) , with restricted support for accessing multidimensional arrays, Dynamic Memory allocation, Multidimensional Arrays, basic character arithmetic, Classes and Object creation with support to int data types. `https://github.com/sanketyd/CS335`

A GRAS Based Stemmer Specific for Bengali **IIT Kanpur**
Information Retrieval Course, mentored by, Dr. Arnab Bhattacharya *Jan 2018 – Apr 2018*

- Implemented the Graph based language independent stemmer GRAS in python.
- Created collections of common word-roots, suffixes, prefixes, *abyay*s.
- Created a stemmer specific for Bangla by using the GRAS implementation and the language specific components. `https://github.com/timkartar/CS657-Project`.
- Achieved improvement of MAP score of query results on a Bengali newspaper document set against a simple GRAS stemmer.

An Android App Cataloging Birds of IIT Kanpur **IIT Kanpur**
Summer Project, mentored by, Prof. T.V Prabhakar *May 2016 – June 2016*

- Learned how to build an Android app with Android Studio with a basic database.
- Studied the Material Design style for UI designing.
- Created an application which catalogs various birds of IIT Kanpur locally on a user's mobile.

Ongoing Projects

One Shot Learning (ongoing) **IIT Kanpur**
Data Mining Course, mentored by, Dr. Arnab Bhattacharya

- One Shot learning aims to solve the image mining problem of object categorization, without using very large image dataset.
- We are studying and implementing the state of the art methods of one shot learning and analyzing them, specially using siamese networks and matching networks. The Omniglot dataset is being used for the project.

Question-Answering in non-English language, Bengali (ongoing) **IIT Kanpur**
Undergraduate Project, mentored by, Dr. Arnab Bhattacharya

- Unicode encoded source of native languages are very small. Hence a large part of the project is text mining.
- Language specific established NLP tricks like Tree Kernel, Language models have been studied to

great length for English. But it is very difficult to make them work for Bengali.
- Trying out various unsupervised QnA tactics like sentence clustering and question targeted short summary generation etc. But these Information Retrieval kind of methods fail mostly due to various reasons. Hence, our target is now to build a primitive knowledge graph to increase our recall by sacrifising a lot of precision.

Gaming over Messaging (ongoing) **IIT Kanpur**

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

- Creating applications using messaging as a platform is on the rise. We are exploring different aspects of the technology stack involved and implementing a simple gaming over messaging system.
- We are building a simple Tic-Tac-Toe app where the communication between the devices of two players will be done over slack messaging instead of using a traditional server.

Relevant Coursework

Data Science: Introduction to Machine Learning, Information Retrieval, Principles of Database Management, Data Mining(ongoing), Probability and Statistics.
Computer Science: Data Structures and Algorithms, Advanced Algorithms, Operating Systems, Compiler Design, Topics in Internet Technologies(ongoing).
Others: Bioinformatics and Computational Biology, Neurobiology(ongoing), Computational Cognitive Science.

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.

Skills

Programming

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

Extracurriculars

Football • Painting using oil and water based medium • Harmonium

Languages Known

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

Positions of Responsibility

- Student Guide, 2016-17, Counselling Service, IIT Kanpur
  - Assisted 6 freshmen students in adjusting to the college environment.
- Academic Mentor, 2016-17, Counselling Service, IIT Kanpur
  - Provided personal tutoring to academically weak students for their courses.

Miscellaneous

- Secretary, Fine Arts Club, Student Gymkhana, IIT Kanpur, 2016-17
- Sectretary, Association of Coding Activities, CSE, IIT Kanpur, 2016-17

- ACA project mentor - Android Applications, 2017 - guided a group of 1st year students.
- ACA project mentor - Reinforcement Learning, 2017 - guided a group of 1st year students.