Amit Roy

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Research Interests

Combinatorics, Boolean functions, Complexity Theory, Design and Analysis of Algorithms

Education

Program	Institution	%/CGPA	Year
MS (Computer Science and Engg.)	IIT Madras	**8.0**	2021
Bachelors (Computer Science and Engg.)	WBUT Kolkata	**8.61**	2018
XII	Delhi Public School Ranchi	**91.2**	2014
X	St. Xavier's High School Deoghar	**10**	2012

MS Thesis

New Bounds and Variants of VC Dimension of Boolean Function Classes **July 2018 - May 2021**

Advisor- Prof. Jayalal Sarma *IIT Madras*

- **Proved** VC-dimension bounds of family of non-monotone Boolean functions parameterized by alternation.
- **Studied** VC-dimension of families of Boolean functions and its relation with other complexity measures.
- These bounds are used to tell number of **examples** needed to **learn a hypothesis** by a learning algorithm.
- Established VC-dimension bound of AND,OR,Parity,Threshold, Majority, Monotone, k-slice Boolean functions.
- **Proved** NP-hardness and Co-NP hardness of computing VC-dimension.
- **Published** the work in EuroComb-2021 Barcelona

Publications

- **Amit Roy** and Jayalal Sarma, **On Alternation, VC-dimension and k-fold Union of Sets**, *EuroComb*21 at Barcelona. **DOI**: 10.1007/978-3-030-83823-2_108
- J. Siddiquee, **A. Roy**, A. Datta, P Sarkar; S. Saha, S S Biswas, **Smart Asthma Attack Prediction System using Internet of Things**, IEEE IEMCON 2016. **DOI**: 10.1109/IEMCON.2016.7746252
- **A Roy**, A Datta, J Siddiquee, B Poddar, B Biswas, S Saha, P. Sarkar, **Energy Efficient Data Centers & Smart Temperature Control System with IoT Sensing**, IEEE IEMCON 2016. **DOI**: 10.1109/IEMCON.2016.7746251
- **A Roy**, J Siddiquee, A Datta, P Poddar, G Ganguly, A Bhattacharjee, **Smart Traffic & Parking Management using IoT**, IEEE IEMCON 2016. **DOI**: 10.1109/IEMCON.2016.7746331

Work Experience

Cisco Systems India - Software Engineer in the Webex Collaboration team **Aug-2021 -** present

- Working on SIP and VoIP which enables Webex to serve more than 39M cloud calling users worldwide.
- Implemented and tested codes for features such as Call Recording, Automatic Callback, Call Forwarding etc.
- **Automated** the process of upgrading/rollback a server to the required patch level which saved huge time and simplified the process for all the developers.
- Delivered tech-talks on Unit Tests using JUnit for legacy code and follow object-oriented design.

Indian Institute of Technology Madras- Teaching Assistant

- Introduction to Programming **Jul 18 - May 19**
  - **Mentored** and guided **15 non-Computer Science** students in learning **Programming in C**.
- Advanced Data Structures & Algorithms **Jul - Nov 2019**
  - **Assisted** 14 first year MTech students in understanding the subject matter.
  - Responsible for making and evaluating assignments, quizzes and invigilation.
- Pseudorandomness **Jan - May 2020**
  - **Helped** students to read their first **technical research paper**.
  - Responsible for evaluating assignments,quizzes, invigilation and attendance.

Projects

1. **Mystery of Negations** (CS6840)
   - Presented the paper Mystery of Negations and demonstrated the proofs and ideas in the class.
2. **Elementary construction of Expanders** (CS6845)
   - Demonstrated the ideas involved in the proofs in the paper for construction of constant degree expanders.
3. **TOTP : Time-Based One-Time Password**
   - **Implemented** Time-Based OTP which is used for 2-Factor Authentication (2FA) based on RFC6238, in python.
   - It can be used to provide an extra layer of security and protects against any compromise due to its short validity.
4. **Data Analytics : Suicides in India**
   - Analyzed suicides in India of last 1 decade to study age group, cause for suicides, and other factors. Used Pandas library to parse data and Matplotlip and Seaborn for visualizations.
5. **Stop and Wait Protocol** (Computer Networks)
   - Implemented Stop and Wait Protocol for file transmission using Java Socket Programming. Java, TCP/IP, UDP.
6. **Multi Client-Server File Transfer Protocol**
   - Designed a platform independent File Transfer Protocol which could handle multiple client requests.
7. **SMS/Call Automation**
   - Created an android app to automate SMS and Calls at a particular time. Android Studio, Java.

Course Works and Certifications

Algorithmic
- Advanced Data Structures & Algorithms
- Sublinear Algorithms
- Approximation Algorithms(Audited)

Mathematical Toolkit
- Advanced Complexity Theory
- Pseudorandomness
- Discreet Mathematics

Systems
- Computer Networks
- Operating Systems

Data Analytics
- Data Analysis with Python: Zero to Pandas

Participation in Seminars and Conferences

- European Conference on Combinatorics, Graph Theory and Applications held at Barcelona (Online)
- Indo-US workshop on Pseudorandomness held at IISc Bangalore .
- Foundations of Software Technology and Theoretical Computer Science-2019 held at IIT Bombay.
- Graphs, Structures and Algorithms(Nov-2019) held at IMSc Chennai.
- Sensitivity, Query and Communication Complexity and Analysis of Boolean Functions held at ISI Kolkata.

Scholastic Achievements

- **Awarded** STAR-TA for the Teaching Assistant position in the course Pseudorandomness out of 150+ TAs.
- Obtained **99.11 percentile** in all India entrance examination for graduate studies, GATE CS 2018.
- Secured All India Rank 28 in Indian Engineering Olympiad 2017.

Languages and Technologies

- **Languages**: Proficient- C++; C; Java; Prior Experience - Python; NoSQL; CSS; HTML; Bash.
- **Adv Java**: OOP; Maven; Spring Framework; Hibernate; JPA; JUnit; Mockito; RESTful API; PowerMock.
- **Libraries**: Numpy; Pandas; Matplotlib; Seaborn.
- Other Skills: Android App Development, Docker, Git, SVN, Linux, Latex, Google Cloud, AWS Fundamentals