Navneet Agarwal

Curriculum Vitae

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Education

2014–2018 **Indian Institute of Technology Bombay**, *Bachelor of Technology (B.Tech)*.
Major: Computer Science and Engineering (with Honors)
Minor: Applied Statistics and Informatics
GPA - 9.65

2012-2014 **St.Stephen's School, Kolkata**, *High School*.
Stream: Science, *Score - 97.00%*

2011-2012 **St.Stephen's School, Kolkata**, *High School*.
Stream: Science, *Score - 96.6%*

Interests

Data Analytics, Financial technology, Statistics

Peer Reviewed Conference Publications

2018 **Authors**: Navneet Agarwal, Sanat Anand & Manoj Prabhakaran [paper]
Title: On Secure m-Party Computation, Commuting Permutation Systems and Unassisted Non-Interactive MPC
Conference: 45th International Colloquium on Automata, Languages, and Programming (ICALP) (ICALP) 2018 - Accepted as Brief Announcement

Scholastic Achievements

2015 Among the top 10 in a batch of 880 students to be granted a branch change to computer science based on extraordinary performance

2014 Secured **64th** rank (State rank **3**) in IIT JEE Mains among 1.5 million candidates

2014 Obtained **5th** rank in State Joint Entrance Examination **WBJEE**

2013 Attained **15th** rank in the Nationwide Education and Scholarship Test (**NEST**)

2014 Bagged Rank **312** in IIT JEE Advanced among 150,000 candidates

2014 Cleared the written examination of Special Class Railway Apprentice Examination

2013 Selected for the **KVPY** Mentorship Scheme, attended the **Vijoyshi** National Science Camp and ranked **256** out of 100,000 students

2013 Participated in Department of Science and Technology (DST) inspired internship science camp conducted by Jagadis Bose National Science Talent Search **JBNSTS**

2014 Attained international rank **66** and state rank **3** in the International Maths Olympiad and national rank **28** and state rank **1** in the National Science Olympiad

Internships

May–July 2017 **Machine Learning for quoting PRDC Risk Charges**.
Goldman Sachs Services Private Limited

- Analyzed the relation between the Monte Carlo generated pathwise payoffs and the **PRDC risk charges**
- Modelled the data using **big data** machine learning techniques such as Adaboosting and Neural Networks
- Achieved an overall RMS error within **one tenth** of the data's standard deviation

July 2017 **Volatility Interpolation in Strike and Expiry**.
Goldman Sachs Services Private Limited

- Implemented a fully implicit finite difference method to efficiently interpolate and extrapolate a discrete set of option quotes to an **arbitrage consistent** full continuous surface of local volatility in expiry and strike
- Examined various time change functions to accurately model the implied volatility

May–July 2016 **Rule Workbench**, .
Electronics For Imaging India Pvt. Ltd.

- Designed **REST Framework APIs** and a web application for a rule engine to facilitate the users to create their own business rules in a user friendly manner
- Developed a user friendly UI for better interaction with the customer for operation on the rules using NodeJS and AngularJS along with HTML
- Used MySQL database queries to support the creation, deletion and updation of rules through the UI
- Used **Mocha** Unit Testing to test the correctness of the APIs

Dec 2015 **Public Opinion Aggregator**, .
Zupp Carpooling, Chitrani Technologies Pvt. Ltd.

- Developed the back-end of a mobile app (a **public opinion poll aggregator**)
- Worked on Android Studio and integrated the app with the database using PHP and MySQL
- Analysed the data collected in a week's duration and displayed the results in a user friendly manner for the user to be able to make several comparisons

Research Projects

Jan–Oct 2017 **Secure Multi-Party Computation**, *IIT Bombay - **UG Thesis***.
Guide : Prof. Manoj Prabhakaran

- Proved a characterization for Aggregated Semi-Honest MPC Functionality and related it to an existing framework of Non-Interactive MPC
- Accepted as a brief announcement in the International Colloquium on Automata, Languages, and Programming (ICALP) 2018 [report]

Key Course Projects

Autumn 2017-18 **Intelligent agent for bomberman**, *Reinforcement Learning*.
Instructor : Prof. Sivaram Kalyanakrishnan

- Designed a neural network for representing the Q-function and used Q-learning updates for training the agent
- Explored effects of human-based features on quality and time of convergence for approximation of Q-values
- Used the idea of Curriculum Learning to teach the agent [github link]

Spring 2016-17 **Agent for Pacman**, *Artificial Intelligence*.
Instructor : Prof. Sivaram Kalyanakrishnan

- Built an intelligent agent of Pacman and compared various heuristics like search, reflex agent, Minimax with pruning, Expectimax and use of evaluation functions to maximize the performance
- Explored another case wherein ghost position is unknown and inferred using Particle Filters and Dynamic Bayes Net

Spring 2015-16 **Malicious URL Detector**, *Machine Learning*.
Instructor : Prof. Ganesh Ramakrishnan

- Extracted lexical and host based features for a URL and did further feature selection to reduce the complexity
- Implemented and tuned various classification models on the selected features to receive high accuracy results [github link]

Autumn 2016-17 **Scanned Document Refiner**, *Image Processing*.
Instructor : Prof. Ajit Rajwade

- Developed an automated system to enhance the quality of pictures of documents
- Used heuristics for finding the Convex Hull and applied Projective Transformations to nullify the skew of the document
- Implemented Adaptive Binarization for text and image enhancement in the document

Autumn 2017-18 **Non-interactive CryptoComputing for** NC_1, *Advanced Tools from Modern Cryptography*.
Instructor : Prof. Manoj Prabhakaran

- Gave a C++ implementation for SYY'99: one of the first works on homomorphic encryption- gives a one round MPC protocol for NC_1 circuits [github link]
- Created a remote cryptocomputer which runs a circuit on encrypted data and returns output such that the original party doesn't learn the circuit [report]

Spring 2016-17 **UC-secure Multi-party Voting**, *Cryptography and Network Security*.
Instructor: Prof. Manoj Prabhakaran

- Developed a protocol for UC-secure multi-party voting against computationally unbounded adversaries using cut-and-choose methodology
- Implemented the above protocol in C++ and observed its practical viability through bench-marking [report]

Teaching Activities and other positions of responsibilities

Autumn 2017-18	**Teaching Assistant** for Prof. Kameshwari Chebrolu - Foundations of Network Security and Cryptography (CS 742/416M)
2017–18	**Department Academic Coordinator** (DAMP) - Leading a team of 20 mentors to help them guide CSE students under the DAMP programme and maintain regular interaction between the faculty and the mentors to smooth the mentoring process
2016-17	**Department Academic Mentor** (DAMP) - Among the 16 department academic mentors who are each responsible to guide a group of 8 students of second year in academics and help them cope with their curriculum
2015-16	**Convener**, Table Tennis Club, IIT Bombay - Conducted workshops of the game and organized freshmen sports orientation along with council members. Organized a general championship and a treasure hunt participated by nearly 550 students

Relevant Additional Courses

Maths	Probability Theory, Derivative Pricing, Statistical Inference, Regression
Machine Learning	Machine Learning, Artificial Intelligence, Intelligent and Learning Agents
Miscellaneous	Digital Image Processing, Data Analysis and Interpretation

Extracurriculars

- Part of bronze medal winning team in the Institute Table Tennis League (ITTL)
- Developed and demonstrated a Windows App under **Code.Fun.Do** competition held by Microsoft
- Participated in Game Jam 2015 and developed a game using **Unity**
- Led and managed 13 players in Institute Table Tennis League and finished 4th
- Successfully completed a Lawn Tennis camp conducted by the institute
- Successfully completed the National Sports Organisation (**NSO**) in Table Tennis in the first year

References

Manoj Prabhakaran
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IIT Bombay
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