

AKSHAY KUMAR

Final Year Dual Degree Student

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EDUCATIONAL QUALIFICATIONS

Year	Degree/Certificate	Institution	Performance
2010 - 2015	B.Tech-M.Tech(Dual), C.S.E.	IIT Kanpur	10.0/10.0 (M.Tech.) 8.9/10.0 (B.Tech.)
2010	XII (CBSE)	Central Academy, Kota	88.2%
2008	X (CBSE)	AECS, Narora	88.2%

AREAS OF INTEREST

Algorithms, Graph Theory, Machine Learning

PATENT & PUBLICATIONS

- B. Bollig, P. Gastin and **A. Kumar**. Parameterized Communicating Automata: Complementarity and Model Checking. In Proceedings of the 34th Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS'14), New Delhi, India, December 2014, Leibniz International Proceedings in Informatics. Leibniz-Zentrum für Informatik. To appear.
- B. V. Srinivasan, **A. Kumar**, S. Gupta, K. Gupta. Stemming the flow of information in a social network. In Proceedings of the 6th International Conference on Social Informatics, Barcelona, Spain, November 2014. To appear.
- **Invention Disclosure:** Filed a U.S. patent application entitled "Identifying Target Customers To Stem The Flow Of Negative Campaign" as one of the inventor. United States 14056624. Filed on October 17, 2013.

INTERNSHIPS

- **PCA: Complementarity and Model Checking**
Research Intern at LSV, ENS Cachan with Prof. Paul Gastin & Benedikt Bollig *(May - Jul 2014)*
 - Proved complementarity for PCAs under certain context bounds.
 - Used it to obtain monadic second order logic (MSO) characterization for PCAs.
- **Stemming the flow of Information in a Social Network**
Research Intern at Adobe Research Labs under the supervision of Dr. Balaji Vasan *(May - Jul 2013)*
 - Tackled the problem of rumor spread in a social network using a graph theoretical approach.
 - Identified possible rumor source(s) based on topology and assigned susceptibility index to each of the nodes.
- **Micello's Automated Report Generator**
Software Intern at Micello under the supervision of Mr. Anil Agarwal *(May - Jul 2012)*
 - Developed a framework for the purpose of automating the process of generating Micello's monthly report.
 - Time taken to generate the report cut down from nearly 20 hours to a few minutes.

MASTER'S THESIS

- **Kernelization techniques for NP-Hard optimization problems**
Supervisor: Prof. S K Mehta *(Jan 2014 - Ongoing)*
 - Investigating Kernel techniques to bound running of NP-Hard problems in a parametrized setting.
 - Devised polynomial time algorithms for vertex/edge removal problems on graphs with bounded treewidth.

KEY ACADEMIC PROJECTS

- **Movie Recommender System** *Course Project in Machine Learning (July - November 2013)*
 - Devised a recommender system to guess movie ratings given by a user using movie's & user's attributes.
 - An improved version of Matrix Factorization algorithm for movie recommendation used in Netflix contest.
- **Hand Gesture Recognition using Microsoft's Kinect** *Project in Artificial Intelligence (Jan - Apr 2014)*
 - Recognized robust hand gestures by applying FEMD on shape of hand extracted by Kinect.
 - Hacked Kinect to detect robust hand gestures using PointCloud Library and OpenCV.
- **Concentration Bounds for Sliding Window Protocol** *Bachelor's Project (Jul - Nov 2013)*
 - Improved the currently existing bounds of Turing's Unproved Lemma on Absolutely Normal Real Numbers.
 - Used Talagrand's Inequality to get a concentration bound on non-independent Bernoulli variables.
 - Paper to be submitted in **Information Processing Letters**.

- **The Onion Router** Course Project in Computer Networks (*July - November 2012*)
 - Implemented onion routing: a distributed P2P application for anonymous communication in Python.
 - Used AES (Advanced Encryption Standard) for data encryption.
- **Hostel Management System** Course Project in Database System (*March - April 2013*)
 - Developed a web portal using Apache/PHP as frontend and MySQL as backend to cater to various affairs of hostel.
 - Implemented a separate sub-system for an administrator than a user.
- **Compiler for a subset of Java to MIPS Assembly** Course Project in Compiler Design (*Jan - Apr 2013*)
 - Designed and developed a compiler for a subset of Java programming language which outputs MIPS assembly code
 - Provided for classes, objects, constructors, methods, access modifiers, inheritance, type coercion & polymorphism
- **Augmenting Pintos operating system** Course Project in Operating Systems (*Jul - Nov, 2012*)
 - Implemented and tested message queues, threads, processes, multiprogramming, scheduling policies, virtual & shared memory management and file-system
 - Analyzed and implemented different system calls, scheduling algorithms and synchronization algorithms
- **Interpreter for Declarative Sequential Language** Course Project in POPL (*Jul - Nov, 2012*)
 - Developed an interpreter in Mozart Oz environment for Declarative Sequential Language.
 - Implemented Semantic Stack and Single Store Assignment to output sequence of execution states given a code as input.
- **CAS - Computerized Algebra System** Summer project with Programming Club, IITK (*May - June 2011*)
 - Developed an automated Computerized Algebra System on the lines of Matlab & Mathematica capable of performing complex manipulations.
 - Handles symbolic computations, differential, integral, optimization, fourier transform, statistical computation, etc.

TECHNICAL EXPERIENCE

Platforms	: Linux, Windows
Programming languages & tools	: C, C++, Java, Haskell, Python, PHP, JSP, Javascript
Tools & Techniques	: Git, Weka, MySQL, L ^A T _E X, PostgreSQL, Lex, Yacc, Octave, Eclipse

RELEVANT COURSES:

- **Applied Computer Science**
Machine Learning, Artificial Intelligence Programming, Database Systems, Computer Networks, Operating Systems, Computer Organisation, Compiler Design, Principles of Programming Languages, Programming Tools & Techniques
- **Theoretical Computer Science**
Randomized Algorithms, Data Compression, Approximation Algorithms, Data Structures & Algorithms, Algorithms II, Theory of Computation, Discrete Mathematics, Mathematical Logic

SCHOLASTIC ACHIEVEMENTS

- [2010] Secured an **AIR¹-162** in IITJEE, **AIR-189** in AIEEE & **AIR-6** in International Maths Olympiad
- [2011] Awarded **Academic Excellence Award** for exceptional academic performance during the Academic Year 2010-11.
- [2010] Awarded the **CBSE Merit Scholarship** for Professional Studies - AIEEE for 2010-2014.
- [2007] **Gold medallist, Junior Science Olympiad & Bronze Medallist, Junior Mathematics Olympiad** awarded by **HBCSE²**, Mumbai.
- [2007] Secured **AIR 88** in NSO³ & **AIR 95** in NSTSE⁴.

EXTRACURRICULARS & POSITIONS OF RESPONSIBILITY:

- Appointed as a **tutor** of the course “**Linear Programming**” with a strength of about 60 students.
- **Finalists** in **IDEA’ 13**: A incubation contest for pitching up with our business plan.
 - Developed a SMART Grid based android app for remotely controlling electrical appliances.
- **Assistant Coordinator, IORC** (India Open Rubiks Cube), Techkriti 2011.
- **Runners up** in **Inter Morales Volleyball** 2011.
- **Runners up** in **Inter Morales Basketball** 2011.

¹AIR: All India Rank

²Homi Bhabha Center for Science Education

³National Science Olympiad

⁴National Science Talent Search Examination