

Akshay Kumar

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| CONTACT INFORMATION | Software Engineer Google LLC Mountain View, CA, USA | http://aksh04ay.github.io e-mail: aksh04ay@gmail.com Mobile: +1 6504765713 |
| RESEARCH INTERESTS | Machine Learning, Algorithms & Optimization | |
| EDUCATION | Indian Institute of Technology, Kanpur B. Tech. / M. Tech. (Dual Degree) in Computer Science & Engineering <i>July 2010 - July 2015</i> – M. Tech. CPI of 10.0 /10.0 (Ranked first in the department among 108 students) – B. Tech. CPI of 8.9 /10.0 | |
| PATENT & PUBLICATIONS | B. Bollig, P. Gastin and A. Kumar . <i>Parameterized Communicating Automata: Complementation and Model Checking</i> . (FSTTCS' 14). [pdf] B. V. Srinivasan, A. Kumar , S. Gupta, K. Gupta. <i>Stemming the flow of information in a social network</i> . (SocInfo' 14). [pdf] Patent: Filed US20150113056A1, " <i>Identifying Target Customers To Stem The Flow Of Negative Campaign</i> " as one of the inventor. [link] | |
| JOB EXPERIENCE | Software Engineer, Google, Mountain View - CA <i>April 2017 - Present</i> Working on brand lift measurement and optimization for YouTube Ads. – Built a deep neural net based brand lift prediction model. – Designed a bid lowering based bidding system to optimize for maximizing brand lift. Software Engineer, Google, London <i>September 2015 - March 2017</i> Worked on AdSense to acquire premium publishers for Google AdSense. | |
| RESEARCH INTERNSHIPS | PCA: Complementation and Model Checking <i>May - July 2014</i> <i>Mentored by Prof. Paul Gastin & Benedikt Bollig at LSV, ENS Cachan</i> Proved the complementability of PCAs (Parameterized Communicating Automata) under context bound and used it to obtain monadic second-order (MSO) logic characterization of PCAs – This work was presented at Highlights 2014 conference. Stemming the flow of Information in a Social Network <i>May - July 2013</i> <i>Research Intern at Adobe Research Labs under the supervision of Dr. Balaji Vasani</i> Developed E2E system for stemming the flow of information in a network by exploiting network structure and finding optimal set of beginning nodes. | |
| RESEARCH EXPERIENCE | Predictive Lift modelling : Predicting incremental gains <i>September 2018 - Present</i> <i>Ongoing Course Project in CS229 (Machine Learning)</i> Stanford University Designing a predictive response model to predict the "incremental" effect of an ad campaign on consumer behavior. Face Swapping and Harmonization using neural nets <i>April - June 2018</i> <i>Course Project in CS231N (CNNs for Visual Recognition)</i> Stanford University Developed an approach for face anonymization via. face detection, anonymization and blending. Trained a 9 layer deep CNN on LFW (Labeled Faces in the Wild) dataset. [report] Network Analysis of Weighted Signed Bitcoin Network <i>September - December 2017</i> <i>Course Project in CS224W (Analysis of Networks)</i> Stanford University Studied trust in signed weighted bitcoin network and designed a linear regression based algorithm for trust prediction using social imbalance theory and graph topology. [report] Parametrized Algorithm for Even Cycle Transversal <i>Dec 2013 - July 2015</i> <i>Master's Thesis project under the guidance of Prof. S K Mehta</i> IIT Kanpur Devised an $O(17^k)$ deterministic FPT algorithm for Even Cycle Transversal Problem. Better than the currently best known $O(50^k)$ FPT algorithm. [report] | |

Concentration Bounds for Absolutely Normal Real Numbers July 2013 - April 2014
Bachelors Project under guidance of Prof. Satyadev Nandakumar **IIT Kanpur**
 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. [\[report\]](#)

SELECTED
PROJECTS

Movie Recommender System July - November 2013
Course Project in CS771 (Machine Learning) **IIT Kanpur**
 Devised a recommender system to guess movie ratings given by a user using an improved version of Matrix Factorization algorithm for movie recommendation used in Netflix contest. Algorithm used is a hybrid filtering algorithm which uses both movie's and user's attributes. [\[report\]](#)

Hand Gesture Recognition using Microsoft's Kinect March - April 2012
Course Project in CS365 (Artificial Intelligence) **IIT Kanpur**
 Recognized robust hand gestures by applying FEMD (Field Earths Mover Distance) on shape of hand extracted by Kinect. Hacked Kinect to detect robust hand gestures using PointCloud Library and OpenCV. Accuracy of nearly 75% reported. [\[report\]](#)

Advanced Data Structure November 2012 - January 2013
Winter Project under guidance of Prof. Surender Baswana **IIT Kanpur**
 Studied advanced data structures such as persistent/retroactive data structures, cache oblivious data structures & algorithms, dynamic graphs and succinct data structures. Also looked into LCA-RMQ problem with linear preprocessing time & constant query time algorithm for the same.

TALKS
GIVEN

- Hand Gesture Recognition using Kinect. *As part of course CS365 (Artificial Intelligence)*. [\[ppt\]](#)
- Google Similarity Distance. *As part of course CS687 (Algorithmic Information Theory)*. [\[ppt\]](#)
- A Combinatorial, Primal-Dual Approach to Semidefinite Programs. *As part of course CS698C (Semidefinite Programming)*. [\[ppt\]](#)
- Stemming the spread of rumors in a social network. *Talk given at Adobe Research Lab*. [\[ppt\]](#)
- Unique Games Conjecture: Subhash Khot wins the Nevanlinna prize. *SIGTACS talk*. [\[webpage\]](#)

ACADEMIC
ACHIEVEMENTS

- Ranked **first in the department** amongst the M. Tech. batch of 108 students.
- Ranked 162 in IIT JEE 2010 and 189 in AIEEE 2010 (amongst 1M candidates in each exam).
- Awarded **Academic Excellence Award** for the term 2011-12 & 2013-14.
- Awarded the **CBSE Merit Scholarship** for Professional Studies - AIEEE for 2010-2014.
- **Gold medallist**, Junior Science Olympiad (2007) & **Bronze Medallist**, Junior Mathematics Olympiad (2007).
- Awarded **KVPY fellowship** by Department of Science & Technology, Government of India.

RELEVANT
COURSE WORK

AI & ML: Machine Learning^{*#}, Artificial Intelligence, Convolutional Neural Networks for Visual Recognition*, Analysis of Networks*, Probabilistic Graphical Models^{*#}, Convex Optimization, Machine Learning: Tools, Techniques & Application, Introduction to Cognitive Science, Non-classical Logic, Mathematical Logic

Algorithms, Theory & Optimizations: Randomized Algorithms, Approximation Algorithms, Semidefinite Programming, Advanced Algorithms, Data Compression, Algorithmic Information Theory, Finite Automata on Infinite Input, Theory of Computation

Mathematics: Linear Programming, Operations Research, Linear Algebra, Complex Analysis, Real Analysis, Multi variable calculus, Differential Equations

Computer Science: Principles of Programming Languages, Computer Networks, Database Management System, Compiler Design, Operating System, Computer System & Organization, Introduction to Computing, Introduction to Electronics

* : Courses done at Stanford University # : Currently ongoing

TECHNICAL
SKILLS

Programming Languages: C, C++, Python, Java, Go, Haskell, R, Oz, SQL, PHP
Other Tools: Tensorflow, L^AT_EX, MATLAB, GNU Octave, Lex, Yacc, weka