Akshay Kumar

Contact Information

Software Engineer
Google LLC
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Interests

Machine Learning, Deep Learning, Algorithms & Optimization

Education

Stanford University
Artificial Intelligence Graduate Certificate — *Sep 2017 - Mar 2019*
- CGPA of **3.850**/4.0.

Indian Institute of Technology, Kanpur
B. Tech. / M. Tech. (Dual Degree) in Computer Science & Engineering — *July 2010 - July 2015*
- Master's CGPA of **10.0**/10.0 (Ranked **first in the department** among 108 students)
- Bachelor's CGPA of **8.9**/10.0

Job Experience

Software Engineer, Google News, Google, Mountain View - CA — *April 2017 - May 2019*
Working on improving video news stream quality in emerging markets.

Software Engineer, YouTube Ads, Google, Mountain View - CA — *April 2017 - May 2019*
Worked 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 AdSense, Google, London — *September 2015 - March 2017*
Worked on AdSense to acquire premium publishers for Google AdSense.

Patent & Publications

B. Bollig, P. Gastin and **A. Kumar**. *Parameterized Communicating Automata: Complementation and Model Checking.* (**FSTTCS' 14**). [pdf]

B. V. Srinivasan, **A. Kumar**, S. Gupta, K. Gupta. *Stemming the flow of information in a social network.* (**SocInfo' 14**). [pdf]

Patent: Filed US20150113056A1, "*Identifying Target Customers To Stem The Flow Of Negative Campaign*" as one of the inventor. [link]

Research Internships

PCA: Complementation and Model Checking — *May - July 2014*
Mentored by Prof. Paul Gastin & Benedikt Bollig at LSV, ENS Cachan
Proved the complementability of PCAs (Parameterized Communicating Automata) under context bound and used it 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 — *May - July 2013*
Research Intern at Adobe Research Labs under the supervision of Dr. Balaji Vasan
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 — September - December 2018
Course Project in CS229 (Machine Learning) — **Stanford University**
Designed a predictive response model to predict the "incremental" effect of an ad campaign on consumer behavior.

Face Swapping and Harmonization using neural nets — April - June 2018
Course Project in CS231N (CNNs for Visual Recognition) — **Stanford University**
Developed an approach for face anonymization via. face detection, anonymization and blending. Trained a 9 layer deep CNN on LFW (Labeleed Faces in the Wild) dataset. [report]

Selected Projects

Network Analysis of Weighted Signed Bitcoin Network *September - December 2017*
Course Project in CS224W (Analysis of Networks) **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 *Dec 2013 - July 2015*
Master's Thesis project under the guidance of Prof. S K Mehta **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]

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]

Talks Given

- Uplift Modeling : Predicting incremental gains. [poster]
- Face swapping and harmonization using neural nets. [poster]
- Network Analysis of Weighted Signed Bitcoin Network. [report]
- Hand Gesture Recognition using Kinect. [ppt]
- Google Similarity Distance. [ppt]
- A Combinatorial, Primal-Dual Approach to Semidefinite Programs. [ppt]
- Stemming the spread of rumors in a social network. [ppt]
- Unique Games Conjecture: Subhash Khot wins the Nevanlinna prize. [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, 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

Technical Skills

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