

# Dhruv Kohli

## Curriculum Vitae

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Math.StackExchange Profile

### Education

- 2012-2016 Bachelor of Technology in Mathematics and Computing.  
**Indian Institute of Technology**, Guwahati (India)  
GPA - 9.06 / 10, Department Rank 2 / 54
- 2011-2012 Higher Secondary.  
**DAV Public School**, Delhi (India)  
CBSE Central Board Exams 92.0%, Mathematics score: 98 / 100
- 2009-2010 Marticulation.  
**A. B. B. Sr. Sec. School**, Delhi (India)  
CBSE Central Board Exams CGPA 9.80, Mathematics score: 10 / 10

### Work Experience

- 06/2016- Researcher, Advanced Technology Lab - Multimedia Division  
03/2017 **Samsung Research Institute**, Bangalore (India)
- Developed a Deep Hierarchical Network invariant to rotation of objects in the input image with two times better cross-dataset accuracy than state of the art.
  - Extensively studied a technique based on contraction mappings to increase the lower bound on the margin in the input space of a non-linear classifier.
  - Implemented video temporal segmentation as a core component of video summarization, based on Affinity Propagation and Sequential Determinantal Point Process.
- 05/2015- Research Intern, Cloud and Information Services Lab Group  
07/2015 **Microsoft Research**, Bangalore (India)
- Worked on real-time detection of issues in high-dimensional performance counter time series data with the aim of detecting the time of the issue and the subset of counters which caused the issue.
  - Modeled the data using a time-varying Gaussian distribution whose mean and covariance had sparse dictionary based representations that were learned automatically, and the sparse codes were constrained to be temporally dependent.
  - Other approaches that we explored - clustering of objects on subsets of attributes, switching state space models, GMM, HMM and Kalman filter.
- 05/2014- Software Developer, Google Summer of Code  
08/2014 **International Neuroinformatics Coordinating Facility**
- Worked on real-time vectorization of brain atlases.
  - Developed an open source software "mindthegap" that vectorizes bitmaps without introducing gaps or overlaps between adjacent regions. [Link]
  - Added services on Scalable Brain Atlas website, enabling researchers to view the region contours of various brain atlases generated by mindthegap. [Link]

## Projects

- 08/2015- Thesis: **Reasoning, Attention and Memory based Machine Learning Models** [Link]  
04/2016 Advisor: *Prof. Amit Sethi*  
Performed a literature survey on Deep Learning models for sequence to sequence learning and on RAM based machine learning models with emphasis on Neural Turing Machines and End to End Memory Networks. Implemented the former from scratch in Theano and tested it on toy tasks such as copy task. Also, evaluated the available latter model on the task of question answering.
- 12/2014- **Game Playing Agent using Deep Reinforcement Learning**  
02/2015 Implemented a deep learning model in Caffe that learns to play Atari games based on a paper by Google DeepMind. Learned various concepts in reinforcement learning - structured markov decision process, value iteration, Q-learning and temporal difference learning.

## Publications

- Dhruv Kohli**, Biplab Ch Das, Viswanath Gopalakrishnan, Kiran Nanjunda Iyer, *Learning Rotation Invariance in Deep Hierarchies using Circular Symmetric Filters*, International Conference on Acoustics, Speech and Signal Processing, 2017 (Accepted). [Link]
- Dhruv Kohli**, Viswanath Gopalakrishnan, Biplab Ch Das *Maximizing Margin Lower Bound in Deep Nonlinear Networks*. [Link]

## Awards and Honors

- 2017 Ranked 18 in Indian Statistical Institute Entrance Exam for Master in Statistics.
- 2016 Ranked 2 in a class of 54 students based on GPA, Mathematics and Computing Department, IIT Guwahati.
- 2014 Ranked 1 across the country in CUDA Coding Challenge India organized by Nvidia in High Performance Computing Conference.
- 2014 Ranked 2 in Machine Learning module of Kriti, Intra-College Technical Competition.
- 2013 Among top 5 teams in Code.Fun.Do organized by Microsoft at IIT Guwahati.
- 2012 Ranked 2076 out of 500,000 students in IIT Joint Entrance Exam.
- 2012 Recommended for KVPY (Kishore Vaigyanik Protsahan Yojana) Fellowship.
- 2008 Awarded Student of the Year by The Times of India for excellent all-round performance.

## Skills

- Prog. Lang. Python, C, C++, CUDA  
Stats. Tools MATLAB, R  
ML Libs Keras, Theano, TensorFlow  
Others Git, LaTeX

## Relevant Coursework

Linear Algebra, Real Analysis, Multivariable Calculus, Basic Topology, Probability Theory, Statistical Inference, Stochastic Processes, ODE, PDE, Machine Learning, Theoretical and Computational Neuroscience.