Dhruv Kohli

Curriculum Vitae

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Education

2012-2016 Bachelors in Mathematics & Computing.
Indian Institute of Technology, Guwahati (India)
Bachelor Thesis: Reasoning, Attention and Memory Based Machine Learning Models[1].
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

Work Experience

06/2016-present Researcher, Advanced Technology Lab - Multimedia Division
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. In preparation for the upcoming ICML conference.
- Implemented ROI (Region of Interest) Pooling operator in theano and modified a Deep Learning Framework to support GPU using CuBLAS, Thrust etc.
- Currently, working on the problem of video temporal segmentation as a core component of video summarization.

05/2015-07/2015 Research Intern, Cloud and Information Services Lab Group
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 an approach based on KL divergence.

[1] Link to project page.

05/2014- Software Developer, Google Summer of Code
08/2014 **International Neuroinformatics Coordinating Facility**

- Worked on the problem of real-time vectorization of brain atlases obtained from slicing 3D scans of brain.
- Developed an open source software "mindthegap" that vectorizes bitmaps without introducing gaps or overlaps between adjacent regions[1]. The core component was an algorithm for automatically fitting digitized curves using cubic bezier splines.
- Added services on Scalable Brain Atlas[1] website to convert a set of 3D volumes of brain into an atlasing template which allows researchers to view the region contours, generated by mindthegap, of the atlas registered to the brain scan.

Projects

03/2015 **Deterministic Automata Membership Test in SIMT Environment**
Prof. Kalpesh Kapoor
Implemented an algorithm for the DFA membership test in CUDA with deployment on a Tesla K40. The algorithm involved specialized partitioning of the input string into chunks so as to balance the workload on threads and minimize latency.

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 DeepMind Technologies. Learnt about various concepts in reinforcement learning such as 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 ABC DEF XYZ*, International Conference on Acoustics, Speech and Signal Processing, 2017 (Submitted).

Awards and Honors

2016 Ranked 2 in a class of 54 students based on GPA, Mathematics and Computing Department, IIT Guwahati.

2014 Ranked 1 accross 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 Ranked 224 out of 40,000 students after writing the exam and being interviewed for KVPY (Kishore Vigyan Protsahan Yojana) Fellowship.

2008 Awarded Student of the Year by The Times of India (TOI) for excellent all-round performance.

[1] Link to software page and link to an atlas template.

Skills

Prog. Lang.	Python, C, C++, CUDA
Stats. Tools	MATLAB, R
ML Libs	Keras, Theano, Caffe, TensorFlow
Others	Git, LateX, OpenMP, MPI, OpenCV

Courses

Linear Algebra, Real and Complex Analysis, Calculus and Analytic Geometry, Ordinary and Partial Differential Equations, Probability Theory and Random Processes, Monte Carlo Simulation, Statistical Analysis of Financial Data, Statistical Simulation and Data Analysis, Artificial Intelligence, Intelligent Systems and Interfaces, Data Structures and Algorithms, Parallel Computing.