Dhruv Kohli

Curriculum Vitae

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Math.StackExchange Profile

Education

2018-2020 Master of Science in Computational Science, Mathematics and Engineering.
University of California, San Diego
GPA - 4.00

2012-2016 Bachelor of Technology in Mathematics and Computing.
Indian Institute of Technology, Guwahati
GPA - 9.06 / 10, Department Rank 2 / 54

Work Experience

06/2016-03/2017 Software Engineer, 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 conventional CNN on mnist-rot.
- 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.

05/2015-07/2015 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 kalman filter.

05/2014-08/2014 Software Developer, Google Summer of Code
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

10/2017-04/2018 **Mini-Projects Based on Original Ideas**

- Devised and implemented a diversity promoting prior based on Determinantal Point Process to promote diversity among filters in a convolutional layer. [Code]
- Implemented a layer to compute Mobius transformation of dense layer. [Code]
- Fitted Bezier surfaces to digital images to represent them as 2D analog signals. [Code]
- Devised and implemented a method to represent fractals acoustically. [Code]

08/2015-04/2016 Thesis: **Reasoning, Attention and Memory based Machine Learning Models**
Advisor: *Prof. Amit Sethi*
Performed a 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. [Link]

Publications

Dhruv Kohli, Jeffrey M. Rabin, *Symmetric Expansion preserves Hyperbolic Convexity and Symmetric Contraction preserves Spherical Convexity* (Submitted).

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 across country in entrance exam for Master in Statistics organized by Indian Statistical Institute, Kolkata. [Link]

2014 Ranked 1 across the country in CUDA Coding Challenge India organized by Nvidia in High Performance Computing Conference. [Code][Link]

2014 Ranked 2 in ML module of Kriti, Intra-College Technical Competition. [Link]

2012 Ranked 2076 out of 600,000 students in IIT Joint Entrance Exam.

2012 Recommended for KVPY (Kishore Vaigyanik Protsahan Yojana) Fellowship.

Skills

Prog. Lang. Python, C++, CUDA, MATLAB, R

ML Libs Keras, Tensorflow

Others Git, LateX

Relevant Coursework

U.Graduate Linear Algebra, Complex Analysis, Basic Topology, Statistical Inference, Stochastic Processes, ODE, PDE, Machine Learning, Parallel Computing. [Link]

Graduate Differential Geometry, Numerical Methods, Convex Analysis and Optimization, Topology.