Aditya Kumar Akash

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Research Interests

Deep Learning, AI, Computer Vision

Education

Sept 2018 - Present
PhD *Computer Science*, University of Wisconsin, Madison
GPA : $4/4$

Aug 2016
Bachelors of Technology with Honors, *Computer Science and Engineering*, Indian Institute of Technology, Bombay
GPA : $9.18/10$

Publications

2016, 2017
Lower bounds for graph exploration using local policies
A. K. Akash, S. P. Fekete, S.K. Lee, A.Lpez-Ortiz, D. Maftuleac, and J. McLurkin
10th International Workshop on Algorithms and Computations (WALCOM)
Journal of Graph Algorithms and Applications [link]

2015
Local policies for efficiently patrolling a triangulated region by a robot swarm
D. Maftuleac, S.K. Lee, S. P. Fekete, A. K. Akash, A.López-Ortiz, and J. McLurkin
IEEE International Conference on Robotics and Automation (ICRA) [link]

Major Research Projects

Sept 2018 - Present
Constraints for Deep Learning
Guide: Prof. Vikas Singh

- Investigating how to incorporate various constraints when training deep architectures for vision
- The work has direct applications in medical image analysis

Autumn 2015 - Spring 2016
Consensus-based Active Learning Strategy for Multi-Label Classification
Undergraduate Dissertation, IIT Bombay
Guide: Prof. Ganesh Ramakrishnan

- Worked on problem of multilabel classification for predicting video tags
- The problem involved multiple human and machine labelers, and required transitioning from scarce labelled data start to a warm-start setting
- Designed a novel active learning based strategy that optimizes the cost of labeling, labeler reliability and inter-labeler consensus
- The work served as base project for following publication [report part1][part2]

Summer 2014 **Local counter-based policies for robot patrolling**
Research Internship, Technische Universität, Braunschweig, Germany
Guide: Prof. Sándor P. Fekete

- Worked on theoretical aspects of swarm of mobile robots exploring an arbitrary graph
- Researched in detail LRV (Least Recently Visited) patrolling policies and established a new, previously unknown, lower bound on LRV-vertex policy
- Contributed to aspects of a possible new upper bound using edge based patrolling policies
- The work led to publications in ICRA and WALCOM [paper1][paper2]

Spring 2016 **Application of Probabilistic Principal Component Analysis (PPCA)**
Undergraduate Research Project, IIT Bombay
Guide: Prof. Suyash Awate

- Analyzed applications of PPCA for cases in which data vectors exhibit missing values
- Investigated the comparative performance of PPCA against variants of standard PCA for estimating missing data
- Empirically established that PPCA performs better when data has inherent mixture model distribution [report][code]

Work Experience

July 2016 - Present **Google, Maps Auto-Moderation Team**
Software Engineer, Bangalore

- Working on auto-moderation system which is responsible for moderating millions of user edits on Google maps and preventing spam and graffiti attacks
- Built user consensus and trust models for leveraging user votes to better decide the acceptance of edits on Maps
- Reduced spam risks and improved sensitivity of the graffiti detection model
- Extensively worked with lattice regression based ensemble models

Summer 2015 **Microsoft, Bing Ads Team**
Intern, Bangalore, Guide : Rahul Agrawal

- Worked on problem of predicting CTR (click through rate) for ads on Bing search
- Used metasearch techniques along with mixture models and boosted fast tree regression to combine relevance scores of queries and related keywords obtained from various algorithms
- Implemented the solution on Microsoft's internal big data platform

Seminars

Spring 2015 **Optimal number of hidden layers and nodes**, Introduction to AI
IIT Bombay, Guide: Prof. Pushpak Bhattacharyya [slides]
Discussed about optimal number of hidden layers and nodes in neural networks. Presented a genetic algorithm to find near-optimal solution with minimum network complexity

Academics

Graduate Courses	Non-linear Optimization, Mathematical foundation of ML
Advanced Undergrad Courses	Artificial Intelligence, Medical Image Processing, Convex Optimization, Machine Learning, Game Theory, Linear Optimization
Skills	C, C++, Java, Python, MATLAB, LaTeX, numpy-scipy, TensorFlow

Relevant Course Projects

Spring 2016 **Application of Partial Least Squares (PLS) Dimension Reduction**
Guide: Prof. Suyash Awate, [report]
Implemented a regression using PLS dimensionality reduction and used it to obtain better classification results than SVM & PCA based methods on datasets with high dimensionality

Autumn 2015 **Second Order Cone Programming for Robust Least Squares**
Guide: Prof. Ganesh Ramakrishnan, [report]
Implemented Barrier method and Primal Dual Interior Point methods in Python and used it to analyze their convergence on Robust Least Squares problem formulated as SOCP

Spring 2015 **Threading and Scheduling in GeekOS**
Guide: Prof. D. M. Dhamdhere, [report]
Added multilevel and round robin scheduling policy in GeekOS, an experimental OS. Implemented kernel and user level thread creations with deadlock handling

Autumn 2014 **Code Corpus**
Guide: Prof. N. L. Sharda, [report]
Created a corpus for competitive programming problems with sophisticated search options. Added intelligent options for auto suggestion of problems and users to follow

Position of Responsibility

2019 **Teaching Assisant** for CS 577, Introduction to Algorithms, UW Madison
2018 **Teaching Assisant** for CS 400, Programming III, (Data structures), UW Madison
2015 **Teaching Assisant** for Computer Programming and Utilization course, IIT, Bombay
2017 Co-hosted intern at Google

Scholastic Achievements

2016 **Winners** in **ACM ICPC** Chennai regionals, qualified for **World Finals**
2013 **Invited by HRD Ministry**, Government of India, to witness Republic Day parade from Prime Minister's box, for academic excellence in senior secondary school
2012 **All India Rank 38** in *IIT JEE*, among 500,000 candidates
2012 **All India Rank 50** in *AIEEE*, among 1.5 million candidates
2010 **KVPY**, National Program of Fellowship in Basic Sciences, awarded by Department of Science and Technology, Government of India