

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 various constraints can be incorporated in deep learning models, and relevant optimization techniques for training them faster
 - Applications in medical image analysis when models have access to limited data samples, eg. tumor segmentation
- 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. Dhamdhare, [\[report\]](#)
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