Curriculum Vitae – Aditi Laddha

Personal Information

Aditi Laddha
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Education

- **Indian Institute of Technology, Bombay** *2013-2017*
  B.Tech in Computer Science and Engineering
  Pursuing minor in Mathematics and honors in Computer Science
- Sapphire School, Ratlam, India *2011-2013*
- St. Joseph's Convent School, Ratlam, India *1999-2011*

Relevant Work Experience

Research Intern
Guide : Prof Sándor Fekete, Technische Universität Braunschweig *Summer, 2015*

- Improved the upper bound on competitive factor of an online algorithm for triangulating a given polygonal region with minimum number of robots having limited communication range
- Extrapolated an algorithm for finding lower envelope of a set of line segments to general curves while preserving run-time complexity
- Worked on Inverse Art Gallery problem, a generalization of the classical Art Gallery Problem which poses the question that given a set of points, what is the minimum number of points that can guard any simple polygon formed using all of the given points

Polynomial methods in circuit complexity
Guide : Prof Nutan Limaye, IIT Bombay *Fall, 2016*

- Worked on the problem of Orthogonal Vectors in higher dimensions
- Devised a subcubic reduction from 3-dimensional orthogonal vectors problem to All Pair Shortest Path
- Devised a reduction from 3-dimensional orthogonal vectors problem to OR-AND-OR circuit

Academic Projects

- **Software Development Intern**
  Microsoft IDC, Hyderabad *Summer, 2016*
  — Processed data on Cosmos, Microsoft's internal BigData analysis platform, for pattern matching and classification
  — Transformed the derived data to a structured stream and populated a non-relational database server with the structured data
- **Carrom playing Agent** *Prof : Shivaram Kalyanakrishnan* *Fall, 2016*
  — Developed an agent to play the game of carrom, in single player mode as well as in a two-player mode. Tried several methods ranging from reinforcement learning to heuristics
  — Used Q-Learning to train the agent. Due to continuous state and action space, we used linear function approximation and tile coding to make Q-Learning feasible
  — Trained another agent using heuristic strategies taking into account coin density, single shot accuracy, first turn advantage
- **Eigenfaces vs Fisherfaces : Facial recognition accuracy comparision**
  Prof : Ajit Rajvade and Suyash Awate *Fall, 2016*
  — Ran facial identification on subjects with varying pose, facial expression, illumination and eyewear by projecting the images on eigenspace and fisherspace
  — Compared the accuracy of the two techniques on multiple image databases
  — Used fisherfaces to detect whether a person in an image is wearing glasses or not
- **A Small C-like Compiler** *Prof : Amitabha Sanyal* *Spring, 2016*
  — Used flexc++ and bisonc++ to develop a compiler for a C-like language that supports all major functionality of C like function calls, recursion, multidimensional arrays, nesting of function calls and arrays etc.
  — Used spim to execute the mips assembly code generated by the compiler
- **Comparison of Page Replacement Policies** *Prof : NL Sarda* *Fall, 2015*
  — Implemented various page replacement algorithms, specifically, LRU, MRU, LFU, First in First Out, Bélády's algorithm and random algorithm on a toy database
  — Compared the performance of these algorithms on select and join database operations

- **Music Genre Classifier** *Prof : G.Sivakumar* *Fall, 2015*
  — Trained a neural network to classify an audio signal into a set of music genres
- **Online Railway Reservation System** *Prof : NL Sarda* *Fall, 2015*
  — Designed algorithms to simulate the functionality of Indian Railway
  — Deployed the system on a PostgreSQL back-end with a JSP-based UI
  — Created an online portal with features like user authentication, booking and canceling tickets, checking PNR status and viewing user history.
- **Seminar** *Prof : Nutan Limaye* *Fall, 2015*
  — Presented a seminar on the Class Σ_2^P and definition of polynomial hierarchy via oracle Turing machines
- **Stable Matching in Bipartite Graphs** *Prof : Sharat Chandran* *Fall, 2014*
  — Designed an algorithm which constructed a stable matching between seats in branches of IITs and college applicants using Gale-Shapley algorithm for stable matchings
  — Modified the algorithm to take into account multiple rank-lists and the fact that some seats are reserved for a certain subset of students and implemented this algorithm using Java
- **Django Based Web Portal** *Prof : Sharat Chandran* *Fall, 2014*
  — Built a python based web app using Django framework where a student can register their JEE ranks and preferences for institutes and branches
  — Implemented features like user statistics, past year seat allocation details, graphic analysis of cut-off ranks from previous year's data, etc
- **Rube Goldberg Machine** *Prof : Sharat Chandran* *Fall, 2014*
  — Simulated a Rube Goldberg machine using Box2d, an open source 2D physics engine
- **Tetris** *Prof : Supratim Biswas* *Fall, 2013*
  — Used simplecpp graphics package to implement the game of tetris
  — Simulated an environment where some special type of blocks have different gameplay than standard blocks

Teaching Experience

- Worked as teaching assistant for a course on Discrete Structures at IIT Bombay, teaching a class of 130 sophomores. *Fall, 2016*
- Worked as teaching assistant for a course on Linear Algebra and Differential Equations at IIT Bombay, teaching a class of 45 freshmen. *Spring, 2015*
- Worked as teaching assistant for Introduction to Calculus at IIT Bombay, teaching a class of 45 freshmen. *Fall, 2014*
- Will work as teaching assistant for a course on Automata Theory, teaching a class of third year students *Spring, 2017*
- Teaching volunteer for Abhyasika, an initiative by IIT Bombay students to teach children from low income families living in and around IIT Bombay Ongoing

Related Coursework

- **Theoretical Computer Science :** Data Structures and Algorithms, Design and Analysis of Algorithms, Logic for Computer Science, Automata Theory, Introduction to Computational Complexity, Research and Development Project
- **Combinatorics** : Basic Algebra, Discrete Structures, Combinatorics*
- **Machine Learning** : Foundations of Intelligent and Learning Agents, Advanced Machine Learning, Foundations of Machine Learning, Artificial Intelligence, Artificial Intelligence Lab
- **Mathematics** : Calculus, Linear Algebra, Differential Equations, Real Analysis, Introduction to Fourier Analysis

*- to be completed by Spring, 2017

Skills

C++, C, JAVA, Prolog, Python, MATLAB, LaTeX, SQL, Octave

Awards and Scholastic Achievements

- Awarded the Aditya Birla Scholarship for academic excellence by the Aditya Birla Foundation *2013-2016*
- Advanced Performer grade in Programming Paradigms and Abstractions Laboratory, Linear Algebra and Differential Equations *2014*
- Secured All India Rank 6 in IIT JEE 2013 among 0.15 million students *2013*
- Secured 15th rank in Madhya Pradesh Pre-Engineering Test among 50,000 students *2013*