

Srajan Garg

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IIT Bombay

Computer Science & Engineering

4th Year Undergraduate

GPA : 9.31/10.0

SCHOLASTIC ACHIEVEMENTS

Hyperlinks at appropriate places

- Secured **All India Rank 21** in JEE Advanced 2014 among 150 thousand candidates
- Achieved **99.96%** percentile in JEE Main 2014 among 1.5 million candidates
- Recipient of the Kishore Vaigyanik Protsahan Yojana Scholarship in 2013 with an **All India Rank 13**
- Amongst the **top 300** students in **each** of the Indian National Olympiad of Physics, Astronomy & Mathematics
- Ranked **43rd** in India at the onsite round of the **ACM ICPC** competitive programming contest 2015

INTERNSHIPS & KEY PROJECTS

Optimizing Linear Algebra Routines with Data Prefetching

Summer '17 + Ongoing

Guide: Harsha Vardhan, Microsoft Research

- Optimized standard linear algebra routines by blocking them into smaller discrete tasks, with known data requirements and access patterns, followed by prefetching and pipeling these tasks
- Implemented the technique for dense-dense matrix-multiplication and attained 70% of the speed of a completely in-memory execution (requiring 200GB of RAM) using only a miniscule fraction of the memory (just 4GB of RAM)
- Further achieved 90% speeds by designating few physical cores of the CPU purely for the task of prefetching

GAN-style Learning for Robustness of 3D Models

Ongoing

Guide: Prof. Siddharta Choudhuri, IIT Bombay & Vladimir Kim, Adobe Research

- Working on modifying GAN-style networks for learning robustness of 3D models as part of my Bachelor Thesis
- Generator network produces modifications of an input object (a voxel grid) while maintaining shape similarity
- Adversarial network can be flexibly modeled to improve the generator according to the robustness specification

Google Summer of Code - SymEngine

Summer '16

Guide: Dr. Ondrej Certik, Los Alamos National Laboratory

- Refactored and restructured the Polynomial module in SymEngine, a C++ Computer Algebra System (CAS)
- Introduced SymEngine wrappers to polynomial classes of other CAS libraries like FLINT and Piranha
- Built a parser 4x faster than Bison generated, to convert mathematical strings to the library's symbolic expressions
- Improved overall infrastructure of the library and introduced changes to speed up build times by about 20%

OTHER WORK EXPERIENCE

Question Recommendation System for Personalized Learning

Summer '16

SilverLeaf Capital Services, an Algorithmic Research Firm

- Designed a prediction & recommender system to suggest questions to students on an e-learning platform
- It learns student's strengths and weaknesses in real-time so as to provide questions as per the student's competence
- Deployed a scalable algorithm using collaborative filtering techniques based on Singular Value Decomposition, which showed significant improvements over other approaches on measures like RMSE and F1 Score

Django based Management Information System

Winter '15

CityFlo Pvt. Ltd, a Bus Aggregator Startup

- Developed an operational customer support dashboard from scratch using the Django Object-Relational Map, to monitor activities and information of the company's customers and assets

Google Summer of Code Mentor - SymEngine

Ongoing

- Responsible for complete code review and guidance of students for Google's Summer of Code 2017
- Primary mentor for 'Implementing Solvers for SymEngine' project within the SymEngine CAS library

MORE PROJECTS

Exact Geodesics on Mesh — *Digital Geometry Processing*

- Implemented an algorithm to find the exact shortest path between points along the surface of a polygonal mesh
- Wrote routines which ‘unfold’ polygonal mesh starting from the source and progress towards the destination in a Dijkstra like fashion, and finally join the two using a straight line on the unfolded plane

TwoCube — *Microsoft code.fun.do*

- Ideated and implemented a 3D Isometric game using a mixture of elements from the games of Tetris and 2048
- Bagged 1st place at Lenovo’s GameJam and 2nd place at Microsoft’s Code.Fun.Do Hackathon at the Institute level

Feature Based Image Metamorphosis — *Digital Geometry Processing*

- Implemented algorithm to morph one digital image into another in a fluid way, based on paper by T. Beier et al.
- Used user specified features (pairs of lines on both the images) to create a smooth transformation of each pixel’s location using rotation, translation, and scaling while blending the two images

Department Allocation as a Matching Problem — *Software Systems*

- Developed a full stack web application to allocate departments to students based on their preferences and GPAs
- Implemented a modified version of the Gale Shapley Algorithm along with improvements like cyclic preference resolution among student choices to solve the given matching problem

Movie Recommendation Engine — *Foundations of Machine Learning*

- Developed a movie recommendation engine in Python based on the Singular Value Decomposition method
- Implemented various other methods including both the user and item based K-Nearest Neighbors algorithm

Raytracer — *Computer Graphics*

- Implemented an efficient raytracer for rendering 3D primitives along with support for reflection & refraction
- Supports shadows and various light types, and used Phong reflection model for calculating surface color

Mesh Simplification — *Digital Geometry Processing*

- Implemented a surface simplification algorithm which produces high quality approximations of polygonal meshes
- Used iterative contractions of vertex pairs to produce simplified meshes with high resemblance to the original

IIT Bombay Reddit — *Databases and Information Systems*

- Built an IIT Bombay exclusive version of the website reddit.com implementing various ranking algorithms for news feed and comments, along with the support for user feed personalization

POSITIONS OF RESPONSIBILITY

Teaching Assistant, IIT Bombay

- MA 105 : Advanced Calculus under Prof. I.K.Rana *Autumn '15*
- CS 152 : Abstractions and Paradigms in Programming under Prof. Om Damani *Spring '16*

Convener, Web and Coding Club

- Responsible for organizing various programming related activities in the institute *2015 - 2016*
- Promoting coding as a hobby, a academic skill by creating an informal engaging environment

TECHNICAL SKILLS

Programming Languages Fluent in C++, experienced in Python, PHP & LaTeX and familiar with C, D, Java, VHDL, Octave and SQL

Libraries & Tools Experienced in Django, git, CMake, Matlab & WireShark and familiar with OpenGL, NumPy, SymPy, Tensorflow and Scikit-learn

KEY COURSES

Theoretical CS Data Structures & Algorithms, Data Analysis & Interpretation, Discrete Structures, Logic for CS, Analysis & Design of Algorithms, Digital Logic & Design, Artificial Intelligence

Applied CS Machine Learning, Information Retrieval, Computer Graphics, Digital Geometry Processing

Systems Computer Networks, Software Systems, Implementation of Programming Languages, Databases, Operating Systems, Computer Architecture, Network Security & Cryptography

Mathematics Calculus, Numerical Analysis, Linear Algebra, Differential Equations, Derivative Pricing