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Aditya Sharma

Year	Examination	Institute	Percentage/CGPA
2017 - Present	B.Tech(CSE)	IIT Bombay	9.27
2017	AISSCE CBSE	Modern Delhi Public School	96.8
2015	Matriculation	Modern Delhi Public School	10.0

Pursuing Minor in **Physics** from *Department of Physics, IIT Bombay.* **Expected Graduation :** May 2021

Research Projects/Internships

Summer 2019 **Scalable Machine Learning**, *IST Austria*, Austria.
The focus of Alistarh group, led by Prof. Dan Alistarh, is now moving towards the current field of **Scalable Machine Learning**. My scientific internship for the period of 2 months contributed to analyzing and proving bounds for algorithms in **Population protocols**. The basic aim was to analyze algorithms(PopSGD) using **randomized load-balancing** which ran on several nodes and converged to give an output faster than sequential algorithms. In the initial part, I also analyzed the Majority/Comparison algorithm and attempted to develop a more advanced version of the algorithm. Although we achieved little success for the latter due to time constraint. *Randomized Algorithms,Theoretical Analysis*

Winter 2018 **Distributed Algorithms and Systems**, *IST Austria*, Austria.
The scientific internship for a period of 7 weeks dealt with the Convergence properties and analysis of **Asynchronous Gradient Descent** for Linear Regression and its comparison with Batch SGD and Vanilla SGD for the same case. Asynchronous SGD converges faster and is dependent on number of interacting nodes. This was done under Prof. Dan Adrian Alistarh who currently leads the Alistarh Research Group at IST, Austria *Theoretical Analysis*

Summer 2018 **Simulations of Natural Gas Hydrates**, *IIT Bombay*, Mumbai.
The project, under Prof. Vikram Vishal, dealt with the **sensitivity analysis** of Thermo-Hydro-Mechanical-Chemical properties of **Natural Gas Hydrate reservoirs**. Reservoir was simulated using the software TOUGH+ and parameters such as permeability, porosity, grid-sensitivity were varied to conclude upon the sensitivity. *Python,TOUGH+*

Winter 2017 **Molecular Clouds and their Morphological distribution**, *IIST*, Thiruvananthapuram.
The project dealt with the Morphological distribution of Molecular Clouds in IRAS 16164-5046, based on images from Herschel Space Observatory and ATLASGAL survey. Images of different wavelengths were convoluted and used together to determine temperature and column densities of gas clouds in space. This project was done under Prof.Anandmayee Tej and Prof.Sarita Vig as a part of NIUS initiative. *Python*

Technical Skills

C/C++, Python, Javascript, MATLAB, HTML, CSS, DJango Framework, LaTeX, Git, Linux, SQL and Basic JAVA

Achievements

- Secured All India Rank **51** out of 2,00,000+ participants in **IIT-JEE Advanced 2017**.
- Secured All India Rank **647** out of 1.5 million participants in **IIT-JEE Mains 2017**.
- Awarded AP grade for exceptional performance in CH105 Organic and Inorganic Chemistry.

Olympiads and Scholarships

- Silver Medalist at the 10^{th} **International Olympiad on Astronomy and Astrophysics 2016**, Bhubaneswar, India in which 40+ countries across the globe participated and competed in a series of exams/tests
- Silver Medalist at the 20^{th} **International Astronomy Olympiad 2015**, Kazan, Tatarstan, Russia
- Conferred with **Infosys award** for medal achievers for India **twice**
- Secured **International Rank 3** in **NSO** conducted by **Science Olympiad Foundation** in the year 2015
- Honored with scholarship by **Haryana State Council for Science and Technology**, State Government of Haryana
- Awarded **Kishore Vaigyanik Protsahan Yojana** (KVPY-2016) fellowship by the Department of Science and Technology, Government of India(**Secured All India Rank - 5**)
- Awarded the **NTSE (National Talent Search Examination)** Scholarship in 2015 by N.C.E.R.T. New Delhi
- Successfully cleared **Regional Mathematics Olympiad** (RMO-Delhi) and selected for the next level **Indian National Mathematics Olympiad** (INMO) in the year 2014 and 2015
- Ranked amongst National top 1% in **National Standard Examinations in Physics, Chemistry and Astronomy (NSEP, NSEC** and **NSEA)** 2016-2017
- Awarded **Academic Excellence Scholarship** 2014-2015 by **Science Olympiad Foundation** for academic merit
- Awarded **Letter of Appreciation** for outstanding performance in 10^{th} Standard Examination by **Former HRD Minister Smriti Zubin Irani**

Course Projects

Fall 2019 **License Plate Recognition using Neural Networks**, *Prof.Ganesh, IIT Bombay*, Mumbai.
Designed and implemented an application for the purpose of License Plate recognition from still images using python libraries for plate detection and self implemented Neural Network for character recognition. Libraries cv2 and skimagelibraries were imported for existing function implementation for edge detection. *Python*

Fall 2019 **Toonify**, *Prof.Suyash Awate and Prof.Ajit Rajwade, IIT Bombay*, Mumbai.
We built a Toonify application that solves the purpose of converting a natural image to a âĂİToonâĂİ version of the image. The basic approach was to apply Canny Edge Detection along with Morphological Operations and bilateral filtering on CIE Lab Colour Space. *Matlab*

Spring 2019 **Write Configuration Logic**, *Prof.Ashwin Gumaste, IIT Bombay*, Mumbai.
Designed and implemented Write Configuration Logic in VHDL based on a set of guidelines to be fulfilled. The principle was to dynamically acknowledge and categorize incoming bits of data into output ports as per the input table of the variable size packet received, that is entering in chunks of 144 bits. *VHDL*

Spring 2019 **Return of Coppersmith's Attack**, *Prof.Bernard L. Menezes, IIT Bombay*, Mumbai.
Revisited the theoretical aspects of "The Return of Coppersmith's Attack: Practical Factorization of Widely Used RSA Moduli" and its applications in exploiting the flaws in algorithm which constructs primes for RSA key generation. We re-implemented the method to perform the factorization with known structured primes and used *Sage Library* for lattice multiplication and *LLL* decomposition. *Theoretical Analysis, Python*

Fall 2018 **Secure Personal CloudSecure Personal Cloud**, *Prof.Soumen Chakrabarti, IIT Bombay*, Mumbai.
Developed a Secure Personal Cloud for the purpose of uploading, downloading, sharing and synchronizing files and directories. It has tree directory structure and multiple client support. User has complete control over the file encryption schema of web server. *Python/PHP/Java*

Spring 2018 **Lights Out Game**, *Prof.Amitabha Sanyal, IIT Bombay*, Mumbai.
Implemented a matrix based algorithm to solve a challenging riddle/game of Lights out and developed its user interface for players. This was a course project taken up during CS 152. *Racket*

Spring 2018 **Surfer Game**, *Prof.Amitabha Sanyal, IIT Bombay*, Mumbai.
Developed a 'Subway Surfer' based game in DrRacket. This was a semester long project which had extensive use of libraries such as 'pict3D', '2htdp/universe' and 'racket/gui'. Mutable Lists were used to simulate a never ending array of no-dead-end obstacles and make it more computationally efficient. *Racket*

Positions of Responsibility

Spring 2020 **Teaching Assistant**, *CS101: Computer Programming and Utilization*, IIT Bombay.
Appointed as a Teaching Assitant for the course Computer Programming and Utilization, course conducted by Department of Computer Science and Engineering, IIT Bombay throughout the semester. Major responsibilities include guiding students and assisting them throughout their lab assignments.

August 2019 **Delegate**, *Harvard College Project for Asian and International Relations*.
Qualified and selected to participate in **HPAIR** Asia Conference 2019, held in Nursultan, Kazakhstan. It deals with current issues in tracks like **Science and Technology**, **Energy and Environmental Sustainability**, etc

November 2018 **Delegate**, *Association of Exploration Geophysicists*, India.
Was a part of the 40^{th} Annual Convention and Seminar on Exploration Geophysics, Mumbai as a Delegate. I submitted and presented Poster Abstract along with other collaborators at the conference.

April 2018 – April 2019 **Resource Person**, *Nehru Science Center and HBCSE, TIFR*, Mumbai.
Appointed as a Resource Person for **Astronomy Orientation cum Selection Camp** for IAO at NCS and for International Olympiad on Astronomy and Astrophysics at HBCSE. I gave talks on Thermodynamics and Error Analysis, helped students clear doubts regarding these topics and mentored them.

2016–2017 **Head Boy**, *Modern Delhi Public School*, Faridabad.
Appointed as the **Head Boy** of the school for the academic year 2016 -2017. Head Boy is given the duties to host events in the school, upkeep and maintain the discipline within the school premises and suggest and implement relevant changes and modifications for betterment of school.

Key Courses Undertaken

Computer Science Database and Information Systems*, Automata Theory*, Advanced Machine Learning*, Abstractions and Paradigms for Programming, Data Structures and Algorithms, Discrete Structures, Data Analysis and Interpretation, Software Systems Lab, Digital Logic Design, Design and Analysis of Algorithms, Logic for Computer Science, Computer Networks, Advanced Network Security and Cryptography, Computer Architecture*, Operating Systems, AI and Machine Learning, Digital Image Processing, Implementation of Programming Languages*

Mathematics Calculus, Linear Algebra, Differential Equations, Real Analysis, Numerical Analysis*

Physics Advanced Statistical Mechanics, Physics of Biological Systems, Thermal and Statistical Physics, Introduction to Quantum Mechanics

**Ongoing courses*

Extra Curricular Activities

- Devoted 60+ hours under **National Service Scheme**. Participated in NGOs in vicinity to teach under-privileged school students and help them overcome the difficulties due to lack of opportunities
- Designed a working model of **Remote Controlled Plane** over a period of three weeks and investigated optimum design parameters which enhanced flight performance and stability in maneuvering the plane

Publications

1. PopSGD: Decentralized Stochastic Gradient Descent in the Population Model
`https://arxiv.org/abs/1910.12308`