🌐 https://aaysharma.github.io
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Amatya Sharma

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Amatya-Sharma 🔗

EDUCATION

University of Michigan, Ann Arbor (US) — *August 2022 - Present*
1st Year Ph.D., Computer Science and Engineering Department

Indian Institute of Technology (IIT), Kharagpur (India) — *August 2017 - May 2022*
Dual Degree (B.Tech + M.Tech) — GPA 9.69/10
Computer Science and Engineering Department — Department Rank-5 | University Rank-8

RESEARCH INTERESTS

Theory CS, {Approximation, Online, Parameterized}-Algorithms, Game Theory, Computational Geometry, Graph Theory

WORK EXPERIENCE

TA of Algorithms-1 Course | CSE, IIT Kharagpur — Jan 2022 - Apr 2022
TA of Algorithmic Game Theory Course | CSE, IIT Kharagpur — Aug 2021 - Dec 2021
Summer Research Intern | Computer Science Department, IIT Delhi — Apr 2021 - Oct 2021
Summer Intern | ExaCC, Oracle R&D — May 2021 - Jul 2021
Summer Research Intern | University of Bergen — Apr 2020 - May 2020
Winter Research Intern | Computer Science and Automation, IISc Bangalore — Dec 2019 - Dec 2019
Summer Research Intern | Computer Science and Automation, IISc Bangalore — May 2019 - Jul 2019

PUBLICATIONS & RESEARCH

On Guillotine Separable Packings for the Two-dimensional Geometric Knapsack Problem — *May 2019 - Jul 2021*
Published at SoCG'21 || Contributed Talk by me at HALG'21
Coauthors: Arindam Khan (IISc), Arnab Maiti (IIT Kgp), Andreas Wiese (U of Chile)

- Designed an Approximation Algorithm (PPTAS) for 2-Dimensional Guillotine Geometric Knapsack.
- Improved previous best approximation factor for both weighted and cardinality cases of the problem.

On Parameterized Complexity of Liquid Democracy — *Jul 2019 - Dec 2019*
Published at CALDAM'21
Coauthors: Palash Dey (IIT Kgp), Arnab Maiti (IIT Kgp)

- Devised Parameterized Algorithms for Computational Social Choice Theory problem of Liquid Democracy.
- Established results on para-NP-Hardness, FPT Algorithms and LP formulation w.r.t different parameters.

Two Dimensional Guillotine Strip Packing — *Feb 2021 - Aug 2021*
Published at ICALP 2022
Coauthors: Arindam Khan (IISc), Aditya Lonkar (IISc), Arnab Maiti (IIT Kgp), Andreas Wiese (U of Chile)

- Designed $(\frac{3}{2} + \epsilon)$-Polynomial time approximation algorithm, complementing the lower bound of $(\frac{3}{2} + o(\epsilon))$.
- Formulated PPTAS (Pseudo-Polynomial Time Approximation Scheme) for the problem.

A Decomposition Approach to Weighted k-server problem — *May 2021 - Apr 2022*
Coauthors: Ashish Chiplunkar (IIT Delhi), Nikhil Ayyadevara (IIT Delhi)

- Formulated online randomized algorithm for a variant of weighted k-server problem.
- Mitigated the gap between established upper bound and lower bound complexities for the variant.

The Art Gallery Problem: A Survey — *Jul 2020 - Jan 2021*
Submitted to ACM Computing Surveys Journal

- Studied NP-hardness, $\exists R - Completeness$ and bounds on multiple variants of Art Gallery problem,

Parameterized Complexity of Nash Equilibrium of Networked Public Good Games — *Jan 2021 - May 2022*
Manuscript   *Coauthor: Palash Dey (IIT Kharagpur)*

- Algorithmic analysis of PSNE for Game Theoretic Problem of Networked Public Good Games.

- Established parameterized hardness and formulated Slicewise polynomial and Fixed Parameter Tractable algorithms.

Parameterized Complexity of Margin of Victory

Advised by Prof. Palash *Jan 2020 - Jun 2020*

- Formulated algorithms for Game Theoretic problem of computing Margin of Victory for tournament solutions.
- Contrived parameterized algorithms with parameters including tree-width for the NP-Hard problem.

Image Augmentation and Auxiliary Loss Duo *Jul 2021 - Dec 2021*

Participating in ML Reproducibility Challenge 2021
Coauthors: Faraaz Rehman Mallick (IIT Kgp), Dewang Modi (IIT Kgp)

- Reproduced AAAI′21 paper on Improving Sample Efficiency in Model-Free Reinforcement Learning
- Implemented and experimented with a new model based on image reconstruction and augmentation.

Gaussian Process Kernels Survey *Jul 2020 - Dec 2020*

Term Project, Advanced Machine Learning Course, IIT Kharagpur

- Surveyed local and global approximations and examined automated learning techniques for Gaussian kernels

SOFTWARE PROJECTS

HTTP Authentication *May 2021 - July 2021*
- Implemented Java Library for secure HTTP Authentication using Java Cryptography Architecture.
- Summer intern Project at Oracle ExaCC team.

Shoten *Jan 2019 - Jul 2019*
- Web Application serving as Online Book Store and Print Shop using MySQL, JSP, HTML-CSS.
- Implemented a website to serve as an e-book store and print request portal on institute level

TinyC Compiler *Jul 2019 - Nov 2019*
- Compiler for language TinyC, a reduced subset of language C.
- Implemented parser and lexer using Yacc, BISON, FLEX, C, C++.

RISC Processor *Jul 2019 - Nov 2019*
- Developed Reduced Instruction Set Computer Processor and simulated on FPGA Spartan 3 boards.
- Designed a single cycle executable processor using Verilog for a subset of MIPS instructions.

SKILLS AND COURSE WORK

Theoretical CS	Approximation and Online Algorithms, Parameterized Algorithms, Randomized Algorithms, Algorithmic Game Theory, Advanced Graph Theory, Computational Geometry, Computational Complexity, Cryptography, Selected Topics in Algorithms.
Learning Theory	Reinforcement Learning, Deep Learning, Advanced Machine Learning, Natural Language Processing, Statistical Foundations of AI and ML.
Software & Tools	MySQL, Java Cryptography Architecture, Matlab, HTML/CSS, JSP, Python, C/C++, GIT
Other Relevant Courses	Discrete Maths, Operating Systems, Networks, Software Engg., Linear Algebra, Probs & Stats
Languages	English, French, Hindi, Himachali

ACADEMIC ACHIEVEMENTS

Department Rank	Department Rank of 5 in the Computer Science and Engineering Department, IIT Kharagpur.
University Rank	University Rank of 8 at Indian Institute of Technology (IIT) Kharagpur.
GATE Scholarship	Availing GATE Scholarship for Teaching Assistantship at CSE, Kharagpur based on GPA.
Department Change'18	Changed Department to CS (in first year) by qualifying in top 10 out of 1300 at IIT Kharagpur.
JEE Advanced'17	Attained an All India Rank of 1464 among 1.7 lakh students in JEE Advanced 2017.
SJVN Merit Scholar'17	Awardee of SJVN Merit Scholarship for performance in CBSE Senior Secondary Examination.
NTSE'15	Recipient of National Talent Search Examination (NTSE) Scholarship (State Rank 1 in Himachal).
RIMC'13	Secured National Rank in top 60, State Rank 1 in Rashtriya Indian Military College Exam.

EXTRA CURRICULAR

Co-Founded Annapurna, an initiative working against global poverty, hunger and wastage of food resources at IIT Kharagpur.