AMATYA SHARMA

Email: amatyantse@gmail.com | WebPage: https://aaysharma.github.io/
Department Of Computer Science and Engineering
Indian Institute of Technology, Kharagpur

EDUCATION

Indian Institute of Technology (IIT), Kharagpur *August 2017 - Present*
5^{th} Year Dual Degree (B.Tech + M.Tech) GPA 9.61/10
Computer Science and Engineering Department Rank 5

RESEARCH INTERESTS

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

WORK EXPERIENCE

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

PUBLICATIONS & RESEARCH

On Guillotine Separable Packings for the Two-dimensional Geometric Knapsack Problem
*Published at **SoCG'21** || Contributed Talk by me at **HALG'21*** *May 2019 - Mar 2020*
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 - Jul 2021*
Manuscript | Submitting to 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.

Weighted k-server problem *May 2021 - Present*
Mentor: Prof. Ashish Chiplunkar (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.

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 AGT problem,
- Analyzed numerous approximation and parameterized algorithms for AGT.

Nash Equilibrium of Networked Public Good Games *Jan 2021 - Present*
Manuscript | *Coauthor: Palash Dey (IIT Kharagpur)*

- Algorithmic analysis of PSNE for Game Theoretic Problem of Networked Public Good Games.
- Established parameterized hardness and formulated XP-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, Online, Parameterized and Randomized Algorithms, Algorithmic Game Theory, Advanced Graph Theory, Computational Geometry, Computational Complexity and Cryptography & Network Security.
Learning Theory	Reinforcement Learning, Deep Learning, Advanced Machine Learning, Natural Language Processing, Linear Algebra and Probability & Statistics.
Software & Tools	SQL, Java Crypto Architecture, Matlab, HTML/CSS, JSP, Python, C/C++, GIT
Other Relevant Courses	Discrete Maths, Operating Systems, Computer Networks, Software Engineering.
Languages	English, French, Hindi, Himachali.

ACADEMIC ACHIEVEMENTS

GATE Scholarship	Availing GATE Scholarship for Teaching Assistantship at CSE, Kharagpur.
Department Rank	Currently holding Department Rank 5 in the Computer Science Department.
Department Change'19	Changed Department to CS (first year) with rank among top 10 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 Senior Secondary Examination.
NTSE'15	Recipient of National Talent Search Examination (NTSE) Scholarship (State Rank 1).
RIMC'13	Secured National Rank in top 60, State Rank 1 in Rashtriya Indian Military College Exam.

EXTRA CURRICULAR

Co-Founder Annapurna, an initiative working against global poverty, hunger and wastage of food resources.