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PUBLICATIONS

3SUM in Preprocessed Universes: Faster and Simpler

Pratyush Sharma, Adam Polak, Shashwat Kasliwal, Accepted in **TheoretCS Journal** [Link](#).

Accepted to *SIAM Symposium on Simplicity in Algorithms '25* (New Orleans, USA) [Arxiv Link](#).

SCHOLASTIC ACHIEVEMENTS

- Secured 1st position in the **Spring India Citadel Terminal 2024**, a **pan India** algorithmic tower strategy game hosted by *Correlations One*, winning the Grand Prize of \$6500. (*Sponsored by Citadel*)
- Secured 1st position in **IIT Delhi** in the first and second prelims and represented the institute at the **Integral Cup** finals, competing against other IIT's in a *MIT style* Integration Competition.
- Secured **All India Rank 10** amongst 1.5 million students and received the **KVPY – SA** scholarship.
- Secured **All India Rank 1** in **LIMIT** Exam amongst all Undergraduate students, hosted by *ISI*.
- Achieved **AIR 399 (Gen)** in **JEE Advanced 2022** and **AIR 335 (Gen)** in **JEE Mains 2022**.
- Achieved **Oxbridge STEM Scholarship** based on past credentials in STEM related academics.
- Secured **AIR 2** in **Mathemania '25** and **AIR 9** in **Mathemania '24** hosted by *IIT Kanpur*.
- Achieved **All India Rank 1** in **ResoStart** and awarded a *sponsored 9 days* trip to **NASA**.
- Secured **All India Rank 1** in Aakash National Talent Hunt Examination (**ANTHE**).

OLYMPIAD ACHIEVEMENTS

- Secured the 3rd position amongst all the teams in the East Division & (1st in *IIT Delhi*) of the Simon Marias Maths Competition **SMMC**, received the **Best Team Prize**. (*Sponsored by Jane Street/Optiver*)
- Secured 2nd position in 14th **Inter IIT** Quant Competition hosted by *Ebulliant Securities*.
- Secured 6th position in 13th **Inter IIT** Maths Competition hosted by *Chennai Maths Institute*.
- Secured **International Rank 4** in Gamma Maths Olympiad (**IGMO**). (*Sponsored by Jane Street*)
- Selected to represent and lead the **IIT Delhi** contingent at the **Al-Khorezmi IMO** (*Uzbekistan*)
- Qualified and Attended **IJSO Junior Science National Camp** (Top 35 in India) in 9th std.
- Qualified for **IOAA Astronomy National Camp** (Top 35 in India) in 10th, 11th & 12th std.
- Qualified for **IPHO Physics National Camp** (Top 35 in India) in 12th std.
- Secured **AIR 7** in Srinivasa Ramanujan Mathematical Competition (**SRMC**) hosted by *IIT Bombay*.

RESEARCH EXPERIENCE

- ◆ **Research Internship** | *Prof. Adam Polak* | *Bocconi University, Italy* (May 2024 – July 2024)
 - Improved on state of the art algorithm for the 3SUM problem in the pre-processed setting from $\tilde{O}(N^{11/6})$ to $\mathcal{O}(N^{1.5} \log N)$ using FFT and Hashing techniques.
 - Presently working on another research that improves time complexity of **Dynamic Range Mode**.
- ◆ **Research Project** | *Prof. Rajendra Kumar* | *IIT Delhi* (August 2024 – December 2024)
 - Exploring the applications of the recently introduced **Continuous Learning with Errors** problem from lattice-based cryptography to improving hardness results for **k means** clustering problems.
 - Surveyed literature on LWE, CLWE and post quantum cryptography and clustering problems.
- ◆ **Research Internship** | *Prof. Kaushik Sinha* | *Wichita University, USA* (July 2025 – Present)
 - Surveyed the current state of the art algorithm for *Condensed Nearest Neighbours*.
 - Reviewed selective sampling in NN models, and the bounds of $\mathcal{O}(\log N)$ asymptotic memory storage.

TECHNICAL SKILLS

- **Languages:** Python, C/C++, Mathematica, MATLAB, HTML, CSS, Brainf**k.
- **Software & Development:** L^AT_EX, Git, Numpy, SciKit, Pandas, Matplotlib, PyTorch, Manim.

PROJECTS

- **Search Engine with Query Processor:** | *Prof. Rahul Garg* | *DSA* (October 2023)
 - Implemented a **query processor** inputting a corpus and query to give the most relevant paragraphs.
 - Linked the query processor to ChatGPT using the API tokens to utilise the API keys in C++.
 - Used **SpaCy LLM** and **TF-IDF** to increase the weight of chosen words and filter out stop words.
- **Expression Evaluator and Compile:** | *Prof. Subodh Sharma* | *DSA* (November 2023)
 - Developed a **language compiler (E++)** for equation solving using *self-implemented AVL and BST*.
 - Generation of code for parse trees in **Targ** (target machine language) to evaluate expressions.
- **Automated Resume Analyzer:** | *Eightfold AI* | *Hackathon Winner* (December 2023)
 - Used Hugging Face's **BERT** for word embeddings, and *cosine similarity* for relevance to query.
 - Utilized **PyMuPDF** for OCR text extraction from CV and annotating the points from the PDF.
- **Page Rank Implementation:** | *Prof. S. Dharmaraja* | *Stochastic Process* (April 2024)
 - Implemented *PageRank* for ranking web pages utilizing the concepts of **DTMC** and **Power Method**.
 - Implemented a Stochastic method to determine the hierarchy for effective web search result ranking.
- **Actor Success Prediction:** | *Prof. Niladri Chatterjee* | *ML* (October 2024)
 - Self implemented ML models (*KNN, RF, LR*) with robust preprocessing and tuning to classify data.
 - Boosted accuracy using NLP (TF-IDF, NER) and feature engineering on the dataset.
- **AQI Prediction:** | *Prof. Niladri Chatterjee* | *ML* (December 2024)
 - Developed a **distributed learning** framework supporting major models for distributed edge sensors.
 - Enabled local model training with data privacy, improving prediction accuracy across networks.

KEY COURSES

- **Computer Science:** Data Structures & Algorithms, Algorithm Design, Digital Logic, Operating Systems, Theory of Computing, Computer Architecture, Lattices in Cryptography.
- **Mathematics:** Probability, Statistics, Discrete Maths, Combinatorics, Graph Theory, Numerical Algorithms, Linear Optimization, Algebra, Linear Algebra, Differential Equations, Measure Theory.

EXTRACURRICULARS

- Featured on **Jane Street** Puzzles website for solving the puzzle of the month *multiple* times.
- Previously the Captain of the IIT Hostel Chess team. Secured 1st in General Championship 2026.
- Placed 6th in both the online and the offline rounds in the college *Poker* tournament.
- **Coordinator MathSoc (IITD):** Led a 10-student team for placement preparation (*May '23 – May '25*)
- **TRYST, IIT Delhi 2023:**
 - 1st in **Codehunt**, a Gamified Competitive Programming contest conducted by *ACES ACM*.
 - 2nd in **GenoQuest**, a competition of synthetic and computational biology conducted by *iGEM*.
 - 3rd in **Integration Bee**, a competition of college integration questions conducted by *MathSoc*.
 - 5th in **Formula Brawl** a competition of physics formulas quiz conducted by *Astronomy Club*.
- **TRYST, IIT Delhi 2024:**
 - 2nd in **GenoQuest**, a competition of synthetic and computational biology conducted by *iGEM*.
 - 3rd in **Integration Bee**, a competition of college integration questions conducted by *MathSoc*.
- **TRYST, IIT Delhi 2025:**
 - 1st in **Number Games**, a competition of calculation and mental maths conducted by *MathSoc*.
 - 1st in **Integration Bee**, a competition of college integration questions conducted by *MathSoc*.
 - 3rd in **CodeDecode**, a new twist on CP by reverse engineering code conducted by *ANCC*.
- **TRYST, IIT Delhi 2026:**
 - 2nd in **Stratezenith**, a competition of multiple game theory rounds conducted by *IGTS*.
 - 1st in **Clash Royale** competition hosted by *Sporttech* among 128+ other participants.