Dildar Ali

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About Me

I work on the design and theoretical analysis of approximation algorithms for NP-hard combinatorial optimization problems, primarily through the lens of submodular and bisubmodular function maximization, with applications to influence maximization, regret minimization, and algorithmic data management. I completed my Ph.D. in Computer Science and Engineering at the Indian Institute of Technology Jammu, advised by Prof. Suman Banerjee and Prof. Yamuna Prasad. I am now seeking a postdoctoral position to extend this line of work toward scalable, provably-guaranteed algorithms for large-scale combinatorial and data-driven decision problems.

Research Interests

Combinatorial Optimization · Approximation Algorithms · Algorithmic Data Management · Fair Division · Reinforcement Learning · Multi-Agent Systems

Education

Ph.D. in Computer Science and Engineering *Indian Institute of Technology (IIT) Jammu, India* *Jan 2022 – March 2026*

- Thesis: *Influential Slot Selection and Regret Minimization in Billboard Advertisement*
- Supervisor: Prof. Suman Banerjee · Co-Supervisor: Prof. Yamuna Prasad, IIT Jammu, India

M.Tech in Computer Science and Engineering *Aliah University, India* *Jul 2018 – Jun 2020*

- CGPA: 9.16/10 (University 2^{nd} Rank Holder)
- Thesis: *A Deep Learning Approach to Improve Effectiveness and Efficiency for Time Series Prediction*

Publications

21 peer-reviewed publications: 5 journal articles, 16 conference papers, including AAAI, PAKDD (×2), DEXA (×2), ADBIS, WISE, SEA, ADC (×2), ACM SAC, ICAART, EUMAS, ADMA, and IKDD CODS.

Journal Articles

- **[J6]** Dildar Ali, Suman Banerjee, Yamuna Prasad. "Joint Slot and Tag Selection in Billboard Advertising: A Bi-Submodular Maximization Approach." [Submitted, **Knowledge and Information Systems**]
- **[J5]** Dildar Ali, Suman Banerjee, Rajibul Islam. "Trajectory-Driven Multi-Product Influence Maximization in Billboard Advertising." [Accepted, **Journal of Combinatorial Optimization** Link]
- **[J4]** Poonam Sharma, Dildar Ali, Suman Banerjee. "A Regret-Aware Framework for Effective Social Media Advertising." **International Journal of Data Science and Analytics**. Link
- **[J3]** Dildar Ali, Suman Banerjee, Yamuna Prasad. "Minimizing Regret in Billboard Advertisement under Zonal Influence Constraint." **Knowledge and Information Systems (KAIS)**. Link
- **[J2]** Dildar Ali, Suman Banerjee, Yamuna Prasad. "Influential Billboard Slot Selection using Spatial Clustering and Pruned Submodularity Graph." **International Journal of Data Science and Engineering**, 1–22. Link
- **[J1]** Dildar Ali, Suman Banerjee, Yamuna Prasad. "Toward Regret-Free Slot Allocation in Billboard Advertisement." **International Journal of Data Science and Analytics** (2024): 1–25. Link

Conference Papers

- **[C18]** Dildar Ali, Paras Dhatwalia, Suman Banerjee. "Two-Sided Online Bipartite Matching for Billboard Ad Allocation: A Deep Reinforcement Learning Approach." [Submitted, **ACML 2026**]
- **[C17]** Dildar Ali, Abishek Salaria, Ansh Jasrotia, Suman Banerjee. "Tag-specific Regret Minimization Problem in Outdoor Advertising." [Submitted, **IKDD CODS 2026**] Link
- **[C16]** Dildar Ali, Ansh Jasrotia, Abishek Salaria, Suman Banerjee. "Approximation Algorithms for Budget Splitting in Multi-Channel Influence Maximization." The 24^{th} **International Symposium on Experimental Algorithms (SEA 2026)**. Link

- [**C15**] Dildar Ali, Suman Banerjee, Yamuna Prasad. "Approximately Bisubmodular Regret Minimization in Billboard and Social Media Advertising." The 30^{th} **Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD 2026)**. Link
- [**C14**] Aditi Anand, Dildar Ali, Suman Banerjee. "Fairness Driven Multi-Agent Path Finding Problem." The 18^{th} **International Conference on Agents and Artificial Intelligence (ICAART 2026)**. Link
- [**C13**] Dildar Ali, Suman Banerjee, Yamuna Prasad. "Balanced Popularity in Multi-Product Billboard Advertisement." The 36^{th} **Australasian Database Conference (ADC 2025)**. Link
- [**C12**] Dildar Ali, Rajibul Islam, Suman Banerjee. "Multi-product Influence Maximization in Billboard Advertisement." The 13^{th} **ACM IKDD International Conference on Data Science (CODS 2025)**. Link
- [**C11**] Aditi Anand, Suman Banerjee, Dildar Ali. "Scalable Submodular Policy Optimization via Pruned Submodularity Graph." The 22^{nd} **European Conference on Multi-Agent Systems (EUMAS 2025).** Link
- [**C10**] Dildar Ali, Suman Banerjee, Yamuna Prasad. "Group Trip Planning Query Problem with Multimodal Journey." The 36^{th} **International Conference on Database and Expert Systems Applications (DEXA 2025)**. Link
- [**C9**] Dildar Ali, Suman Banerjee, Yamuna Prasad. "Influential Slot and Tag Selection in Billboard Advertisement." The 36^{th} **International Conference on Database and Expert Systems Applications (DEXA 2025)**. Link
- [**C8**] P. Sharma, Dildar Ali, Suman Banerjee. "Minimizing Regret in Social Media Advertisement." The 12^{th} **IEEE International Conference on Big Data (BigData 2024)**, pp. 473–478. Link
- [**C7**] Dildar Ali, Suman Banerjee, Shweta Jain, Yamuna Prasad. "Fairness Driven Slot Allocation Problem in Billboard Advertisement." The 29^{th} **Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD 2025)**, LNCS vol. 15871. Link
- [**C6**] Dildar Ali, Suman Banerjee, Yamuna Prasad. "Multi-Slot Tag Assignment Problem in Billboard Advertisement." The 35^{th} **Australasian Database Conference (ADC 2024)**, pp. 3–16. Link
- [**C5**] Dildar Ali, Harishchandra Kumar, Suman Banerjee, Yamuna Prasad. "An Effective Tag Assignment Approach for Billboard Advertisement." The 25^{th} **International Conference on Web Information Systems Engineering (WISE 2024)**, pp. 159–173. Link
- [**C4**] Dildar Ali, Suman Banerjee, Yamuna Prasad. "Influential Billboard Slot Selection Under Zonal Influence Constraint." The 28^{th} **European Conference on Advances in Databases and Information Systems (ADBIS 2024)**, pp. 93–106. Link
- [**C3**] Dildar Ali, Suman Banerjee, Yamuna Prasad. "Regret Minimization in Billboard Advertisement under Zonal Influence Constraint." The 39^{th} **ACM/SIGAPP Symposium on Applied Computing (ACM SAC 2024)**, pp. 329–336. Link
- [**C2**] Dildar Ali, A. K. Bhagat, Suman Banerjee, Yamuna Prasad. "Efficient Algorithms for Regret Minimization in Billboard Advertisement" (Student Abstract). The 37^{th} **AAAI Conference on Artificial Intelligence (AAAI 2023)**, 37(13), 16148–16149. Link
- [**C1**] Dildar Ali, Suman Banerjee, Yamuna Prasad. "Influential Billboard Slot Selection Using Pruned Submodularity Graph." The 18^{th} **International Conference on Advanced Data Mining and Applications (ADMA 2022)**. Link

Research Contributions

- Developed approximation algorithms for NP-hard combinatorial optimization problems based on submodular and bisubmodular optimization with provable guarantees.
- Designed scalable algorithms for influence maximization and regret minimization under spatial, budget, and fairness constraints.
- Proposed efficient optimization techniques, including Pruned Submodularity Graphs, to accelerate large-scale submodular optimization.
- Extended optimization frameworks to multi-product, multi-channel, and multi-agent decision-making problems with theoretical analysis.
- Authored 21 peer-reviewed publications (5 journal articles, 16 conference papers) at venues including AAAI, PAKDD, DEXA, SEA, ADBIS, WISE, ACM SAC, ICAART, and EUMAS.

Experience

Post Doctoral Fellow *National Tsing Hua University (NTHU), Taiwan* — *Hsinchu, Taiwan*
March 2026 – July 2026

- Project: *"Advanced Information Technology Research on Multimodal Language Reinforcement Models"*,(NSTC 115-2811-E-007-006), funded by National Science and Technology Council (NSTC), Taiwan
- PI: Prof. Hung-Yu Kao, NTHU, Taiwan

Teaching Assistant *Indian Institute of Technology (IIT) Jammu* — *Jammu, India*
Jan 2022 – March 2026

- Assisted in six courses spanning core CS theory and systems: Machine Learning, Database Management Systems, Design and Analysis of Algorithms, Theory of Computation, Discrete Mathematical Structures, and Data Structures and Algorithms.
- Worked under Profs. Suman Banerjee, Shaifu Gupta, Harkeerat Kaur, Sumit Kumar Pandey.

Project Associate *Indian Institute of Technology (IIT) Bhilai* — *Chhattisgarh, India*
Nov 2021 – Dec 2021

- Project: *Building Trust on Computing Platform and Training of Secure Coding of Security Chips*, funded by MeitY, Government of India
- PI: Prof. Dhiman Saha, IIT Bhilai, India

Graduate and Post-Graduate Students Guided

- Devendra Mani – M.Tech Thesis (2027), IIT Jammu
- Aditi Anand – B.Tech Project (2026), IIT Jammu
- Ansh Jasrotia, Abishek Salaria – Winter Interns (2026), NIT Srinagar
- Paras Dhatwalia – Summer Intern (2025), Himachal Pradesh University
- Yamini Uppal (SMVDU, Jammu), Amit Kumar (Bharati Vidyapeeth, Pune) – AICTE Interns (2025)
- Rajibul Islam (2025, GITA Bhubaneswar), Harishchandra Kumar (2024, NIT Raipur), Tejash Gupta (2023, NIT Hamirpur), Ankit Kumar Bhagat (2022, University of Delhi) – Rise-Up Interns
- Atharva Sanjay Tekawade – Under-Graduate Research Program (2022), IIT Jammu

Professional Services

Journal Reviewer

- IEEE Transactions on Audio, Speech and Language Processing
- Knowledge and Information Systems (KAIS)
- GeoJournal
- Journal of Supercomputing

Conference Reviewer

- AAAI Conference on Artificial Intelligence (AAAI)

Technical Skills

Programming Languages: C, C++, Java, Python

Tools & Platforms: LaTeX, Linux, Microsoft SQL Server, Oracle Database, NetworkX, Gurobi/CPLEX

References

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