

Sujoy Kumar Sikdar

Jolley Hall 216,
Department of Computer Science and Engineering,
Washington University in St. Louis,
One Brookings Dr., St. Louis, MO 63130, USA

Phone: +1 518 698 1355
Email: sujoyks@gmail.com
Web: <https://sujoyksikdar.github.io/>

Research Interests Artificial Intelligence, Computational Social Choice, Mechanism Design, Machine Learning, Algorithm Design, Human Decision-Making, Social Networks.

Education **Doctor of Philosophy, Computer Science,** 2012 - 2018
Rensselaer Polytechnic Institute, Troy, NY.
Dissertation: Optimal Multi-Attribute Decision Making in Social Choice Problems.
Institute Nominee for the **Joint AAAI/ACM SIGAI Doctoral Dissertation Award**.
Supervisors: Prof. Lirong Xia, Prof. Sibel Adalı.

Master of Science, Computer Science, 2012 - 2015
Rensselaer Polytechnic Institute, Troy, NY.
Thesis: Towards an Understanding of Information Credibility on Online Social Networks.
Supervisor: Prof. Sibel Adalı.

Bachelor of Engineering, Information Technology, 2005 - 2009
Manipal Institute of Technology, Manipal, KA, India.

Research Experience and Employment **Postdoctoral Research Associate,** 2019 - Present
Washington University in St. Louis, St. Louis, MO.
Adviser: Prof. Sanmay Das.

Research Assistant, 2012 - 2019
Rensselaer Polytechnic Institute, Troy, NY.
Research adviser: Prof. Sibel Adalı (2012-2016), Prof. Lirong Xia (2016-2019).

Software Developer II, 2009 - 2011
Juniper Networks, Bangalore, KA, India.
In Juniper's Remote Access group, on the SSL-VPN, and briefly, the WAN Acceleration product lines. I worked on Linux server side and Windows and Linux client side code for the SSL-VPN product, and VxWorks server side code for the WAN Acceleration product.

Software Intern, 2008 - 2009
Juniper Networks, Bangalore, KA, India.

Awards Best Paper Award, 2013 International Conference on Social Computing (**SocialCom**).

Publications

1. Hadi Hosseini, Sujoy Sikdar, Rohit Vaish, Jun Wang, and Lirong Xia. *Fair Division Through Information Withholding*. (To Appear) In the Thirty-Fourth AAAI Conference on Artificial Intelligence (**AAAI-20**).
2. Haibin Wang, Sujoy Sikdar, Xiaoxi Guo, Lirong Xia, Yongzhi Cao, and Hanpin Wang. *Multi-type Resource Allocation with Partial Preferences*. (To Appear) In the Thirty-Fourth AAAI Conference on Artificial Intelligence (**AAAI-20**).

3. Haoming Li, Sujoy Sikdar, Rohit Vaish, Junming Wang, Lirong Xia, and Chaonan Ye. *Minimizing Time-to-Rank: A Learning and Recommendation Approach*. In Proceedings of the 28th International Joint Conference on Artificial Intelligence (**IJCAI-19**).
4. Rupert Freeman, Sujoy Sikdar, Rohit Vaish, and Lirong Xia. *Equitable Allocations of Indivisible Goods*. In Proceedings of the 28th International Joint Conference on Artificial Intelligence (**IJCAI-19**).
5. Sujoy Sikdar, Sibel Adalı, and Lirong Xia. *Mechanism Design for Multi-type Housing Markets with Acceptable Bundles*. In Proceedings of the Thirty-Third AAAI Conference on Artificial Intelligence (**AAAI-19**).
6. Hejun Wang, Sujoy Sikdar, Tyler Shepherd, Zhibing Zhao, Chunheng Jiang, and Lirong Xia. *Practical Algorithms for Multi-Stage Voting Rules with Parallel Universes Tiebreaking*. In Proceedings of the Thirty-Third AAAI Conference on Artificial Intelligence (**AAAI-19**).
7. Sujoy Sikdar. *Optimal Multi-Attribute Decision Making in Social Choice Problems*. (Doctoral Consortium) In Proceedings of the 27th International Joint Conference on Artificial Intelligence (**IJCAI-18**).
8. Shreyas Sekar, Sujoy Sikdar, and Lirong Xia. *Condorcet Consistent Bundling with Social Choice*. In Proceedings of the 16th International Conference on Autonomous Agents and Multiagent Systems (**AAMAS-17**).
9. Sujoy Sikdar, Sibel Adalı, Lirong Xia. *Optimal Decision Making with CP-nets and PCP-nets*. (Short Paper) In Proceedings of the 16th International Conference on Autonomous Agents and Multiagent Systems (**AAMAS-17**).
10. Sujoy Sikdar, Sibel Adalı, Lirong Xia. *Mechanism Design for Multi-Type Housing Markets*. In Proceedings of the 31st AAAI Conference on Artificial Intelligence (**AAAI-17**).
11. Benjamin Horne, Sibel Adalı, Sujoy Sikdar. *Identifying the Social Signals that Drive Online Discussions: A Case Study of Reddit Communities*. The 26th International Conference on Computer Communications and Networks (**ICCCN 2017**). IEEE, 2017.
12. Sujoy Sikdar, Sibel Adalı, Md Tanvir Amin, Tarek Abdelzaher, Kevin Chan, Jin-Hee Cho, Byungkyu Kang, John O'Donovan. *Finding True and Credible Information on Twitter*. 17th International Conference of Information Fusion (**FUSION-14**), pp. 1-8, July 2014.
13. Sujoy Sikdar, Byungkyu Kang, John O'Donovan, Tobias Hollerer, Sibel Adalı. *Cutting Through the Noise: Defining Ground Truth in Information Credibility on Twitter*. ASE HUMAN Journal 3(1), pp. 151-167, 2013.
14. Sujoy Sikdar, Byungkyu Kang, John O'Donovan, Tobias Hollerer, Sibel Adalı. *Understanding Information Credibility on Twitter*. 2013 International Conference on Social Computing (**SocialCom-13**), pp. 19-24, 8-14 September 2013. Received the **Best Paper Award**.

| | |
|------------------------|---|
| Dissertation | Sujoy Sikdar. <i>Optimal Multi-Attribute Decision Making in Social Choice Problems</i> . Ph.D. Dissertation. Co-advised by Prof. Lirong Xia and Prof. Sibel Adalı. 2018. |
| Workshop Papers | <ul style="list-style-type: none"> • Sujoy Sikdar, Sibel Adalı, Lirong Xia. <i>Optimal Decision Making with CP-nets and PCP-nets</i>. In EXPLORE-2017: The 4th Workshop on Exploring Beyond the Worst Case in Computational Social Choice (peer reviewed). |
| Invited Talks | <ul style="list-style-type: none"> • Chunheng Jiang, Sujoy Sikdar, Hejun Wang, Lirong Xia, and Zhibing Zhao. <i>Practical Algorithms for Computing STV and Other Multi-Round Voting Rules</i>. Invited talk at Dagstuhl Seminar 17261, Voting: Beyond Simple Majorities and Single-Winner Elections. 2017. |

Research Projects

- **Multi-Type Exchange Markets.** 2016 - ongoing
Designed the first core selecting and strategy-proof mechanism for multi-type exchange markets. Here, the goal is to redistribute resources of multiple types among the agents who own them. Our results hold under natural structural assumptions on agents' combinatorial preferences over bundles consisting of resources of multiple types.
- **Multi-Type Resource Allocation.** 2017 - ongoing
Designed the first fair and efficient mechanisms for multi-type resource allocation problems with both divisible and indivisible items. (Joint work with Yongzhi Cao, Xiaoxi Guo, Haibin Wang, Hanpin Wang, and Lirong Xia.)
- **Fair and Efficient Allocation of Indivisible Goods and Chores.** 2019 - ongoing
Introduced, and designed mechanisms that satisfy, a novel notion of envy-freeness through information withholding, where envy is eliminated by carefully hiding the allocation of a small number of resources. (Joint work with Hadi Hosseini, Rohit Vaish, and Lirong Xia.) Introduced relaxations of equitability and designed the first mechanisms to satisfy (approximate) equitability and efficiency. (Joint work with Rupert Freeman, Rohit Vaish, and Lirong Xia.)
- **Multi-Issue Voting with CP-nets and PCP-nets.** 2016 - 2017
Designed a quantitative loss minimization framework to reason about optimal decisions when agents' preferences over issues are represented by PCP-nets with full generality. Proposed natural loss functions, and a new class of voting rules that allow for the aggregation of CP and PCP-net preferences without additional structural assumptions on preferences.
- **Practical Algorithms for Multi-Round Voting Rules.** 2016 - 2018
Developed AI search techniques and machine learned heuristics for exact, efficient computation of winners under all possible tie breaking rules for popular multi-round voting rules such as STV. (Joint work with Chunheng Jiang, Hejun Wang, Lirong Xia, Zhibing Zhao.)
- **Product Bundling.** 2015 - 2016
Developed algorithms to compute (approximately) optimal, stable bundles of products based on users' rankings over products. (Joint work with Shreyas Sekar and Lirong Xia.)
- **Sandbox Games.** 2017 - ongoing
Developed a game theoretic model of the strategic interaction between malware and anti-malware that uses dynamic analysis of potential malware within sandbox environments.
- **Learning Preferences from Human Decisions.** 2015 - ongoing
Developed models to understand human decision making and preference formation inspired by psychology literature in diverse settings such as question answering and voting behavior in large online social discussion platforms using natural language and semantic features in collaboration with social psychologists.
- **Information Credibility in Online Social Networks.** 2012 - 2014
Developed models and reliable metrics of information credibility on large scale online social networking data through experiments using unsupervised and supervised machine learned models on data annotated through carefully conducted crowdsourced studies. We modeled multiple aspects that affect credibility such as competence and reliability of sources from social ties as well as linguistic features.

Professional Service

- Program Committee member: AAAI 2019, IJCAI 2016 and 2018, WWW 2015.
- Reviewer for Journals: Journal of Artificial Intelligence Research, Journal of Autonomous Agents and Multi-Agent Systems, Transactions on Knowledge Discovery from Data, Transactions on Knowledge and Data Engineering, Transactions on the Web; Conferences: AAAI, AISTAT, EC, IJCAI, NIPS, WINE.

| | |
|----------------------------|---|
| Graduate Coursework | Machine Learning, Foundations of Data Science, Analysis of Algorithms, Approximation Algorithms, Computational Social Choice, Algorithmic Game Theory, Frontiers of Network Science, Computational Finance, Distributed Computing Over the Internet, Operating Systems, Mathematical Statistics, Linear Programming. |
| Data Science | Machine learning and Statistics packages: scikit-learn, scipy, Weka, Tensorflow. Natural language processing: nltk, word2vec, LIWC, IBM Watson APIs. Optimization packages: AMPL/Cplex, Gurobi. Social network APIs, and analytics on large scale social network datasets and large crowd-sourced experiments conducted on Amazon Mechanical Turk. |
| Skills | <div> <div>Languages:</div> <div>Python, MATLAB, C, C++, HTML, Javascript.</div> </div> <div> <div>Version control:</div> <div>Perforce, SVN, Git.</div> </div> <div> <div>Operating Systems:</div> <div>Linux, Windows.</div> </div> <div> <div>Typography:</div> <div>Latex, Microsoft Office.</div> </div> |