Sujoy Kumar Sikdar

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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 (December, expected)
Rensselaer Polytechnic Institute, Troy, NY.
Thesis: Optimal Multi-Attribute Decision Making in Social Choice Problems.
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

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

Employment

- **Software Developer II,** 2009 - 2011
  Juniper Networks, Bangalore, KA, India.
  I worked for Juniper's Remote Access group on the SSL-VPN product and briefly on the WAN Acceleration product. I worked on Linux server side and Windows and Linux client side code bases 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. Sujoy Sikdar, Sibel Adalı, and Lirong Xia.
   Mechanism Design for Multi-type Housing Markets with Acceptable Bundles.
   (To appear) In Proceedings of the Thirty-Third AAAI Conference on Artificial Intelligence (**AAAI-19**).
2. Hejun Wang, Sujoy Sikdar, Tyler Shepherd, Zhibing Zhao, Chunheng Jiang, and Lirong Xia.
   Practical Algorithms for Computing STV and Other Multi-Round Voting Rules.
   (To appear) In Proceedings of the Thirty-Third AAAI Conference on Artificial Intelligence (**AAAI-19**).

3. 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**).

4. 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**).

5. 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**).

6. 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**).

7. 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.

8. Sujoy Sikdar, Sibel Adalı, Md Tanvir Amin, Tarek Abdelzaher, Kevin Chan, Jin-Hee Cho, Byungkyu Kang, John ODonovan.
Finding True and Credible Information on Twitter.
17th International Conference of Information Fusion (**FUSION-14**), pp. 1-8, July 2014.

9. 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.

10. 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. *Optimal Multi-Attribute Decision Making in Social Choice Problems.* Ph.D. Dissertation. Co-advised by Prof. Lirong Xia and Prof. Sibel Adalı. 2018.

Workshop Papers and Technical Reports

- Sujoy Sikdar, Sibel Adalı, Lirong Xia. *Optimal Decision Making with CP-nets and PCP-nets.* In EXPLORE-2017: The 4th Workshop on Exploring Beyond the Worst Case in Computational Social Choice (peer reviewed).
- Sujoy Sikdar. *Towards an Understanding of Information Credibility on Online Social Networks.* M.S. Dissertation. Advised by Prof. Sibel Adalı. 2015.

Invited Talks

- Chunheng Jiang, Sujoy Sikdar, Hejun Wang, Lirong Xia, and Zhibing Zhao. *Practical Algorithms for Computing STV and Other Multi-Round Voting Rules.* 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
  Characterization of sequential allocation mechanisms to allocate multiple types of resources given agents' combinatorial preferences over bundles of resources. Bounds on rank efficiency of different mechanisms when agents are strategic.
- **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

Languages:	Python, MATLAB, C, C++, HTML, Javascript.
Version control:	Perforce, SVN, Github.
Operating Systems:	Linux, Windows.
Typography:	Latex, Microsoft Office.