Tasuku Soma

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March 2, 2021

EDUCATION

The University of Tokyo — **Tokyo, Japan**
Ph.D (Information Science and Technology): supervised by Prof. Satoru Iwata — *March 2016*

Kyoto University — **Kyoto, Japan**
Master of Science: supervised by Prof. Satoru Iwata — *March 2013*

Kyoto University — **Kyoto, Japan**
Bachelor of Science — *March 2011*

ACADEMIC POSITIONS

Postdoctoral Fellow — **February 2021 - current**
Massachusetts Institute of Technology

Research Associate — **April 2016 - March 2021**
The University of Tokyo

JSPS Research Fellowships for Young Scientists — **April 2014 - March 2016**
The University of Tokyo

Research Assistant — **April 2013 - March 2014**
JST ERATO Kawarabayashi Large Graph Project

GRANT

JSPS Grant-in-Aid for Early-Career Scientists — *April 2019 - March 2022*
4,000,000 JPY

Japan Science and Technology Agency ACT-I — *September 2017 - March 2019*
3,000,000 JPY

JSPS Grant-in-Aid for Research Activity Start-up — *September 2016 – March 2018*
2,900,000 JPY

JSPS Research Fellowships for Young Scientists — *April 2014 - March 2016*
1,900,000 JPY

AWARDS

Dean's list for Ph.D thesis
Graduate school of information science and technology, the university of Tokyo — *March 2016*

Student Paper Award
Japan operations research society — *March 2013*

TEACHING

Courses Taught

- Exercise course of geometry — 2017 Fall, 2018 Fall, 2019 Fall, the university of Tokyo

- Exercise course of algebra — 2016 Summer, the university of Tokyo

Graduate Students Supervised

- Joachim Moussalli (M.Sc, EPFL[1]), 2019.

RESEARCH INTERESTS

- Submodular optimization and its applications in machine learning
- Sparsification and spectral methods in algorithm design
- Compressed sensing, tensor approximation, and matrix spaces

RESEARCH VISIT

- **University of British Columnbia** (hosted by Nicholas J. A. Harvey), August to September, 2019.
- **Max Planck Institute of Mathmatics in Sciences** (hosted by André Uschmajew), September, 2018.

SERVICE TO THE COMMUNITY

Journal and Conference Referees

- Mathematical Programming
- Mathematics of Operations Research
- Algorithmica
- Discrete Optimization
- Applied Mathematics and Optimization
- ISSAC 2018, 2020
- FOCS 2018, 2020
- ESA 2017
- SODA 2017, 2020
- AAAI 2017, 2021
- IPCO 2017, 2016, 2021
- ICML 2020
- NIPS 2016
- NeurIPS 2019, 2020

PUBLICATIONS

Refereed Journal Articles

[1] T. Soma. "Fast deterministic algorithms for matrix completion problems". In: *SIAM Journal on Discrete Mathematics* 28.1 (2014), pp. 490–502.

[2] T. Soma. "Multicasting in linear deterministic relay network by matrix completion". In: *IEEE Transactions on Information Theory* 62.2 (2016), pp. 870–875.

[3] Y. Nakatsukasa, T. Soma, and A. Uschmajew. "Finding a low-rank basis in a matrix subspace". In: *Mathematical Programming* 162.1-2 (2017), pp. 325–361.

[4] Z. Li, Y. Nakatsukasa, T. Soma, and A. Uschmajew. "On Orthogonal Tensors and Best Rank-One Approximation Ratio". In: *SIAM Journal on Matrix Analysis and Applications* 39.1 (2018), pp. 400–425.

[5] T. Soma and Y. Yoshida. "Maximizing monotone submodular functions over the integer lattice". In: *Mathematical Programming* 172 (2018), pp. 539–563.

[1] He visited the university of Tokyo as an exchange student

Refereed Conference Proceedings

[6] T. Soma. "Fast Deterministic Algorithms for Matrix Completion Problems". In: *Integer Programming and Combinatorial Optimization (IPCO)*. 2013, pp. 375–386.

[7] T. Soma. "Multicasting in linear deterministic relay network by matrix completion". In: *Proceedings of the IEEE International Symposium on Information Theory (ISIT)*. 2014, pp. 1191–1195.

[8] T. Soma, N. Kakimura, K. Inaba, and K. Kawarabayashi. "Optimal budget allocation: Theoretical guarantee and efficient algorithm". In: *Proceedings of the 31st International Conference on Machine Learning (ICML)*. **cycle 1**. 2014, pp. 556–568.

[9] T. Soma and Y. Yoshida. "A generalization of submodular cover via the diminishing return property on the integer lattice". In: *Advances in Neural Information Processing Systems (NIPS)*. 2015, pp. 847–855.

[10] T. Soma and Y. Yoshida. "Non-convex compressed sensing with the sum-of-squares method". In: *Proceedings of 17th the Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)*. 2016, pp. 570–579.

[11] T. Soma and Y. Yoshida. "Maximizing Monotone Submodular Functions over the Integer Lattice". In: *Integer Programming and Combinatorial Optimization (IPCO)*. 2016, pp. 325–336.

[12] T. Soma and Y. Yoshida. "Non-monotone DR-submodular function maximization". In: *Proceedings of the 31st AAAI Conference on Artificial Intelligence*. 2017, pp. 898–904.

[13] T. Soma and Y. Yoshida. "Regret ratio minimization in multi-objective submodular function maximization". In: *Proceedings of the 31st AAAI Conference on Artificial Intelligence*. 2017, pp. 905–911.

[14] K. Fujii and T. Soma. "Fast greedy algorithms for dictionary selection with generalized sparsity constraints". In: *Advances in Neural Information Processing Systems (NeurIPS) 31*. **spotlight**. 2018, pp. 4749–4758.

[15] T. Soma and Y. Yoshida. "A New Approximation Guarantee for Monotone Submodular Function Maximization via Discrete Convexity". In: *Proceedings of the 45th International Colloquium on Automata, Languages, and Programming, (ICALP)*. 2018, 99:1–99:14.

[16] T. Soma. "No-regret algorithms for online k-submodular maximization". In: *Proceedings of Machine Learning Research (AISTATS)*. Vol. 89. 2019, pp. 1205–1214.

[17] T. Soma and Y. Yoshida. "Spectral Sparsification of Hypergraphs". In: *Proceedings of the 20th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)*. 2019, pp. 2570–2581.

[18] N. J. A. Harvey, C. Liaw, and T. Soma. "Improved Algorithms for Online Submodular Maximization via First-order Regret Bounds". In: *Advances in Neural Information Processing Systems (NeurIPS) 33*. 2020, pp. 123–133.

[19] S. Ito, S. Hirahara, T. Soma, and Y. Yoshida. "Tight First- and Second-Order Regret Bounds for Adversarial Linear Bandits". In: *Advances in Neural Information Processing Systems (NeurIPS) 33*. **spotlight**. 2020, pp. 2028–2038.