

Tasuku Soma

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EDUCATION

The University of Tokyo <i>Ph.D (Information Science and Technology): supervised by Prof. Satoru Iwata</i>	Tokyo, Japan <i>March 2016</i>
Kyoto University <i>Master of Science: supervised by Prof. Satoru Iwata</i>	Kyoto, Japan <i>March 2013</i>
Kyoto University <i>Bachelor of Science</i>	Kyoto, Japan <i>March 2011</i>

ACADEMIC POSITIONS

Postdoctoral Fellow <i>Massachusetts Institute of Technology: mentored by Prof. Michel Goemans</i>	February 2021 – current
Research Associate <i>The University of Tokyo</i>	April 2016 – March 2021
JSPS Research Fellowships for Young Scientists <i>The University of Tokyo</i>	April 2014 – March 2016
Research Assistant <i>JST ERATO Kawarabayashi Large Graph Project</i>	April 2013 – March 2014

GRANT

JSPS Grant-in-Aid for Early-Career Scientists 4,000,000 JPY	<i>April 2019 – March 2022</i>
Japan Science and Technology Agency ACT-I 3,000,000 JPY	<i>September 2017 – March 2019</i>
JSPS Grant-in-Aid for Research Activity Start-up 2,900,000 JPY	<i>September 2016 — March 2018</i>
JSPS Research Fellowships for Young Scientists 1,900,000 JPY	<i>April 2014 – March 2016</i>

AWARDS

Dean's list for Ph.D thesis <i>Graduate school of information science and technology, the university of Tokyo</i>	<i>March 2016</i>
Student Paper Award <i>Japan operations research society</i>	<i>March 2013</i>

TEACHING

Courses Taught.....

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

Graduate Students Supervised.....

- o Joachim Moussalli (M.Sc, EPFL¹), 2019.

RESEARCH INTERESTS

- o Submodular optimization and its applications in machine learning
- o Linear algebra in combinatorial optimization and algorithm design
- o Convex optimization, online learning, and compressed sensing

RESEARCH VISITS

- o **University of British Columbia** (hosted by Nicholas J. A. Harvey), August – September, 2019.
- o **Max Planck Institute of Mathematics in Sciences** (hosted by André Uschmajew), September, 2018.

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.
- [6] K. Fujii, T. Soma, and Y. Yoshida. “Polynomial-time algorithms for submodular Laplacian systems”. In: *Theoretical Computer Science* 892 (2021), pp. 170–186.
- [7] T. Matsuda and T. Soma. “Information geometry of operator scaling”. In: *Linear Algebra and its Applications* (to appear).

Refereed Conference Proceedings.....

- [8] T. Soma. “Fast Deterministic Algorithms for Matrix Completion Problems”. In: *Integer Programming and Combinatorial Optimization (IPCO)*. 2013, pp. 375–386.
- [9] 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.
- [10] 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.
- [11] 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.

¹He visited the university of Tokyo as an exchange student

- [12] 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.
- [13] T. Soma and Y. Yoshida. “Maximizing Monotone Submodular Functions over the Integer Lattice”. In: *Integer Programming and Combinatorial Optimization (IPCO)*. 2016, pp. 325–336.
- [14] 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.
- [15] 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.
- [16] 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.
- [17] 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.
- [18] T. Soma. “No-regret algorithms for online k -submodular maximization”. In: *Proceedings of Machine Learning Research (AISTATS)*. Vol. 89. 2019, pp. 1205–1214.
- [19] 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.
- [20] 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.
- [21] 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.
- [22] T. Soma and Y. Yoshida. “Online Risk-Averse Submodular Maximization”. In: *Proceedings of the 50th International Joint Conference on Artificial Intelligence (IJCAI)*. 2021, pp. 2988–2994.