

# A (Slightly) Improved Approximation Algorithm for the Metric Traveling Salesperson Problem

Anna R. Karlin ✉

Paul G. Allen School of Computer Science and Engineering, University of Washington, USA

---

## Abstract

We describe recent joint work with Nathan Klein and Shayan Oveis Gharan showing that for any metric TSP instance, the max entropy algorithm studied by [1] returns a solution of expected cost at most  $\frac{3}{2} - \epsilon$  times the cost of the optimal solution to the subtour elimination LP and hence is a  $\frac{3}{2} - \epsilon$  approximation for the metric TSP problem. The research discussed comes from [1], [2] and [3].

**2012 ACM Subject Classification** Theory of computation → Approximation algorithms analysis

**Keywords and phrases** Traveling Salesperson Problem, approximation algorithm

**Digital Object Identifier** 10.4230/LIPIcs.ICALP.2023.1

**Category** Invited Talk

**Related Version** *Full Version:* <https://arxiv.org/pdf/2007.01409.pdf>

**Funding** *Anna R. Karlin:* Research supported by Air Force Office of Scientific Research grant FA9550-20-1-0212 and NSF grant CCF-1813135

---

## References

- 1 Anna R. Karlin, Nathan Klein, and Shayan Oveis Gharan. A (slightly) improved approximation algorithm for metric TSP. In Samir Khuller and Virginia Vassilevska Williams, editors, *STOC '21: 53rd Annual ACM SIGACT Symposium on Theory of Computing, Virtual Event, Italy, June 21-25, 2021*, pages 32–45. ACM, 2021. doi:10.1145/3406325.3451009.
- 2 Anna R. Karlin, Nathan Klein, and Shayan Oveis Gharan. A (slightly) improved bound on the integrality gap of the subtour LP for TSP. In *63rd IEEE Annual Symposium on Foundations of Computer Science, FOCS 2022, Denver, CO, USA, October 31 - November 3, 2022*, pages 832–843. IEEE, 2022. doi:10.1109/FOCS54457.2022.00084.
- 3 Anna R. Karlin, Nathan Klein, and Shayan Oveis Gharan. A (slightly) improved deterministic approximation algorithm for metric TSP. *CoRR*, abs/2212.06296, 2022. doi:10.48550/arXiv.2212.06296.



© Anna R. Karlin;

licensed under Creative Commons License CC-BY 4.0

50th International Colloquium on Automata, Languages, and Programming (ICALP 2023).

Editors: Kousha Etessami, Uriel Feige, and Gabriele Puppis; Article No. 1; pp. 1:1–1:1

Leibniz International Proceedings in Informatics



LIPICs Schloss Dagstuhl – Leibniz-Zentrum für Informatik, Dagstuhl Publishing, Germany

