The Role of Local Algorithms in Privacy

Sofya Raskhodnikova
Department of Computer Science, Boston University, MA, USA

Abstract

We will discuss research areas at the intersection of local algorithms and differential privacy. The main focus will be on using local Lipschitz filters to enable black-box differentially private queries to sensitive datasets. We will also cover new sublinear computational tasks arising in private data analysis. Finally, we will touch upon distributed models of privacy.

2012 ACM Subject Classification Theory of computation → Design and analysis of algorithms

Keywords and phrases Sublinear algorithms, differential privacy, reconstruction of Lipschitz functions, local algorithms

Digital Object Identifier 10.4230/LIPIcs.STACS.2024.2

Category Invited Talk

1 Summary

This talk will be mostly based on joint work with Madhav Jha [2], Jane Langer, Ephraim Linder, and Arsen Vasilyan [3], Satchit Sivakumar, Adam Smith, and Marika Swanberg [4], and Talya Eden, Quanquan Liu, and Adam Smith [1].

References

1 Talya Eden, Quanquan C. Liu, Sofya Raskhodnikova, and Adam D. Smith. Triangle counting with local edge differential privacy. In Kousha Etessami, Uriel Feige, and Gabriele Puppis, editors, *50th International Colloquium on Automata, Languages, and Programming, ICALP 2023, July 10-14, 2023, Paderborn, Germany*, volume 261 of *LIPIcs*, pages 52:1–52:21. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2023. doi:10.4230/LIPICS.ICALP.2023.52.

2 Madhav Jha and Sofya Raskhodnikova. Testing and reconstruction of Lipschitz functions with applications to data privacy. *SIAM J. Comput.*, 42(2):700–731, 2013. doi:10.1137/110840741.

3 Jane Lange, Ephraim Linder, Sofya Raskhodnikova, and Arsen Vasilyan. Local Lipschitz filters for bounded-range functions. *CoRR*, abs/2308.14716, 2023. doi:10.48550/ARXIV.2308.14716.

4 Sofya Raskhodnikova, Satchit Sivakumar, Adam D. Smith, and Marika Swanberg. Differentially private sampling from distributions. In Marc'Aurelio Ranzato, Alina Beygelzimer, Yann N. Dauphin, Percy Liang, and Jennifer Wortman Vaughan, editors, *Advances in Neural Information Processing Systems 34: Annual Conference on Neural Information Processing Systems 2021, NeurIPS 2021, December 6-14, 2021, virtual*, pages 28983–28994, 2021. URL: https://proceedings.neurips.cc/paper/2021/hash/f2b5e92f61b6de923b063588ee6e7c48-Abstract.html.