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EXACT UPPER BOUND ON THE SUM OF SQUARED NEAREST–NEIGHBOR DISTANCES BETWEEN POINTS IN A RECTANGLE

IOSIF PINELIS

Abstract. An exact upper bound on the sum of squared nearest-neighbor distances between points in a rectangle is given.

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REFERENCES

[1] P. K. AGARWAL, L. ARGE, AND F. STAALS, *Improved dynamic geodesic nearest neighbor searching in a simple polygon*, In 34th International Symposium on Computational Geometry, volume 99 of LIPIcs. Leibniz Int. Proc. Inform., pages Art. No. 4, 14. Schloss Dagstuhl. Leibniz-Zent. Inform., Wadern, 2018.
[2] A. ANDONI, A. NAOR, A. NIKOLOV, I. RAZENSHTEYN, AND E. WAINGARTEN, *Hölder homeomorphisms and approximate nearest neighbors*, In 59th Annual IEEE Symposium on Foundations of Computer Science—FOCS 2018, pages 159–169. IEEE Computer Soc., Los Alamitos, CA, 2018.
[3] F. AURENHAMMER, *Voronoi diagrams—a survey of a fundamental geometric data structure*, ACM Comput. Surv., 23(3):345–405, Sept. 1991.
[4] S. BASU, R. POLLACK, AND M.-F. ROY, *Algorithms in real algebraic geometry*, volume 10 of Algorithms and Computation in Mathematics, Springer-Verlag, Berlin, second edition, 2006.
[5] T. B. BERRETT, R. J. SAMWORTH, AND M. YUAN, *Efficient multivariate entropy estimation via k-nearest neighbour distances*, Ann. Statist., 47(1):288–318, 2019.
[6] W. GAO, S. OH, AND P. VISWANATH, *Demystifying fixed k-nearest neighbor information estimators*, IEEE Trans. Inform. Theory, 64(8):5629–5661, 2018.
[7] R. JANSSEN, M. JONES, P. L. ERDŐS, L. VAN IERSEL, AND C. SCORNAVACCA, *Exploring the tiers of rooted phylogenetic network space using tail moves*, Bull. Math. Biol., 80(8):2177–2208, 2018.
[8] MATHOVERFLOW, *Sum of squared nearest-neighbor distances between points in a square*, 2019, `https://mathoverflow.net/questions/321033/sum-of-squared-nearest-neighbor-distances-between-points-in-a-square/321048#321048`.

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