

The Hong Kong University of Science and Technology

Department of Mathematics

Seminar on Pure Mathematics

Entropy and Sorting

By

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Abstract

We reconsider the old problem of sorting under partial information, and give polynomial time algorithms for the following tasks: (1) Given a partial order P, find (adaptively) a sequence of comparisons (questions of the form, "is x < y?") which sorts (i.e., finds an unknown linear extension of) P using O(log(e(P))) comparisons in worst case (where e(P) is the number of linear extensions of P). (2) Compute (on line) answers to any comparison algorithm for sorting a partial order P which force the algorithm to use $\Omega(\log(e(P)))$ comparisons. (3) Given a partial order P of size n, estimate e(P) to within a factor exponential in n. (We give upper and lower bounds which differ by the factor nⁿ /n!.) Our approach, based on entropy of the comparability graph of P and convex minimization via the ellipsoid method, is completely different from earlier attempts to deal with these questions.

Date: Monday, 25 February 2019 Time: 3:00p.m. - 4:00p.m.

Venue: Room 4334, Academic Building (near Lifts 3), HKUST

All are welcome!