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Average parameterization and partial kernelization for computing medians. (English)

Zbl 1215.68107

Summary: We propose an effective polynomial-time preprocessing strategy for intractable median problems. Developing a new methodological framework, we show that if the input objects of generally intractable problems exhibit a sufficiently high degree of similarity between each other on average, then there are efficient exact solving algorithms. In other words, we show that the median problems Swap Median Permutation, Consensus Clustering, Kemeny Score, and Kemeny Tie Score all are fixed-parameter tractable with respect to the parameter “average distance between input objects”. To this end, we develop the novel concept of “partial kernelization” and, furthermore, identify polynomial-time solvable special cases for the considered problems.

MSC:
68Q25 Analysis of algorithms and problem complexity
91B12 Voting theory

Keywords:
polynomial-time preprocessing; data reduction; fixed-parameter tractability; rank aggregation; consensus clustering

Full Text: DOI

References:


[4] Bartholdi, J.; Tovey, C.A.; Trick, M.A., Voting schemes for which it can be difficult to tell who won the election, Soc. choice welsh., 6, 157-165, (1989) - Zbl 0672.90004


[21] Kenyon-Mathieu, C.; Schudy, W., How to rank with few errors, (), 95-103 · Zbl 1232.68181


[27] Niedermeier, R., Reflections on multivariate algorithmics and problem parameterization, (), 17-32 · Zbl 1230.68096


[29] Schalekamp, F.; van Zuylen, A., Rank aggregation: together we’re strong, (), 38-51

[30] Simjour, N., Improved parameterized algorithms for the kemeny aggregation problem, (), 312-323 · Zbl 1273.68186


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