Bodlaender, Hans L.; **Fomin, Fedor V.**; **Koster, Arie M. C. A.**; **Kratsch, Dieter**; **Thilikos, Dimitrios M.**
On exact algorithms for treewidth. (English) ┆Zbl 1131.68481┆
Azar, Yossi (ed.) et al., Algorithms – ESA 2006. 14th annual European symposium, Zurich, Switzerland, September 11–13, 2006. Proceedings. Berlin: Springer (ISBN 978-3-540-38875-3/pbk). Lecture Notes in Computer Science 4168, 672-683 (2006).

Summary: We give experimental and theoretical results on the problem of computing the treewidth of a graph by exact exponential time algorithms using exponential space or using only polynomial space. We first report on an implementation of a dynamic programming algorithm for computing the treewidth of a graph with running time $O^*(2^n)$. This algorithm is based on the old dynamic programming method introduced by Held and Karp for the Traveling Salesman problem. We use some optimizations that do not affect the worst case running time but improve on the running time on actual instances and can be seen to be practical for small instances. However, our experiments show that the space used by the algorithm is an important factor to what input sizes the algorithm is effective. For this purpose, we settle the problem of computing treewidth under the restriction that the space used is only polynomial. In this direction we give a simple $O^*(4^n)$ algorithm that requires polynomial space. We also prove that using more refined techniques with balanced separators, Treewidth can be computed in $O^*(2.9512^n)$ time and polynomial space.

For the entire collection see [Zbl 1130.68002].

MSC:

68R10	Graph theory (including graph drawing) in computer science
05C85	Graph algorithms (graph-theoretic aspects)
68Q25	Analysis of algorithms and problem complexity
90C35	Programming involving graphs or networks

Cited in **13** Documents

Full Text: DOI