
Abstract

It is an old open question in algorithmic graph theory to determine the complexity of the MAXIMUM INDEPENDENT SET problem on P_t -free graphs, that is, on graphs not containing any induced path on t vertices. So far, polynomial-time algorithms are known only for $t \leq 5$ [Lokshtanov et al., SODA 2014, 570–581, 2014]. Here we study the existence of subexponential-time algorithms for the problem: by generalizing an earlier result of Randerath and Schiermeyer for $t = 5$ [*Discrete Appl. Math.*, 158 (2010), 1041–1044], we show that for any $t \geq 5$, there is an algorithm for MAXIMUM INDEPENDENT SET on P_t -free graphs whose running time is subexponential in the number of vertices.

SCATTERED SET is the generalization of MAXIMUM INDEPENDENT SET where the vertices of the solution are required to be at distance at least d from each other. We give a complete characterization of those graphs H for which d -SCATTERED SET on H -free graphs can be solved in time subexponential in the *size of the input* (that is, in the number of vertices plus number of edges):

- If every component of H is a path, then d -SCATTERED SET on H -free graphs with n vertices and m edges can be solved in time $2^{(n+m)^{1-O(1/|V(H)|)}}$, even if d is part of the input.
- Otherwise, assuming ETH, there is no $2^{o(n+m)}$ -time algorithm for d -SCATTERED SET for any fixed $d \geq 3$ on H -free graphs with n -vertices and m -edges.

Digital Object Identifier 10.4230/LIPIcs...