

Oberseminar Theoretische Informatik

Wintersemester 2008/2009

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Finding Transitive Approximations of Directed Graphs

Mo, 09.02.2009 um 14 Uhr (c.t.) im SR 3319 (Ernst-Abbe-Platz 2, 3. Stock).

In Bioinformatics, the task of hierarchical disease classification based on noisy data recently led to studying the TRANSITIVITY EDITING problem, which is to change a given digraph by adding and removing a minimum number of arcs such that the resulting digraph is transitive. We show that both TRANSITIVITY EDITING and TRANSITIVITY DELETION, which does not allow the insertion of arcs, are NP-complete even when restricted to DAGs. We provide polynomial-time executable data reduction rules that yield an $O(k^2)$ -vertex kernel for general digraphs and an $O(k)$ -vertex kernel for digraphs of bounded degree. Furthermore, a heuristic approach and a search tree algorithm are presented. We show an asymptotic running time of $O(2.57^k + n^3)$ for TRANSITIVITY EDITING and $O(2^k + n^3)$ for TRANSITIVITY DELETION.

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