

Problems: Randomized Algorithms, FPT algorithms

Sudeshna Kolay
Indian Institute of Technology, Kharagpur

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1. Show that a graph has at most 2^k inclusion-wise minimal vertex covers of size at most k . Show that all these vertex covers can be enumerated in $2^k n^{O(1)}$ time.
2. The CLUSTER VERTEX DELETION problem takes as input a graph G and a nonnegative integer k and decides if there are k vertices the deletion of which will make the resulting graph a disjoint union of cliques. Design a $3^k n^{O(1)}$ time algorithm for the problem.
3. FEEDBACK VERTEX SET takes as input a graph G and a nonnegative integer k and decides if there is a set of at most k vertices the deletion of which makes the resulting graph acyclic. Design a $4^k n^{O(1)}$ algorithm using the iterative compression technique.
4. Design a randomized algorithm for the k -tree problem where the objective is to find a fixed tree of size k as a subgraph.
5. The k -Triangle Packing problem takes as input an undirected graph G and a positive integer k , and decides if there are k vertex-disjoint triangles in G . Design an FPT algorithm for the problem using the colour coding technique.