A New Local Search Framework and Inference Rules for Dominating Set

The problem of finding a minimum dominating set (MinDS) in a graph is a well known combinatorial optimization problem with wide applications. Due to its NP-hardness, for large and hard instances one must resort to heuristic approaches to obtain good solutions within reasonable time. This paper develops an efficient local search algorithm for MinDS, which has two main ideas. The first one is a novel local search framework, while the second is a construction procedure with inference rules. Our algorithm named FastDS is evaluated on 4 standard benchmarks and 3 massive graphs benchmarks. FastDS obtains the best performance for almost all benchmarks. Particularly, FastDS obtains significantly better solutions than state-of-the-art algorithms on massive graphs.

Camera ready version to come.