Abstract

We consider the critical node detection problem (CNDP) in directed graphs. Given a directed graph G and a parameter k, we wish to remove a subset S of at most k vertices of G such that the residual graph $G \setminus S$ has minimum pairwise strong connectivity. This problem is NP-hard, and thus we are interested in practical heuristics. We present a sophisticated linear-time algorithm for the $k = 1$ case, and, based on this algorithm, give an efficient heuristic for the general case. Then, we conduct a thorough experimental evaluation of various heuristics for CNDP. Our experimental results suggest that our heuristic performs very well in practice, both in terms of running time and of solution quality.