

# Relation between fractality of networks and efficiency of network dismantling algorithms

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Network dismantling is to find a minimal set of target nodes whose removal tears the network apart, into tiny pieces of subextensive size. Because identifying the optimal set of targets is NP-hard, many heuristic approaches have been developed, for instance, belief propagation-based decimation (BPD) algorithm and the collective influence (CI) algorithm. Here, we study the performance of these algorithms and analyze their dependence on the fractality of the network. Networks can be categorized into two types: fractal and non-fractal networks. We investigated performance of each algorithm on the World Wide Web and Internet at the autonomous system level, as real-world examples for fractal and non-fractal networks respectively. Furthermore, we analyze how the performance of the algorithms are affected by topological properties, using various fractal and non-fractal model networks by adjusting degree exponent, shortcut number, and system size. We find that the BPD algorithm dismantles fractal networks much more easily than for non-fractal networks, whereas CI algorithm destroyed non-fractal networks more easily<sup>†</sup>.

<sup>†</sup> Yoon Seok Im and B. Kahng, arXiv:1804.10267 (2018).