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Exact and approximation algorithms for sensor placement against DDoS attacks

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In a distributed denial of service (DDoS) attack, the attacker gains control of many network users through a virus. Then the controlled users send many requests to a victim, leading to its resources being depleted. DDoS attacks are hard to defend because of their distributed nature, large scale and various attack techniques. One possible mode of defense is to place sensors in a network that can detect and stop an unwanted request. However, such sensors are expensive, as a result of which there is a natural question as to the minimum number of sensors and their optimal placement required to get the necessary level of safety. Presented below are two mixed integer models for optimal sensor placement against DDoS attacks. Both models lead to a trade-off between the number of deployed sensors and the volume of uncontrolled flow. Since the above placement problems are NP-hard, two efficient heuristics are designed, implemented and compared experimentally with exact mixed integer linear programming solvers. Keywords: DDoS, sensor placement, network safety optimization, heuristics
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