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An Earth Mover's Distance Algorithm Based DDoS Detection Mechanism in SDN

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Abstract : Software-defined networking (SDN) provides a solution for scalable network framework with decoupled control and data plane. However, this architecture also induces a particular distributed denial-of-service (DDoS) attack that can affect or even overwhelm the SDN network. DDoS attack detection problem has to date been mostly researched as entropy comparison problem. However, this problem lacks the utilization of SDN, and the results are not accurate. In this paper, we propose a DDoS attack detection method, which interprets DDoS detection as a signature matching problem and is formulated as Earth Mover’s Distance (EMD) model. Considering the feasibility and accuracy, we further propose to define the cost function of EMD to be a generalized Kullback-Leibler divergence. Simulation results show that our proposed method can detect DDoS attacks by comparing EMD values with the ones computed in the case without attacks. Moreover, our method can significantly increase the true positive rate of detection.

Keywords : DDoS detection, EMD, relative entropy, SDN
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