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Nowadays, cyber threats (e.g., intrusions) are distributed across various networks with the dispersed networking resources. Intrusion detection systems (IDSs) have already become an essential solution to defend against a large amount of attacks. With the development of cloud computing, a modern IDS is able to implement more complicated detection algorithms by offloading the expensive operations such as the process of signature matching to the cloud (i.e., utilizing computing resources from the cloud). However, during the detection process, no party wants to disclose their own data especially sensitive information to others for privacy concerns, even to the cloud side. For this sake, privacy-preserving technology has been applied to IDSs, while it still lacks of proper solutions for a collaborative intrusion detection network (CIDN) due to geographical distribution. A CIDN enables a set of dispersed IDS nodes to exchange required information. With the advent of fog computing, in this paper, we propose a privacy-preserving framework for collaborative networks based on fog devices. Our study shows that the proposed framework can help reduce the workload on cloud’s side.

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