IFMN Model: An Advanced Classification Architecture for Intrusion Detection with HYFSPSO Method

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Abstract

Intrusion Detection Systems (IDSs) are crucial in protecting IoT networks from unauthorized access and security threats. The ability to detect anomalies and suspicious activities in real-time is vital for preventing cyber-attacks and minimizing the damage caused by them. Traditional IDSs have relied on signature-based approaches, which are limited in their ability to detect novel and unknown attacks. To overcome these limitations, this paper proposes a novel deep learning architecture named as Inverted Funnelized Multilayer Network (IFMN) for detecting intrusions in IoT networks. The proposed approach for intrusion detection employs a feature selection model that uses a Hybrid Yellow saddle goatfish algorithm and Particle Swarm Optimization algorithm for Feature Selection (HYFSPSO) to identify the optimal features. The effectiveness of the selected features is evaluated using a decision tree (DT) classification method, ensuring only the most informative features are used in the deep learning architecture for intrusion detection. For analyzing and proving the effectiveness of our scheme the current research have used three benchmark datasets i.e. KDD-CUP99, NSL-KDD and UNSW-NB15 datasets. The simulations of the proposed architecture are conducted in MATLAB and evaluated using performance matrices. While comparing the outcomes on 3 datasets results revealed that proposed HYSGPSO-DL based IDS approach is more effective on NSL-KDD and UNSW-NB15 datasets with an accuracy of 99.96% and 99.80%, while as it achieved an accuracy of 99.53% on KDD-CUP99 dataset. Additionally, comparative analysis with existing intrusion detection systems shows that our proposed scheme outperforms the state-of-the-art methods.

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