Abstract

In today's world, economic growth, social wellbeing, and the national security are highly affected by information and communication technologies. However, these technologies are fostered by a groups of people with intrusive and malicious tendency who also known as networks hackers, attackers, intruders, cyber criminals, etc. Therefore, the combating to these intrusive activities is considered as one of the major international priorities and principal active field of research.

Intrusion Detection Systems (IDS) are considered one of the basic building blocks of the protection wall against these malicious intrusive activities through detecting it before it hits the network systems.

A variety of advanced intrusion detection techniques created by conventional integrating or combining multiple learning algorithms have shown better overall detection performance than general single learning algorithms.

On the other hand, there have been very few researches focusing on achieving high detection rate, accuracy and precision for each attack category, especially for attacks of high risk and low frequency specially attacks of type (U2R and R2L).

In this thesis, we propose a hybrid intelligent technique based on a combination of supervised and unsupervised neural networks in order to boost the overall intrusion detection performance of the resultant intrusion detection model and the particular detection performance for each type of attacks (DoS, Probe, U2R, R2L).

The general methodology of the proposed model is to use a hybrid classification strategy where the unsupervised Self-Organized Map (SOM) network is hybridized with the supervised Kalman Back Propagation network in a cascaded detection layers.

The proposed model is demonstrated using NSL-KDD benchmark dataset, where it has achieved superior performance in terms of Detection Rate (98.2%), Accuracy (97.59%), and Precision (96.86%).

Hybrid Intrusion Detection Based on Self-Organized Map and Kalman Backpropagation

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