**CYBER THREAT DETECTION BASED ON ANN USING EVENT PROFILES**

ABSTRACT:

One of the major challenges in cyber security is the provision of an automated and effective cyber-threats detection technique. In this paper, we present an AI technique for cyber-threats detection, based on artificial neural networks. The proposed technique converts multitude of collected security events to individual event profiles and use a deep learning-based detection method for enhanced cyber-threat detection. For this work, we developed an AI-SIEM system based on a combination of event profiling for data preprocessing and different artificial neural network methods, including FCNN, CNN, and LSTM. The system focuses on discriminating between true positive and false positive alerts, thus helping security analysts to rapidly respond to cyber threats. All experiments in this study are performed by authors using two benchmark datasets (NSLKDD and CICIDS2017) and two datasets collected in the real world. To evaluate the performance comparison with existing methods, we conducted experiments using the five conventional machine-learning methods (SVM, k-NN, RF, NB, and DT). Consequently, the experimental results of this study ensure that our proposed methods are capable of being employed as learning-based models for network intrusion-detection, and show that although it is employed in the real world, the performance outperforms the conventional machine-learning methods.

Existing System:

Traditionally, there are two primary systems for detecting cyber-threats and network intrusions. An intrusion prevention system (IPS) is installed in the enterprise network, and can examine the network protocols and flows with signature-based methods primarily. It generates appropriate intrusion alerts, called the security events, and reports the generating alerts to another system, such as SIEM. The security information and event management (SIEM) has been focusing on collecting and managing the alerts of IPSs. The SIEM is the most common and dependable solution among various security operations solutions to analyze the collected security events and logs . Moreover, security analysts make an effort to investigate suspicious alerts by policies and threshold, and to discover malicious behavior by analyzing correlations among events, using knowledge related to attacks.

Disadvantages:

* It is still difficult to recognize and detect intrusions against intelligent network attacks owing to their high false alerts and the huge amount of security data
* These learning-based approaches require to learn the attack model from historical threat data and use the trained models to detect intrusions for unknown cyber threats

Proposed System:

Our proposed system aims at converting a large amount of security events to individual event profiles for processing very large scale data. We developed a generalizable security event analysis method by learning normal and threat patterns from a large amount of collected data, considering the frequency of their occurrence. In this study, we specially propose the method to characterize the data sets using the base points in data preprocessing step. This method can significantly reduce the dimensionality space, which is often the main challenge associated with traditional data mining techniques in log analysis.

• Our event profiling method for applying artificial intelligence techniques, unlike typical sequence-based pattern approaches, provides featured input data to employ various deep-learning techniques. Hence, because our technique is able to facilitate improved classification for true alerts when compared with conventional machine-learning methods, it can remarkably reduce the number of alerts practically provided to the analysts.

• For the applicability, we evaluate our system with real IPS security events from a real security operations center (SOC) and validate its effectiveness through performance metrics, such as the accuracy, true positive rate (TPR), false positive rate (FPR) and the F-measure. Moreover, to evaluate the performance comparison with existing methods, we conducted experiments using the five conventional machine-learning methods (SVM, k- NN, RF, NB and DT). And we also perform an evaluation by applying our method to two benchmark datasets (i.e., NSLKDD, CICIDS2017), which are most commonly used in the field of network intrusion detection research.

Advantages:

* For cyber-threat detection, the SIEM analysts spend an immense amount of effort and time to differentiate between true security alerts and false security alerts in collected events.