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| | authors | <ul style="list-style-type: none">Siamak ParhizkariMohammad Bagher MenhajAtena Sajedin | authors | <ul style="list-style-type: none">Menhaj, Mohammad BagherParhizkari, Siamak | DUPLICATES | 142 |
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| | abstract | Intrusion detection is one of the important mechanisms that provide computer networks security. Due to an increase in attacks and growing dependence upon other fields such as medicine, commerce, and engineering, offering services over a network and maintaining network security have become a significant issue. The purpose of Intrusion Detection Systems (IDS) is to develop models which are able to distinguish regular communications from abnormal ones, and take the necessary actions. Among different methods in this field, Artificial Neural Networks (ANNs) have been widely used. However, ANN-based IDS encountered two main problems: low detection precision and weak detection stability. To overcome these problems, this paper proposes a new approach based on Deep Neural Network ans Support vector machine classifier, which inspired by "divide and conquer" philosophy. The proposed model predicts the attacks with better accuracy for intrusion detection rather similar methods. For our empirical study, we were taking advantage of the KDD99 dataset. Our experimental results suggest that the new approach enhance to 95.4 percent classification accuracy. | abstract | Intrusion detection is one of the primary mechanisms to provide computer networks with security. With an increase in attacks and growing dependence on various fields such as medicine, commercial, and engineering to give services over a network, securing networks have become a significant issue. The purpose of Intrusion Detection Systems (IDS) is to make models which can recognize regular communications from abnormal ones and take necessary actions. Among different methods in this field, Artificial Neural Networks (ANNs) have been widely used. However, ANN-based IDS, has two main disadvantages: 1- Low detection precision. 2- Weak detection stability. To overcome these issues, this paper proposes a new approach based on Deep Neural Network (DNN. The general mechanism of our model is as follows: first, some of the data in dataset is properly ranked, afterwards, dataset is normalized with Min-Max normalizer to fit in the limited domain. Then dimensionality reduction is applied to decrease the amount of both useless dimensions and computational cost. After the preprocessing part, Mean-Shift clustering algorithm is the used to create different subsets and reduce the complexity of dataset. Based on each subset, two models are trained by Support Vector Machine (SVM) and deep learning method. Between two models for each subset, the model with a higher accuracy is chosen. This idea is inspired from philosophy of divide and conquer. Hence, the DNN can learn each subset quickly and robustly. Finally, to reduce the error from the previous step, an ANN model is trained to gain and use the results in order to be able to predict the attacks. We can reach to 95.4 percent of accuracy. Possessing a simple structure and less number of tunable parameters, the proposed model still has a grand generalization with a high level of accuracy in compared to other methods such as SVM, Bayes network, and STL.Comment: 18 pages, 6 figure | | |
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