Machine Learning Based Cloud Computing Anomalies Detection

Abstract:

Recently, machine learning algorithms have been proposed to design new security systems for anomalies detection as they exhibit fast processing with real-time predictions. However, one of the major challenges in machine learning-based intrusion detection methods is how to include enough training examples for all the possible classes in the model to avoid the class imbalance problem and accurately detect the intrusions and their types.

In this article, we propose a novel weighted classes classification scheme to secure the network against malicious nodes while alleviating the problem of imbalanced data. In the proposed system, we combine a supervised machine learning algorithm with the network node past information and a specific designed best effort iterative algorithm to enhance the accuracy of rarely detectable attacks.

The machine learning algorithm is used to generate a classifier that differentiates between the investigated attacks. The system stores these decisions in a private database. Then, we design a new weight optimization algorithm that exploits these decisions to generate a weights vector that includes the best weight for each class.

The proposed model enhances the overall detection accuracy and maximizes the number of correctly detectable classes even for the classes with a relatively low number of training entries. The UNSW dataset has been used to evaluate the performance of the proposed model and compare it with state of the art techniques.

Keywords:

- Machine learning,
- Machine learning algorithms,
- Data models,
- Security,
- Predictive models,
- Training,
- Cloud computing

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