

Intrusion Detection of Imbalanced Network Traffic Based on Deep Learning

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Abstract: In this work, include deep learning techniques for intrusion detection in imbalanced network traffic. A novel Difficult Set Sampling Technique (DSSTE) algorithm to tackle the class imbalance problem. First, use the Edited Nearest Neighbors (ENN) algorithm to divide the imbalanced training set into the difficult set and the easy set. Next, use the K Means algorithm to compress the majority samples in the difficult set to reduce the majority. Zoom in and out the minority samples' continuous attributes in the difficult set to synthesize new samples to increase the minority number. Finally, the easy set, the compressed set of majorities in the difficult, and the minority in the difficult set are combined with its augmentation samples to make up a new training set. The algorithm reduces the imbalance of the original training set and provides targeted data augmentation for the minority class that needs to learn. It enables the classifier to learn the differences in the training stage better and improve classification performance. For classification, convolution neural networks are used for model creation. In this study, the NSL-KDD dataset is used for the intrusion detection system.

Keywords: Intrusion Detection, CNN, NSL-KDD, DSSTE, ENN, K-Means

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