
Distributed Denial-of-Service (DDoS) Detection Using Multitask Learning based on Deep Learning

Muhammad Fauzan Abyandani¹, Parman Sukarno², Aulia Arif Wardana³

Fakultas Informatika, Universitas Telkom, Bandung

fauzanbyan@student.telkomuniversity.ac.id,

psukarno@telkomuniversity.ac.id,

aulia.wardana@pwr.edu.pl,

Abstract

Distributed Denial of Service (DDOS) is one of the most significant threats among a wide variety of threats that can attack increasingly vulnerable computer networks. Traditional detection methods often fail to effectively manage the complexity of modern attack scales because traditional methods usually rely on monitoring the traffic volume and identifying spikes as an attack. This approach causes ineffective, inaccuracy, and lack of scalability. To address these challenges, this research aims to develop an advanced and innovative approach to detect and classify DDOS attacks. We use Multitask Learning (MTL) combined with Deep Learning (DL) using three DL models: Multi-Layer Perceptron (MLP), Long Short-Term Memory (LSTM), and Convolutional Neural Networks (CNN). Using the NF-CSE- CIC-IDS2018-V2 and NF-BoT-IoT-V2 datasets, our methodology includes data pre-processing, feature normalization, and adjustment to a specific model such as changing the input. The evaluation shows that MTL-CNN model achieves perfect scores across multiple metrics: 100% accuracy, 100% precision, 100% recall, and 100% F1-score, as well as an execution time of 32.77 seconds. Although there is an increase in the time metric because of MTL compared to Single Task Learning(STL), MTL combined with the DL algorithm allows the model to learn faster with shared representation. This allows faster learning over time using knowledge learned from both datasets, resulting in better generalization and stronger attack detection.

Keywords: Convolutional Neural Network(CNN), Deep Learning(DL), Distributed Denial of Service (DDOS), Intrusion Detection, Long Short-Term Memory(LSTM), Multi-Layer Perceptron(MLP), Multitask Learning(MTL)
