ABSTRACT

The rapid expansion of Vehicular Ad Hoc Networks (VANET) and Cooperative Intelligent Transport Systems (C-ITS) has intensified the need for effective security mechanisms, particularly due to the constrained processing capabilities of these devices. Misbehaviour Detection Systems (MDS) are critical in safeguarding these networks from potential threats that can disrupts the normal functioning services. Although Machine Learning-based MDS (MLMDS) approaches have shown promising accuracy, their substantial computational complexity poses challenges for real-time implementation in resource-limited environments such as VANETs.

This study proposes a novel lightweight MDS method specifically designed for VANETs, utilizing a Cascaded Artificial Neural Network (ANN) architecture. The proposed model is subjected to be evaluated on BurST-ADMA dataset, under a 5 fold cross-validation framework. This dual-layered classification system is structured to enhance detection accuracy while minimizing computational demands, thus making it more suitable for deployment in environments with limited resources.

The simulation results demonstrate that the Cascaded ANN model achieves exceptional performance, with a perfect scores of 100% across all metrics on the BurST-ADMA dataset. Additionally, the model exhibits low system complexity, with minimal memory consumption and short simulation times. These findings confirm that the proposed model is both highly accurate and computationally efficient, making it well-suited for MDS deployment in resource-constrained VANET environments.

Keywords: VANET, C-ITS, MLMDS, Cascaded ANN, BurST-ADMA.