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Notice for the PhD Viva-Voce Examination

Ms Annie Christila S, Registration Number: 1840070, PhD Scholar at the Department of Computer Science, School of Sciences, CHRIST (Deemed to be University) will defend her PhD thesis at the public viva-voce examination on Saturday, 14 June 2025 at 11.00 am in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

Title of the Thesis	:	**An Improved Deep Learning Based DDoS Attack Detection and Classification in Software Defined Network Based Cloud Environment**
Discipline	:	**Computer Science**
External Examiner (Outside Karnataka)	:	**Dr Pranav Dass** Assistant Professor Department of Computer Science Shyam Lal College University of Delhi, Delhi - 110007 New Delhi
External Examiner (Within Karnataka)	:	**Dr Anand Kumar M** Associate Professor Department of Information Technology National Institute of Technology Surathkal, Mangalore - 575025 Karnataka
Supervisor	:	**Dr Sivakumar R** Associate Professor Department of Statistics and Data Science School of Sciences CHRIST (Deemed to be University) Bengaluru – 560029 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva-voce examination.

Registrar (Academics)

Place: Bengaluru
Date: 03 June 2025

ABSTRACT

In critical sectors like healthcare, banking, and other essential services, the need for secure and cost-efficient computing resources is paramount. Software Defined Networking (SDN) based Cloud computing emerges as a potential solution. SDN enables network traffic control and elastic resource management which is much needed in cloud environment to bring cost-effective solutions. The SDN-based cloud environment becomes susceptible to cyber threats, especially like that of Distributed Denial of Service (DDoS) attacks and other cyber-attacks that perturb the SDN-based cloud environment. The methods proposed in this study helps to identify and mitigate the DDoS attack security problem that occurs in a SDN based cloud environment. An ensemble model based on deep learning (DLEM-DDoS) was created to identify and categorize DDoS attack in SDN based cloud environment.

This model uses majority voting classifiers to classify incoming packets using an ensemble architecture that incorporates methods like Long Short-Term Memory, 1-D Convolutional Neural Network, and Gated Recurrent Unit. This research introduces a novel Multi-Layer Ensemble Deep Reinforcement Learning based DDoS Attack Detection and Mitigation (MEDR-DDoSAD) technique in Cloud-SDN Environment. In the presented technique, it transforms the input data into images and the features are derived via deep convolutional neural network based Xception model. Besides, the ensemble of deep Q-learning network (DQN) and fuzzy reinforcement learning (FRL) is used as a reward based classification model for processing the output from the previous layer. Finally, a fusion of various data samples at varying iterations takes place in the meta learner to reach the final decision..

Keywords: *Distributed Denial of Service (DDoS), Software Defined Network (SDN), Deep Learning based Ensemble Model (DLEM), Machine Learning (ML) , Multi-Layer Ensemble Deep Reinforcement Learning based DDoS Attack Detection and Mitigation (MEDR-DDoSAD), Deep Q-learning network (DQN), Fuzzy reinforcement learning (FRL)*

Publications:

1. **S. Annie Christila** and R. Sivakumar, "An Empirical Review of DDoS Attack Mitigation System on SDN Using Cloud Environment" in *Webology Journal*, vol. 19, pp. 283-284, 2020, **DOI**: 10.14704/WEB/V19I1/WEB19022.
2. **S. Annie Christila** and R. Sivakumar, "Reducing CPU Utilization & Improving Failover Time in Dual Controller SDN (Software Defined Network) Environment" in *International Journal on Recent and Innovation Trends in Computing and Communication*, vol. 11(9), pp. 1010–1018, 2023, **DOI**:10.17762/ijritcc.v11i9.8992.
3. **S. Annie Christila** and R. Sivakumar, "A Deep Ensemble Framework for DDoS Attack Recognition and Mitigation in Cloud SDN Environment" in *Journal of Computer Science*, vol. *20*(10), pp. 1281-1290, 2024, **DOI:** https://doi.org/10.3844/jcssp.2024.1281.1290.