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# Notice for the PhD Viva Voce Examination

Ms Sajitha I, Registration Number: 2072420, PhD Scholar at the Department of Computer Science and Engineering, School of Engineering and Technology, CHRIST (Deemed to be University) will defend her PhD thesis at the public viva-voce examination on Thursday, 14 May 2026 at 10.30 am in CDI Conference Hall, Block V, Bangalore Kengeri Campus, CHRIST (Deemed to be University),

**Title of the Thesis** : **Prediction Model for Measuring Post Disaster Building Damages Using Machine Learning Algorithms**

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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.

**Place:** Bengaluru

**Registrar (Academics)**

**Date:** 05 May 2026

# ABSTRACT

Natural disasters such as earthquakes, tsunamis, and floods are swift and severe events that occur across the world. It is crucial for emergency management and recovery efforts to document the distribution of damage as soon as a natural disaster occurs. Detecting building objects and accurately extracting their footprints from images of collapsed structures is a significant challenge in disaster assessment, urban planning, and remote sensing. This research introduces a deep learning-based framework that enhances building footprint localization and damage classification using pre- and post-disaster satellite imagery. The proposed Enhanced U-Net (EUnet), developed from a modified Siamese U-Net architecture, reduces inference time while maintaining accuracy, thereby enabling faster disaster assessment. The application of data augmentation and optimal thresholding further improves the detection of small buildings. To refine damage estimation, the Damage Estimation U-Net (DE-Unet) is designed by integrating a Damage Ratio Analyzer algorithm with the EUnet model, enabling accurate quantification of varying damage levels (no damage, minor damage, major damage, and destroyed) within affected regions. Additionally, the Damage Enhanced U-Net (DamageX-Unet) is developed by incorporating an Enhanced Connected Component Labelling (ECCL) algorithm with the EUnet model to improve classification performance. The ECCL algorithm is introduced Dynamic Thresholding and Union–Find data structure to boost precision and recall by accurately merging damaged building components. Evaluated on the xBD dataset, the proposed models outperform existing methods, demonstrating the potential of advanced segmentation and post-processing techniques in improving post-disaster building damage assessment. This framework will be invaluable for government disaster management agencies, insurance companies, and other related organizations.

***Keywords:*** *Deep Learning, Enhanced U-net, Building Damage Assessment, Satellite Imagery, Image Segmentation, Disaster Response.*

**Publications:**

1. **Sajitha I**, Rakoth Kandan Sambandam, and Saju P John. “Improvised Machine Learning Model for Extracting Building Footprints from Collapsed Images Using High-Resolution Remote Sensing Images” International Journal of Modeling, Simulation, and Scientific Computing, https://doi.org/10.1142/S1793962325410193.
2. **Sajitha I**, Rakoth Kandan Sambandam and Saju P John. “Advancing Building Damage Classification Accuracy through Machine Learning Based Model Design using High Resolution Remote Sensing Images”, International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems. 33(5), 665–683 (2025).
3. **Sajitha I**, Rakoth Kandan Sambandam and Saju P John. “Remote sensing data analyzed by machine learning to predict structural changes” Int J Syst Assur Eng Manag (2026). https://doi.org/10.1007/s13198-026-03199-8.
4. **Sajitha I**, Rakoth Kandan Sambandam and Saju P John. “A Comprehensive Review of Small Building Detection in Collapsed Images: Advancements and Applications of Machine Learning Algorithms” Proceedings of International Conference on Communication and Computational Technologies, Lecture Notes in Networks and Systems 1121, pp 429–438, 2024.
5. **Sajitha I**, Rakoth Kandan Sambandam and Saju P John. “Review on image processing- based building damage assessment techniques” Proceedings of Fourth Doctoral Symposium on Computational Intelligence, Lecture Notes in Networks and Systems 726, pp 863–882, 2023.
6. **Sajitha I**kkara, Rakoth Kandan Sambandam and Saju P John. “Evaluating Building Damage Classification Accuracy: A Benchmarking Study of UNet” 2025 IEEE International Conference on Next-Gen Technologies of Artificial Intelligence and Geoscience Remote Sensing (EarthSense), Hyderabad, India, 2025, pp. 1-4, doi: 10.1109/EarthSense66084.2025.11297371.