



Notice for the PhD Viva-Voce Examination

Ms Pooja S Dodamani, Registration Number: 1982409, PhD Scholar at the Department of Computer Science and Engineering, School of Engineering and Technology, CHRIST (Deemed to be University), Bangalore will defend her PhD thesis at the public viva-voce examination on Friday 19 September 2025 at 10.30 am in the Conference Room, Block I, Bangalore Kengeri Campus, Bengaluru - 560074, Karnataka, India.

Title of the Thesis	:	Classification of Osteoporosis Cases Using X-Ray Images Based on Modified Vision Transformer Model and Majority Voting
Discipline	:	Computer Science and Engineering
External Examiner - I	:	Dr Premanand Ghadekar Professor Department of Information Technology Vishwakarma Institute of Technology Bibwewadi, Pune – 411037, Maharashtra
External Examiner - II	:	Dr Vinod Chandra S S Professor Department of Computer Science, University of Kerala Thiruvananthapuram – 695581, Kerala
Supervisor	:	Dr Kanmani P Assistant Professor Department of Computer Science and Engineering School of Engineering and Technology Bangalore Kengeri Campus CHRIST (Deemed to be University) Bengaluru – 560074, Karnataka
Co-Supervisor	:	Dr Ajit Danti Professor (Former) Department of Computer Science and Engineering School of Engineering and Technology Bangalore Kengeri Campus CHRIST (Deemed to be University) Bengaluru – 560074, 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.

Place: Bengaluru
Date: 11 September 2025

Registrar (Academics)

ABSTRACT

In this study, the Oxray database was meticulously developed by adhering to established medical guidelines. The research focuses on an advanced automated semantic segmentation technique aimed at the localization and extraction of bone regions from digital X-ray images, primarily to enhance the detection of osteoporosis. The suggested system makes use of an attention-modulated Multi-Res U-Net architecture, with a critical pre-processing step that employs grey wolf optimisation (GWO)-guided non-local means (NLM) denoising to boost picture clarity. The research also explores cutting-edge models for picture segmentation and classification, which use improved versions of Pix2Pix and the Vision Transformer (ViT) setup. The enhanced Pix2Pix model is particularly noted for its efficacy in reducing false positives, achieving a specificity of 97.24%. The MViT-B/16 variation in particular stands out among the modified ViT models for its exceptional accuracy, which reaches 96.01% when it comes to osteoporosis case classification. The methodology is validated through extensive experiments and benchmarked against standard metrics such as precision, recall, F1 Score, specificity, and total accuracy, showcasing its significance in diagnosing osteoporosis for early detection and intervention. This integration of advanced segmentation techniques and cutting-edge classification models not only advances the field of medical image analysis but also highlights its potential impact on improving overall healthcare practices, particularly in the critical area of osteoporosis diagnosis and treatment.

Keywords: *Medical image analysis, Healthcare improvement, Grey Wolf Optimization (GWO), Early diagnosis, Osteoporosis detection.*

Publications:

1. **Pooja S Dodamani**, and Ajit Danti. "Assesment of Bone Mineral Density in X-ray Images using Image Processing." 2021 8th International Conference on Computing for Sustainable Global Development (INDIACom). IEEE, 2021.
2. **Pooja S Dodamani**, Danti, A., Dodamani, S., & Patil, V. "OXRAY: Database to Diagnose Osteoporosis Condition and Classify using Transformer." 2023 Special Issue on Carbon Nanotubes, Bridging Material Science, Chemistry, Computer, and Engineering. European Chemical Bulletin, 2023.
3. **Pooja S Dodamani**, and Ajit Danti. "Diagnosis of Osteoporosis from X-ray Images using Automated Techniques." 2022 International Conference on Machine Learning, Big Data, Cloud and Parallel Computing (COM-IT-CON). Vol. 1. IEEE, 2022.
4. **Pooja S Dodamani**, and Ajit Danti. "Grey Wolf Optimization Guided Non-Local Means Denoising for Localizing and Extracting Bone Regions from X-Ray Images." Biomedical and Pharmacology Journal 16.2 (2023).
5. **Pooja S Dodamani**, Ajit Danti. "Transfer Learning-Based Osteoporosis Classification Using Simple Radiographs". International journal of online and biomedical engineering June Vol. 19 No. 08 (2023).
6. **Pooja S Dodamani**, Kanmani P, Ajit Danti. "Novel Approach for Osteoporosis Classification Using X-ray Images". Biomedical and Pharmacology Journal Special Issue (2025).