**CHEST X-RAY CLASSIFICATION USING DEEP LEARNING**

Sasmita Sahoo1, Mamali Sahoo1, Prangya Paramita Pani1, Omm Prasad Singh1,

Dr. Chinmayee Dora2, Dr. Sujata Chakravarty1

1Department of Computer Science and Engineering, Centurion University of Technology and Management, Odisha, India

2Department of Electronics and Communication Engineering, Centurion University of Technology and Management, Odisha, India

A global health challenge has been created by the widespread growth of diseases like pneumonia, lung cancer, COVID-19, and heart abnormalities. However, the traditional manual analysis of chest X-ray images by medical professionals requires expertise, which is also highly prone to human error and may result in delays in patient care. The rapid and accurate identification of these diseases becomes crucial to stopping their spread and guaranteeing early treatments. So this research of chest X-ray classification system aims to dramatically increase diagnostic efficiency and accuracy in clinical settings. Our comprehensive approach integrates  preprocessing, feature extraction, and advanced deep learning techniques such as convolutional neural networks (CNNs) and transfer learning by utilizing the Covid-19 repository dataset of 299x299 high-resolution images and metadata. It includes multi-filter contrast enhancement, Bayesian-optimized deep learning with EfficientNet-B0 and MobileNet-V2 models, feature fusion and Grad-CAM visualization for infection localization. High accuracy of 97.3% was achieved by MobileNetV2 whereas 97% was achieved by EfficientNetB1 in the detection of COVID-19 X-ray images.Thorough evaluation and hyperparameter optimization plays an essential role in the effective classification of these kinds of scenarios. The study offers encouraging results and enhances healthcare solutions by emphasizing the potential emerging deep learning techniques and their integration to medical image analysis.

Keywords: Deep Learning, Convolutional neural networks(CNN), chest X-ray, Covid-19,

Optimization, MobileNetV2, Feature Extraction, multilabel classification.