

ABSTRACT

Tuberculosis is an infectious disease caused by bacteria. Tuberculosis is spread through the air and saliva that contain mycobacterium tuberculosis. If not treated immediately, it can spread to other vital organs, such as the heart and liver, and can even lead to death. In the medical field, datasets of sick people are smaller compared to datasets of healthy people. This study aims to address this gap by employing Ensemble Learning for Tuberculosis detection with chest X-ray images, specifically focusing on combining Support Vector Machine (SVM) and Random Forest classifiers. The primary objective is to assess the efficacy of Ensemble Learning, with the Voting Classifier, in enhancing Tuberculosis detection accuracy compared to standalone Machine Learning classifiers or Deep Learning models. The research methodology involves data acquisition, preprocessing using CLAHE and model training with SVM and Random Forest classifiers with hyperparameter tuning. These individual models are then evaluated and compared based on performance metrics such as accuracy, Area Under Curve, specificity, sensitivity, Confusion Matrix, and computational efficiency. By leveraging the power of Ensemble Learning, this study aims to contribute to the development of robust Tuberculosis detection systems, with potential applications in clinical settings where accurate and efficient Tuberculosis diagnosis is critical for patient care. This study reach 99.40% of accuracy, 99.97 of AUC, and 0.0436 of loss. this method tackling others method that using deep learning and single machine learning with all balanced dataset.

Keywords: *Tuberculosis, Ensemble Learning, Machine Learning, Voting Classifier, CLAHE.*