Osteoporosis Detection with Ensemble Learning

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Abstract:

The skeletal disorder known as osteo- porosis appears as reduced bone density coupled with elevated bone fracture hazards yet most people experience this condition without diagnosis before they develop fractures. The timely detection of osteoporosis remains crucial to decrease its impact on patients along with improving their quality of care. The objective of this research paper examines ensemble learning techniques for osteoporosis detection through the development of multiple machine learning methods to boost diagnostic precision. This research analyses Ensemble methods specifically Random Forests Boosting and Bagging as solutions to address the detection challenges of osteoporosis that include imbalanced classes and high-dimensional clinical and imaging data. Through our research we analyse datasets that contain BMD measurements as well as demographic data and imaging input which we apply to multiple ensemble-based approaches. The research compares different ensemble algorithms to determine their best performance in the detection of osteoporosis. The results indicate that ensemble learning techniques boost both the precision and robustness of the osteoporosis diagnosis therefore providing health care professionals with promising diagnostic tools.

Keywords:

Deep learning, ensemble learning, neural networks, x-rays.