

# **Spine X-Ray-Based Osteoporosis Detection Using Deep Learning Techniques**

## **ABSTRACT**

Bone fractures are common in elderly patients due to osteoporosis, a prevalent metabolic bone disease in this population. While early diagnosis is possible, current techniques (such as DEXA, QCT, etc.) are often expensive and invasive. This project proposes a less complex deep learning model to predict osteoporosis using grayscale images of human spine X-rays. The VGG16 CNN architecture is applied for feature extraction, and the extracted features are classified using a Feedforward Neural Network (FNN). The database for this project was obtained from publicly accessible archives. The results demonstrate high accuracy, supporting the effectiveness of the proposed model that integrates VGG16 with FNN for an automatic osteoporosis diagnostic system. Specifically, this imaging-based approach offers an alternative for early diagnosis at lower costs and with less invasiveness, ultimately improving diagnostic effectiveness and enhancing patient care.

### **Keywords:**

Osteoporosis detection, Spine X-ray images, VGG16 architecture, Feed-Forward Neural Network (FNN), Deep learning in healthcare, Non-invasive diagnosis.

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