ABSTRACT

The current international gold standard method for diagnosing osteoporosis is Dual Energy X-ray Absorptiometry (DEXA), which still has several limitations as the standard for bone density examination, including inaccuracies in certain conditions, size limitations, and radiation exposure of 1 to 3 mrad per measurement. Therefore, this research aims to develop a prototype for bone density testing using ultrasonographic spectroscopy technology as an alternative to address these challenges.

This research consists of several stages, starting from needs analysis, specification determination, solution design, implementation, and system testing. In the needs analysis stage, it was decided to design a system that can classify bone model density, acquire data in less than 1 minute, and perform measurements easily. Subsequently, testing was conducted with the assistance of machine learning using the random forest method.

The test results showed that the developed prototype can meet all aspects of the system design accurately. The use of ultrasonographic spectroscopy technology as a method for bone model density testing indicates that this method can be further developed with various customized parameters to meet future medical needs.

Keywords: ultrasonographic spectroscopy, random forest, bone model, DEXA, density testing, machine learning.