

ABSTRACT

In this capstone design, we present a crucial problem faced by the public in maintaining dental health, specifically related to pulpitis. Pulpitis is an inflammation of the dental pulp tissue that can be caused by various factors such as bacterial infection, trauma to the tooth, or tooth decay. We responded to this challenge by creating an innovative solution to detect pulpitis and distinguish it from healthy teeth. This solution is expected to help dental professionals diagnose and treat pulpitis more effectively.

The method we applied in this study is pulpitis disease detection using voice signals with machine learning algorithms. The study population included civilians with pulpitis disease. We approached this method by recording the patient's teeth tapping. The application of machine learning is vital in data processing, enabling rapid detection of pulpitis disease at an affordable cost. However, we also faced challenges, such as the difficulty in distinguishing the pitch of an individual's speech which may remain the same both when healthy and when suffering from pulpitis disease.

Based on the data we collected from the test results, the CNN1D model without the addition of MFCC showed the best performance with hyperparameter Adam, learning rate 0.001, epoch 300, batch size 8, and test size 0.4. Meanwhile, the CNN1D model with the addition of MFCC also showed the best performance with the same hyperparameters but with batch size 32 and test size 0.2. Model evaluation is done using a confusion matrix to assess the model's ability to predict based on sound. The implementation of machine learning in pulpitis disease detection through sound signals can help health workers diagnose the condition with a significant level of accuracy. The dataset used in this study is a dataset of 90 pulpitis teeth and 90 healthy teeth. The sound recording is the result of tapping the teeth collected with the help of a validated medical team from the Faculty of Dentistry, Padjadjaran University.

Keywords: Data, teeth, machine learning, method, pulp, pulpitis, MFCC