ABSTRACT

DENTAL CARIES DETECTION USING FASTER REGION-BASED CONVOLUTIONAL NEURAL NETWORK (FASTER R-CNN) WITH RESNET

Oleh

Andre Citro Febriliyan Lanyak

19102274

According to the Global oral health status report by WHO dental caries is the highest prevalent dental disease in the world by 2022. Caries can be stopped by early detection of patients through efficient screening. Object detection is a machine learning or artificial intelligence method used to detect an object in an image and provide accurate localization of the object. In the health and medical industry, the accuracy of detection of a disease is very important and forms the basis of decisions to be made to treat the disease. Although an expert is an expert in their field, the reality is that experts can sometimes make mistakes. There are several factors for misdiagnosis ranging from limitations in memory, age of the expert, to human error. This research aims to develop a dental caries detection system that can detect dental caries in intraoral images. Using a dataset collected from scraping on Google Image with the keyword "Dental Caries", the proposed method starts by creating an original dataset consisting of 81 base images which are then augmented to a total of 486 images and annotated by dental health experts from Jenderal Soedirman University. Transfer Learning Faster Region-Based Convolutional Neural Network (Faster R-CNN) with ResNet-50 and ResNet-101 is presented with the aim of training and testing the dataset to detect and localize the position of dental caries. The results in this study compare the Faster R-CNN ResNet-50 and ResNet-101 models. The Faster R-CNN ResNet-50 model trained using the adam optimizer produced a mAP (mean average precision) of 0.213, and the one using the momentum optimizer produced a mAP of 0.177. While the Faster R-CNN ResNet-101 model trained using the adam optimizer produces a mAP of 0.192, and the one using the momentum optimizer produces a mAP of 0.004. Faster R-CNN ResNet-50 and ResNet-101 trained on the dataset showed satisfactory results in detecting dental caries, especially for the ResNet-50 model with adam optimizer. The application of Faster R-CNN to help detect caries-affected teeth can reduce diagnostic effort by saving examination time and enabling automated screening documentation.

Kata kunci : *Faster R-CNN, CNN, Teeth, Dental Caries, ResNet, Object Detection*