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Paper Title: Preprocessing Technique for Oral Lesion Classification using U-NET Segmentation

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Abstract

This project aims to use deep learning techniques to segment oral lesions in medical images for use as a pre-processing step in a classification model. Due to the complexity of oral lesions with undefined margins and dynamic shapes, and the limited amount of data certified by dentists, this approach was found to be underfitting and unsatisfactory. To improve the accuracy of the model, a new approach was proposed to segment interferences such as teeth from the images. This allows the model to better focus on the oral lesions. To achieve this goal, we implemented

U-net models with different additional Convolutional Neural Networks (CNN) backbones, including DenseNet 121, EfficientNet B3, VGG 19, Resnet 18, Seresnet 18, Resnext 50, Inception V3, Mobilenet V2 and Seresnext 50. A segmentation model was trained with five classes of oral lesions: leukoplakia, pseudomembranous candidiasis, lichen planus, ulcer, and other white lesions. The results showed that DenseUNet and EfficientUNet achieved the highest validation and Intersection over Union (IoU) scores of 98% and 92%, respectively. Our proposed approach effectively segmented the interferences from the images, demonstrating the success of these models in handling the approach. Subsequently, a CNN model of DenseNet 121 was employed for classification. The training accuracy achieved 99.1%, while the validation and test accuracies reached 86.1% and 75.5%, respectively.
