

Early Detection of Diabetic Foot Ulcers Using Image Classification and Segmentation

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Abstract

One of the most severe complications of diabetes is the Diabetic Foot Ulcers (DFUs). Otherwise, they may cause infection, or even amputation. The timely diagnosis is vital to successful treatment and avoiding acute health conditions. Old ways of diagnosis rely on clinical examination by experts, which may be lengthy, subjective, and even inaccessible in the rural or remote regions. The project presents a deep learning solution that is based on the automatic detection, segmentation, and classification of diabetic foot ulcers based on Convolutional Neural Network (CNN) architectures. YOLOv8 is employed in detection, and U-Net is employed in segmentation. The system is trained with DFU_4Class (Wagner-Meggitt) data, that contains different ulcer cases which are divided into None, Infection, Ischemia, and Both. The given model gives an opportunity to analyze ulcers early, accurately, and automatically by using images taken by cameras or smartphones. It is developed to be efficient and lightweight and can be deployed on the web platforms and is suitable in a clinical and telehealth environment.

Keywords

Diabetic Foot Ulcer, YOLOv8, U-Net, Deep Learning, Image Segmentation, Medical Imaging.

