Segmentation of Diabetics Foot Ulcers Using Deep Learning: A Sri Lankan Study

W.R.G.A.D.P. Herath[1], V. Vinoharan[2] and S. Bramyah[1]
[1] *Department of Physical Science, Faculty of Applied Science, University of Vavuniya, Sri Lanka*
[2] *Department of ICT, Faculty of Technological Studies, University of Vavuniya, Sri Lanka*

Abstract: Segmentation of Diabetics Foot Ulcers Using Deep Learning: A Sri Lankan Study Abstract Diabetes is a chronic metabolic disorder that affects millions of people worldwide, including in Sri Lanka, and often leads to severe complications such as diabetic foot ulcers (DFUs). DFUs are a serious condition caused by nerve damage, reduced blood flow, and a weakened immune response, all of which impair the healing process. Without timely and accurate detection, DFUs can become infected, potentially resulting in amputation. This research aims to improve the segmentation of DFUs in medical imaging by employing advanced pre-trained deep-learning techniques, providing clinicians with a reliable tool for monitoring ulcer progression and enhancing patient care. Data for this study was collected from 180 patients at Dambulla Base Hospital in Sri Lanka, resulting in a dataset of 300 samples that captured various aspects of ulcers. Ethical approval was obtained from the University of Vavuniya's Ethics Review Committee. Following preprocessing, manual annotation, and data augmentation, a total of 1,652 images were utilized for training. The study employed the pre-trained Segment Anything Model (SAM), a vision transformer-based model, to enhance segmentation accuracy and generalization. The model was specifically trained on the Sri Lankan dataset, achieving a Dice Similarity Coefficient of 83.31%, a Specificity of 99.73%, and a Precision of 90.42%. These metrics demonstrate the model's effectiveness in accurately segmenting DFUs, underscoring the potential of pre-trained models like SAM in improving DFU segmentation and supporting better clinical decision-making. This study highlights the importance of using advanced deep-learning models tailored to specific populations, ultimately contributing to improved management and outcomes for patients with diabetic foot ulcers in Sri Lanka. Keywords: Diabetics Foot Ulcers, Segmentation, Segment Anything Model, Sri Lankan stud.

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