WoundView: A Novel Comprehensive Tool Utilizing Machine Learning Models for Remote, Cost-Effective, Real-Time Wound Risk Assessment

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Wound care management is a major medical challenge, causing significant clinical, social, and economic burden. To address this, I developed WoundView, an AI-powered app for real-time wound assessment. WoundView uses a wound image to provide a risk score and generates tailored treatment plan using advanced Large Language Models (LLMs). I used three distinct, publicly-available datasets, consisting of more than 4,000 images. For wound classification, a full image classifier using the Convolutional Neural Network model (ResNet34) was developed, classifying among 18 types of wounds. To enable accurate wound segmentation, a SAM2.1 model was fine-tuned to precisely identify the region of interest. This segmentation was used to analyze the wound's color composition, a key factor in the diagnostic process. The classification model achieved an F1-score of 92-99%, and the segmentation model achieved ~69% Intersection over Union (IoU). The outputs from classification and segmentation were used to prompt an LLM to generate both a wound risk severity score and a tailored treatment plan. Since no standardized wound severity scale exists, I developed a novel scoring system, Wound Risk Assessment Score (WRAS) based on existing scientific literature. The score incorporates demographics and comorbidities to enhance WoundView's accuracy. To assess the performance of the LLMs, six OpenAI models (basic GPTs and WRAS-integrated GPTs+) were compared for 10 cases. Physicians evaluated the responses, identifying models using WRAS as more reliable for clinical use. WoundView demonstrates the potential of AI to enhance wound care through accessible, cost-effective, and accurate assessments, empowering both medical professionals and patients.

Awards Won: