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Intelligent Detection of Varicose Veins to Enhance Diagnostic Accuracy via AI-Based Image Analysis

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Abstract: Varicose veins, a prevalent chronic condition indicated by enlarged and twisted veins, are often undiagnosed in the early stages, particularly in rural and underserved regions. This study presents an AI-based diagnostic system for the intelligent disclosure of varicose veins using the use of deep learning methods implemented to perform medical image analysis. By leveraging the You Only Look Once (YOLO) object detection framework, enhanced with EfficientNet feature extraction, our model demonstrates high accuracy in identifying affected regions in leg images. A curated dataset of over 2,500 labelled images, classified into normal and infected categories, was used to train and validate the model. The system supports image uploads, allowing monitoring and facilitating early detection. The results indicate an improvement in diagnostic precision and a potential reduction in diagnostic costs by up to 80%, making it a viable tool for aiding clinical decision-making and prioritizing patients for further investigation, such as Doppler ultrasound. The proposed approach aims to bridge the diagnostic gap in resource-limited settings by offering a scalable, accessible, and cost-effective solution for varicose vein detection.

Keywords: Varicose veins, YOLO, EfficientNet, Computer-aided diagnosis, Deep learning, Vein detection, AI in healthcare



