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Comparing UNET architectures in blood vessel segmentation task

Advancements in UNet architectures have been pivotal in medical image segmentation, particularly for blood vessel segmentation, which is crucial for medical diagnosis and treatment. This article presents a comprehensive comparative study of various UNet models, examining their effectiveness in blood vessel identification within medical imaging. We explore the evolution of these models from the original UNet to advanced architectures like Swin UNetR, emphasizing their application in segmenting complex structures. Methodologically, we integrate different encoder architectures within the UNet++ framework with a decoder attention mechanism to evaluate their segmentation performance. Through both qualitative and quantitative analyses, we reveal significant performance differences across models and discuss the implications of these findings for clinical practice. The study underscores the importance of precision, recall, accuracy, and other metrics in determining model efficiency and highlights the potential of hybrid models that combine convolutional and transformer-based approaches. As we move forward, the goal is to refine these models for broader and more effective use in medical diagnostics, thereby enhancing patient care.

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