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Perspective

Recent Advancements in Medical Imaging Segmentation

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DESCRIPTION

Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and radionuclide imaging are common techniques for visualizing tumors. Doctor's experience, accountability, and awareness are crucial for the identification of medical photographs, thus it takes a lot of work for them to properly review each image. In the meantime, severe weariness brought on by prolonged mechanical and repetitive labor also leads to medical professionals making poor decisions. Currently, utilizing computer technology to aid in tumor diagnosis has progressively emerged as a research hotspot, helping physicians diagnose tumors more quickly and accurately.

Artificial intelligence is being applied in more and more ways which provides big data technology and the ongoing advancements in computer and medical imaging technologies as well as increased processing power. These days, automated medical image processing is a vital technological tool for clinical diagnosis, medical research, and patient care. Simultaneously, deep learning-based medical image segmentation has advanced quickly. A number of effective segmentation models have been put forth one after the other.

Convolutional networks, in particular, are deep learning algorithms that have swiftly taken the lead in the analysis of medical picture data. The deep learning-based model is faster and more accurate than the manual segmentation method, which can significantly lessen the workload for clinicians. Deep learning-based medical picture segmentation has grown to be a significant area of study in the field of computer vision, in which numerous domestic and international academics having examined it.

There is a great deal of inter-reader variability in the reading and interpretation of medical pictures since in current clinical practice, the accuracy of the detection and diagnosis of malignancies and/or many other diseases rely on the skill of individual clinicians (e.g., radiologists, pathologists). Numerous Computer-Aided Detection and diagnosis (CAD) schemes have been created and tested with the goal of helping physicians make more accurate and objective diagnostic decisions by helping them scan medical pictures more quickly. This is a response to the clinical situation at hand. This approach's scientific justification is that a number of challenges faced by clinical practitioners, such as the wide variations in clinician's levels of expertise, the possibility of human expert fatigue, and insufficient funding for healthcare, can be addressed by employing computer-aided quantitative image feature analysis.

There is still a close relationship between Computer Vision (CV) and medical image analysis despite the specifics of the field. Therefore, automatic analysis of medical pictures has likewise reflected the shift in the standard CV method. Convolutional Neural Network (CNN) has been one of the most influential image processing frameworks since deep learning changed the course of CV development. This is in line with earlier attempts to use CNN for visual tasks including detection and segmentation on a variety of medical image modalities, including Computed Tomography (CT), Ultrasound (US), and Magnetic Resonance Imaging (MRI). In local feature extraction, the convolution operation—which served as the foundation for most CNNs proved to be highly effective.

The newest field of study is automated disease identification from medical imaging using deep learning. A summary of the numerous medical image datasets used to segment diseases and the performance criteria applied to assess the effectiveness of the image segmentation algorithm are also given. The research delves into the various obstacles encountered during the deep network segmentation of medical pictures and examines the latest approaches to surmount these issues. Deep learning is becoming increasingly relevant in picture segmentation due to technological advancements. The current study will assist researchers in developing neural network designs for disease diagnosis in the medical domain. Additionally, the researchers will learn about the state-of-the-art approaches and potential difficulties in the field of deep learning-based medical image segmentation.

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