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Advances in Medical Image Processing, Segmentation and Classification

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Medical data typically include physiological signals, diagnostic images, and treatment histories, offering essential insights into patient conditions and outcomes. Computer-aided diagnosis (CAD) systems—used for detection, segmentation, and classification—are now key components of clinical workflows. These systems apply image processing techniques to ensure accurate analysis across CT, MRI, X-ray, and ultrasound scans. Artificial intelligence (AI), especially machine learning and deep learning, has further advanced CAD by enabling automated, accurate disease detection. Yet, the success of such models depends on large, annotated datasets and expertise in preprocessing, modeling, and validation. AI-driven CAD systems have shown strong potential in diverse clinical settings. Future work should prioritize multi-center data sharing, federated learning, few-shot learning, and explainable AI to enhance reliability and adaptability. Integrating AI with technologies like the Internet of Medical Things (IoMT) opens doors to real-time, scalable diagnostics. With continued innovation and rigorous validation, AI is set to become an essential part of clinical decision-making. This volume presents cutting-edge research and strategies to address current gaps, aiming to improve patient outcomes and advance global healthcare systems.

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