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Multi-sensor Fusion in Medical Imaging, Diagnosis and Therapy

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Multi-sensor fusion plays an important role in medical imaging, diagnosis and therapy. Recently, with the advancement of various imaging modalities such as ultrasound, computer tomography (CT), magnetic resonance imaging (MRI) and positron emission tomography (PET), the fusion of various imaging data has aroused great interest among researchers. Effective fusion algorithms significantly influence the quality of fused data, thereby affecting final diagnoses and chosen therapies. Traditional fusion methods based on sparse representation and multi-scale decomposition have been explored in depth. Deep learning-based fusion methods can generally deliver efficient data fusion by combining the convolutional neural network or transformer and unsupervised loss function. As part of the research on fusion methods, great efforts have been made to explore the application of fusion methods in disease diagnosis and therapy, such as PET-CT fusion for lung cancer detection and MR-ultrasound fusion for targeted prostate biopsy.

