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Medical image fusion: applications, approaches and evaluation

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Medical image processing is a rapidly growing area of research for the last three decades. X-ray, ultrasound, MRI (magnetic resonance imaging) and CT (computed tomography) are a few examples of medical imaging sensors which are used for extracting clinical information. ese sensors provide complementary information about patient's pathology, anatomy, and physiology. For example, CT is widely used for tumor and anatomical detection, whereas information about so tissues is obtained by MRI. Similarly, other medical imaging techniques like fMRI (functional magnetic resonance imaging), PET (positron emission tomography), SPECT (single positron emission computed tomography) provide functional and metabolic information. Further, T1-MRI image provides details about anatomical structure of tissues, whereas T2-MRI image gives information about normal and abnormal tissues. Hence, one can easily conclude that none of these modalities is able to carry all relevant information in a single image. erefore, multimodal medical image fusion is required to obtain all possible relevant information in a single composite image for better diagnosis and treatment. Spatial and transform domain approaches have been widely used for medical image fusion. ese techniques include PCA (principal component analysis), linear fusion etc., and multiresolution fusion scheme using wavelet and pyramid transforms. Subjective and objective evaluations are the two possible ways to assess fusion algorithms. Subjective evaluation can be performed by medical experts, whereas for objective

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