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Implementation and Comparative Analysis of PET and CT Image Fusion Algorithms

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Abstract : Medical imaging modalities are becoming life saving components. These modalities are very much essential to doctors for proper diagnosis, treatment planning and follow up. Some modalities provide anatomical information such as Computed Tomography (CT), Magnetic Resonance Imaging (MRI), X-rays and some provides only functional information such as Positron Emission Tomography (PET). Therefore, single modality image does not give complete information. This paper presents the fusion of structural information in CT and functional information present in PET image. This fused image is very much essential in detecting the stages and location of abnormalities and in particular very much needed in oncology for improved diagnosis and treatment. We have implemented and compared image fusion techniques like pyramid, wavelet, and principal components fusion methods along with hybrid method of DWT and PCA. The performances of the algorithms are evaluated quantitatively and qualitatively. The system is implemented and tested by using MATLAB software. Based on the MSE, PSNR and ENTROPY analysis, PCA and DWT-PCA methods showed best results over all experiments.

Keywords : image fusion, pyramid, wavelets, principal component analysis
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