

Wavelet-based medical image fusion via a non-linear operator

ABSTRACT

Medical image fusion has been extensively used to aid medical diagnosis by combining images of various modalities such as Computed Tomography (CT) and Magnetic Resonance Image (MRI) into a single output image that contains salient features from both inputs. This paper proposes a novel fusion algorithm through the use of a non-linear fusion operator, based on the low sub-band coefficients of the Discrete Wavelet Transform (DWT). Rather than employing the conventional mean rule for approximation sub-bands, a modified approach is taken by the introduction of a non-linear fusion rule that exploits the multimodal nature of the image inputs by prioritizing the stronger coefficients. Performance evaluation of CT-MRI image fusion datasets based on a range of wavelet filter banks shows that the algorithm boasts improved scores of up to 92% as compared to established methods. Overall, the non-linear fusion rule holds strong potential to help improve image fusion applications in medicine and indeed other fields.

Keyword: Medical image fusion; Non-linear fusion operator; Wavelet transforms; Medical imaging