Wavelets improve medical imaging

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An approach to converting the data from MRI (magnetic resonance imaging) machines, mammograms and other medical equipment gives doctors a much clearer picture of your insides and a chance to detect disease and other problems earlier, according to research published in the *International Journal of Biomedical Engineering and Technology*. The technique known as the wavelet transform was first reported in 1910, but it was during the early 1990s that its applications in medicine and biomedical research first emerged and it is now reaching maturity as a technique to supplement or even displace conventional analytical methods.

The conventional approach to processing imaging data from medical scanners is to apply a computer algorithm, a Fourier transform, which converts the raw signals into a format that can be displayed as an image on the computer screen to reveal brain damage, detect tumors and look for defects in the heart and for countless other diagnostic reasons. The Fourier transform is a powerful tool but Satya Singh and Shabana Urooj of the Gautam Buddha University, in Uttar Pradesh, India, suggest that an alternative signal processing system based on an analysis of "wavelets" could improve medical imaging significantly. They point out that a wavelet transform applied to the raw imaging data would boost the signal to noise ratio for the data by ignoring many of the artifacts generated by interfering electrical signals and waves present in the body and picked by the scanner.

The team reports that the same wavelet transform approach could have applications not only in MRI but in simplifying electrocardiography, de-

noising biomedical images and in facilitating and functional neuroimaging, including positron emission tomography and functional MRI (fMRI). The latter requiring data processing in real-time so that live images can be recorded and studied. In addition, the wavelet transform produces a much smaller digital file than conventional processing, which means faster data transfer and lower storage requirements per scan.

More information: Singh, S.P. and Urooj, S. (2015) 'Wavelets: biomedical applications', *Int. J. Biomedical Engineering and Technology*, Vol. 19, No. 1, pp.1-25.

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