Towards New Multiwavelets: Associated Filters and Algorithms. Part I: Theoretical Framework and Investigation of Biomedical Signals, ECG and Coronavirus Cases

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Abstract

Biosignals are nowadays important subjects for scientific researches from both theory, and applications, especially, with the appearance of new pandemics threatening the humanity such as the new Coronavirus. One aim in the present work is to prove that Wavelets may be a successful machinery to understand such phenomena by applying a step forward extension of wavelets to multi-wavelets. We proposed in a first step to improve multi-wavelet notion by constructing more general families using independent components for multi-scaling, and multi-wavelet mother functions. A special multi-wavelet is then introduced, continuous, and discrete multi-wavelet transforms are associated, as well as new filters, and algorithms of decomposition, and reconstruction. The constructed multi-wavelet framework is applied for some experimentations showing fast algorithms, ECG signal, and a strain of Coronavirus processing.

Full Text

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