GRAPH SIGNAL PROCESSING AND WAVELET PACKETS

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Nowadays graphs became of significant importance given their use to describe complex system dynamics, with important applications to real world problems, e.g. graph representation of the brain, social networks, biological networks, spreading of a disease, etc.. In this work we introduce a novel graph wavelet packets construction, to our knowledge different from the ones known in literature. We get inspired by the Spectral Graph Wavelet Transform defined by Hammond et all. in [1], based on a spectral graph wavelet at scale $s > 0$, centered on vertex n, and a spectral graph scaling function, respectively. Moreover after defining the wavelet packet spaces, and the associated tree, we obtain a dictionary of frames for $\mathbb{R}^N$, with known lower and upper bounds. We will give some concrete examples on how the wavelet packets can be used for compressing, denoising and reconstruction by considering a signal, given by the fRMI (functional magnetic resonance imaging) data, on the nodes of voxel-wise brain graph $\mathcal{G}$ with 900.760 nodes (representing the brain voxels) defined in [2]-[3].

References

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