Spectral wavelet packets frames for signals on finite graphs

Sandra Saliani

Classical wavelet, wavelet packets and time-frequency dictionaries have been generalized to the graph setting, the main goal being to obtain atoms which are jointly localized both in the vertex domain (the analogue of the time domain for signals on the real line) and the graph spectral domain (the analogue of the frequency domain).

We present a new method to generate frames of wavelet packets defined in the graph spectral domain to represent signals on weighted graphs.

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 [**1**]-[**2**].

Joint work with Iulia Martina Bulai.

References

[1] Anjali Tarun, David Abramian, Martin Larsson, Hamid Behjat, and Dimitri Van De Ville, Voxel-Wise Brain Graphs from Diffusion-Weighted MRI: Spectral Analysis and Application to Functional MRI, preprint (2021).

[2] Anjali Tarun, Hamid Behjat, Thomas Bolton, David Abramian, Dimitri Van De Ville, (2021) Structural mediation of human brain activity revealed by white-matter interpolation of fMRI, NeuroImage 213 (2020) 116718.

Dipartimento di Matematica, Informatica ed Economia, Università degli Studi della Basilicata, Viale dell'Ateneo Lucano 10, 85100 Potenza, ITALIA

Email address: sandra.saliani@unibas.it