Computer Science > Learning

Multivariate Temporal Dictionary Learning for EEG

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This article addresses the issue of representing electroencephalographic (EEG) signals in an efficient way. While classical approaches use a fixed Gabor dictionary to analyze EEG signals, this article proposes a data-driven method to obtain an adapted dictionary. To reach an efficient dictionary learning, appropriate spatial and temporal modeling is required. Inter-channels links are taken into account in the spatial multivariate model, and shift-invariance is used for the temporal model. Multivariate learned kernels are informative (a few atoms code plentiful energy) and interpretable (the atoms can have a physiological meaning). Using real EEG data, the proposed method is shown to outperform the classical multichannel matching pursuit used with a Gabor dictionary, as measured by the representative power of the learned dictionary and its spatial flexibility. Moreover, dictionary learning can capture interpretable patterns: this ability is illustrated on real data, learning a P300 evoked potential.

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