A new EEG Signal Compression Scheme Based on ICA and Waaves

Imen DHIF[1,2], Khalil HACHICHA[1], Andrea PINNA[1], Sylvain HOCHBERG[2] and Patrick GARDA[1]
[1]Sorbonne Université, UPMC Univ Paris 06, LIP6, Paris, France
[2]CIRA, 11 rue Charcot Puteaux, France

Email : imen.dhif@lip6.fr

Abstract
An electroencephalogram (EEG) is a measurement of the electrical activity occurring in the brain over a period of time. It is used to diagnose different pathologies related to the human brain. However, due the lack of neurophysiologists who can diagnose EEG exams, this task is becoming more difficult to achieve. Therefore, the EEG signal compression would be efficient to reduce the amount of data and then transmit EEG signals more efficiently.
In our work, we propose a new compression scheme for EEG signals based on the Independent Component Analyses (ICA) and WAAVES compression algorithm. Before compression with Waaves coder, EEG signals are uncorrelated using ICA, then scaled and arranged into 2D-matrix. After compression, the residu is calculated and compressed to minimize the error of the lossy compression scheme. A variant compression architecture is tested to maximize the compression ratio (CR=43.79) and minimize the Percentage Root-Mean-Squared Difference (PRD=7.09%) to preserve a diagnostic quality.