PATTERN RECOGNITION IN EPILEPTIC EEG SIGNALS VIA DYNAMIC MODE DECOMPOSITION

JONG-HYEON SEO

Abstract. In this work, we apply a dynamic mode decomposition (DMD) to epileptic EEG data to figure out the spatio-temporal patterns in the data. It is found that some patterns with high frequency have direct influence on the epileptic seizure, and instantaneously capture the abnormal patterns of the neuron firing with high precision. We prepare an ictal and interictal EEG data in awake and sleep states of an epileptic patient, and determine a classifier from the data through the process of learning, and finally, apply the classifier to the data in different timing to test how effective the method works for classification. As a result, the precision of classification into sleep and awake states is 88.9%, and the precision for the classification into ictal and interictal is 99.8%. This concludes that the DMD mode properly captures the spatio-temporal pattern of high frequency in ictal signals and that of low frequency in sleep state. Moreover the DMD modes extracted from the EEG signal can be useful for analyzing and understanding the dynamics of the epileptic EEG data.

Academy of Emerging Science, Chubu University
Email address: hyeonni94@isc.chubu.ac.jp

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