

Abstract

Eye condition (eyes open or closed eyes) result in changes in brain activity and generate brain signals with certain characteristics and values. By using special methods and instruments that can detect and record brain signals electroencephalography (EEG), we can know the brain activity that occurs through the values generated by each sensor electroencephalography and records it in the form of numerical data that can be analyzed and processed.

In this thesis, the author tries to do research by building a system that will perform eye state classification based on the values of the EEG signal using Hierarchical Temporal Memory (HTM). HTM is a method based on the biological mechanism of the neocortex. To learn, HTM uses an algorithm called Temporal Memory (TM) which consists of several stages of receiving inputs of sparse distributed representations (SDRs) of EEG data formed by spatial pooling, then forming a new representation of EEG data according to the context of the data EEG before, and then do the classification. The public EEG signal data obtained from UC Irvine Machine Learning Repository will be used to generate models/learning patterns in HTM and then used to classify the state of the eye.

The HTM system can be used for eye state classification based on EEG signals and is suitable for data with regularly and harmoniously changing patterns. The accuracy of the HTM system in classification is considered good enough for the chronological data pattern shown with the accuracy of 87.65%. The parameter of the number of active columns and bits also affects the accuracy value. HTM is less suitable for classifying random data due to the nature of HTM requiring sequential contexts from an earlier data to classify the data encountered, as seen from the tests using random data, the best accuracy of only 52.19%.

Keywords: classification, EEG, eye state, Hierarchical Temporal Memory