SEIZURE SIGNAL ANALYSIS USING SPECTROGRAM

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ABSTRACT

Electroencephalogram (EEG) is a technique that records the brain electrical activity. This technique is widely used by neurologist to study human brain functions and lead them to investigate a disorder related to brain such as epilepsy, tumor and seizure. The output of EEG signals is in microvolts (μV) and its characteristics are very non-linear, non-stationary and very weak; it can be easily contaminated by other sources. Furthermore, by using visual inspection method, it is quite difficult to extract useful information from these signals just by observation. Thus, to overcome the limitation of the visual inspection method, the time-frequency analysis using Spectrogram method has been applied to analyze seizure from EEG signal test. This method has the ability to extract weak signal that are non-linear, nonstationary such as EEG signal. Spectrogram yields an output of power at each frequency of the EEG signal as a function of time. This method portrait the relationship between power density and frequency respective to time and it is used to extract the hidden information in EEG signal. In this research, the results of the Spectrogram showed that a dominant frequency of a healthy subject signal is in the range of 7.5 Hz to 13 Hz and for seizure subject the signal is from 1 Hz to 3 Hz. The statistical analysis justified that the findings of seizure onset signal has a dominant frequency in range of delta rhythm and the healthy subject signal has dominant frequency in range of alpha rhythm.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Seizure is a sign of brain damage and needs further treatment before it affects one's personal life. Seizure is a common symptom of many neurological disorders such as tumor, epilepsy and also brain injury. Before further treatment is carried out to seizure subject, an EEG test needs to be done to study either a subject has an abnormality in their brain waves. A method analysis is necessary to apply the EEG test to classify one has an abnormality brain waves. Spectrogram is used as the analysis method because of its advantages.

1.2 Problem Statement

This study is done due to several problems in analyzing EEG signal for seizure subject. The first problem is the visual inspection problem that is very subjective and it needs an analysis method to extract hidden information from this signal. Visual inspection method is very time consuming and may be inaccurate, particularly for long data recordings. The main reason to use analysis method in extracting EEG signal is possibilities of disagreement among neurophysiologist since EEG signal are very subjective in nature. This factor causes an effect to the analysis output which makes it hardly allows any statistical analysis or standardization. The analysis method that is used to extract the EEG signal should be easier and can simplify the extraction signal process compared to other analysis methods and without neglecting the accuracy of the output.