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Analysis of Brain activity for EEG signals using neural network and logistic regression

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***Abstract*—The analysis of brain wave in diagnosis of different brain disorders. Brain signal analysis make them well studied to the analysis of biological and medical signal. In this technique to applied to computed tomographic in EEG and MEG or EMG.**

***Keywords*—EEG, EDF format,Image classifier, Normal ana excited brain and depression.**

Introduction

A Human Brain is the organ that gives the person the capacity for art, language ,rational thoughts and moral judgements. There are two different types of EEG signals: scalp or intracranial. For scalp EEG small metal discs, electrodes are placed on the scalp with electrical contact. Intracranial EEG is obtained by electrodes implanted in the brain during surgery. It is also responsible for activiting about the world. It is one of the body organs. It has hundred billions nerve cells. The changes in the voltage difference between electrodes are sensed and amplified before being transmitted.EEG signal involve a great deal of information about the function of the brain.EEG signals in time domain may be insufficient. There are four frequency bands – delta(4hz),theta(4-8hz),alpha(8-13hz) and beta(13-30hz).The choice of this network was based on the most popular type of artificial neural networks(ANNs).It is used lifting-based discrete wavelet transform(LBDWT)coefficients of EEG signals as an input to classified system with two discrete outputs.

I. Method

A. Wavelet transform analysis

The discrete wavelet transform is a versatile signal processing that find scientific applications. The lifting scheme is a new method for constructing bio orthogonal wavelets. Bio orthogonal wavelets share the same scaling function such that one can construct the desired wavelet form a simple one. LBDWT acts mathematical microscope ,zooming into small scales to reveal compactly spaced events in time and zooming out into large scales to exhibit the global waveform patterns.

B. Artificial neural networks

ANNs are made up of large number of simple, highly interconnected processing elements(nodes). ANNs are learning mechanism of biological systems. The application of ANNs are used in MLPNN. The architechture of MLPNN contain two or more layers. Input layer containing the input variables to the problems and output layer is solution of the problem.

II. Lifting based wavelet transform

Lifting provides a framework that allows the construction certain bio orthogonal wavelets. It can be generalized to the second generation settings. This wavelet becomes elementary matrix, triangular matrix with all diagonal elements unity.

A. Visual inspection and validation

The Microsoft visual is used to implement the program, which supports modern object oriented programming and it can be used in windows operating systems. Analysis of EEG signal separated in this study to epileptic and normal signals. In this field of computer memory and linked to the start and duration.

B. Logistic regression

In this technique used in probability,p1, of variables in this form. These input variables are co efficient of four channels.

C. Equations

$$\text{Log it } (p1) = \ln (p1/1-p1)$$
$$= \beta 0 + \beta 1 X1 + \ldots + \beta nXn == \beta 0 + \sum (i=1 \ldots n) (\beta iXi)$$

III. Depression

Depression is a state of low mood and aversion to activity that can affect a persons thoughts , behavior ,feelings and physical well-being. The signals of the brain in these situations can also be used to study the emotions which can lead to great help in diagnosis of psychosomatic disorders.

A. Development of ANNs

For developing the logistic regression and neural network classifiers and used for deriving the logistic regression models or neural networks. The attractive of ANNs, such as their parallel operation , associative memory, multifunctional optimization and extensibility, biological and medical signals. ANNs are generates output for the problem the ANNs are solve , based on new input data without further training signals.

a) ANNs here serve mainly as non-linear . The inputs are preprocessed so as to feature space. It is used to collect the data into distint classes.

b) ANNs are operate within closed loop systems to process changing inputs, or mapping their outputs to parameters used in online control.

c) Signal separation and deconvolution: ANNs are separate their input signals into the weighted sum or convolution of a number .

d) ANNs are important impact on the analysis of EEG and MEG by separating the problem of EEG or MEG source.

e) EEG and MEG data collect from any point on the scalp may include activity arising within a large brain volume.

f) ANNs both embody and exemplify is perhaps that our human intelligence is multifunctional.

B. The levenberg- marquardt algorithm

combines the gauss newton technique and the steepest – algorithm , but avoid the limitations.

C. Figures and Tables

1) Validation data sets.

Class	Training set	Validation set	Total
Epileptic	102	88	190
normal	198	112	310
Total	300	200	500

1. Frequencies corresponding to different levels of decomposition for daubechies four filter wavelet with a sampling frequency of 200hz

Decomposed signals	Frequency range(hz)
D1	50-100
D2	25-50
D3	12.5-25
D4	6.25-12.5
D5	3.125-6.25
A5	0-3.125

ANN network and fuzzy based techniques were also employed to exploit their natural ability in pattern recognition task for successful classification of EEG beats.

Conclusion

An artificial neural networka are that classifies subjects as epileptic seizure provides a valuable diagnostic support tool for neurologists result in different treatments.

The EEG signal in EDF format is converted into WAV foemat using EDF to WAV converter. the signal is then passed through the filters of different frequencies to separate alpha, beta, delta and theta waves.

The MLPNN may be used diagnostic decision support treatment of epileptic patients.

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