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ELECTROENCEPHALOGRAPH SIGNAL CLASSIFICATION FOR DIFFERENT WAVE DIAGNOSIS

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Abstract - In Patients brainwaves are produced by synchronized electrical pulses from masses of neuron communicating of neurons communicating with each other.These waves are detected using sensors electrodes and attached to the scalp.Then, Electrode Wires are attach to a machine, into the electrical impulses and to describe these functions, they are the best thought of a continuous spectrum of consciousness from slow, loud and functional – to fast, subtle, and complex. Emotions and behaviors is the communication between neurons within our brains. When lower frequencies of brainwaves are dominant we can feel tired, slow, sluggish, or dreamy. And then, higher frequencies are dominant we feel wired, or hyper-alert. The challenge of resourcing these types of medical and image processing is to describe the adoption of the open source electroencephalography. The brain activities or actions can be detected by using the Electroencephalogram (EEG) Signal waves transducer.

INTRODUCTION**:**

The aim of our work was to develop, analyze, optimize and verify the system for the classification of characteristic shapes of EEG signals using Active contour and Histogram thresholding. The key requirement built into the classification system was to use changes in signal parameters rather than information about the electrode position on the Scalp. Successful classification of movement-related EEG signals is a pre-requisite for on-line classification of movement related EEG data which can be utilized in driving of external devices. EEG signals also show large inter-individual variability precludingextrapolation of EEG classification from one subject to the whole sample.

The first step in the classification of movement-related EEG data was to choose a suitable classification paradigm. We have tried to fulfill the following conditions:

- ✓ The ability to use context for recognition.
- ✓ The possibility of finding out “what does the system learn”.

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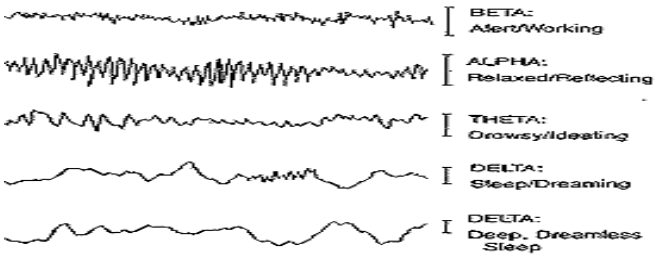
- ✓ The reduction of the number of arithmetic operations.

It is essential for reaching a satisfactory recognition score. The EEG signals display a context information and previous study pointed to the importance of the context information in EEG classification. It highly facilitates debugging and testing of the system. The third condition is of technological and practical importance. These conditions seem to be satisfied using the approach based on Histogram and Contouring. The above characteristic gives a reliable recognition of EEG patterns.

Intensity inhomogeneity causes many difficulties in image segmentation and the understanding of magnetic resonance (MR) images. Bias correction is an important method for addressing the intensity inhomogeneity of MR images before quantitative analysis. The brain activities or actions can be detected by using the Electroencephalogram (EEG) transducer. Therefore, this work was done to design a vision system that will incorporate the data of EEG in order to provide more information to the end user. Neuroimaging used as a tool to design the vision system of the brain wave signals.

Classifications of EEG signal Waves:



Electro-corticographic gamma activity during word production in spoken and sign language, Neurology [1]. Algorithms used to design brain–computer interface (BCI) systems based on electroencephalography (EEG). We briefly present the commonly employed algorithms and describe their critical properties. Based on the literature, we compare them in terms of performance and provide guidelines to choose the suitable classification algorithm(s) for a specific BCI.

High-speed memory scanning: a behavioral argument for a serial oscillatory model. Cognitive Brain Research [2].The current research of brain–computer interfaces (BCIs) is how to classify time-varying electroencephalographic (EEG) signals as accurately as possible. The problem from the aspect of updating feature extractors and propose an adaptive feature extractor, namely positron emission tomography (PET), single-photon emission computed tomography (SPECT) functional MRI (fMRI), can exhibit physiologic changes but not with the temporal resolution of EEG.

Coherence of gamma-band EEG activity as a basis are the associative learning[3]. It provides a direct communication channel from the user's brain to the external world by reading the electrical signatures of brain's activity and its responses to external stimuli. These responses can then be translated to computer commands, which can either be carried out or made known to others, thus providing a communication link, particularly for people with severe disabilities.EEG signals, however, suffer from high noise levels due to the low conductivity of the human skull.

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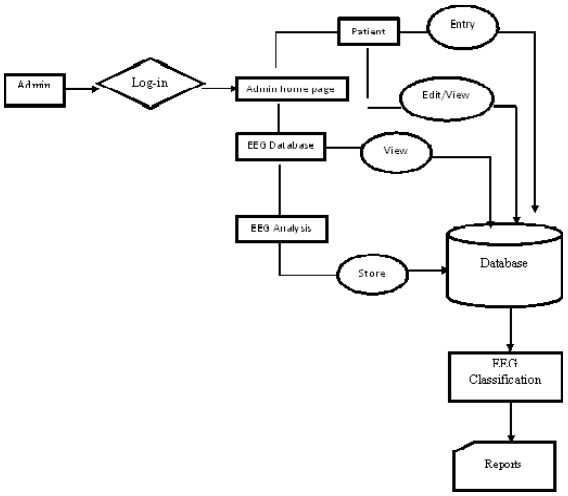
The Invariant reversible EEG effects of anesthetics.Consciousness and Cognition [4]. The concept of event-related oscillations bridges the gap between single neurons and neural assemblies. Taking this concept further, we review experiments concerning oscillatory responses to events (in the alpha, theta and delta ranges) as possible correlates of sensory and cognitive functions. It is argued that selectively distributed delta, theta, alpha and gamma oscillatory systems act as resonant communication networks through large populations of neurons, with functional relations to memory and integrative functions.

Computerized EEG spectral analysis in elderly normal, demented and depressed subjects [5]. Brain Computer Interface (BCI) is the method of communicating the human brain with an external device. People who are incapable to communicate conventionally due to spinal cord injury are in need of Brain Computer Interface.

EEG biofeedback of low beta band components: frequency-specific effects on variables of attention and event-related brain potentials[6].Brain Computer Interface uses the brain signals to take actions, control, actuate and communicate with the world directly using brain integration with peripheral devices and systems. Artificial Neural Network (ANN) is a functional pattern classification technique.

Patrick Improved neuronal regulation in ADHD: An application of 15 sessions of photic-driven EEG neurotherapy[7]. In order to classify the mental tasks, the brain signals are trained using neural network and also using Principal Component Analysis with Artificial Neural Network. Principal Component Analysis (PCA) is a dominant tool for analyzing data and finding patterns in it.

Methodology:



Classification using Algorithm:

Intensity inhomogeneity causes many difficulties in image segmentation and the understanding of magnetic resonance (MR) images. Bias correction is an important method for addressing the intensity inhomogeneity of MR images before quantitative analysis. In this paper, a modified model is developed for segmenting images with intensity inhomogeneity and estimating the bias field simultaneously. In the modified model, a clustering criterion energy function is defined by considering the difference between the measured image and estimated image in local region. The experimental results demonstrate the advantages of our model in terms of accuracy and insensitivity to the location of the

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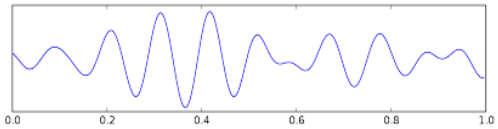
initial contours. In particular, our method has been applied to various synthetic and real images with desirable results.

The brain activities or actions can be detected by using the Electroencephalogram (EEG) transducer. The electrical data that come out from the EEG is illustrated in term of time response and histogram using the wave ware software that comes together with the system. However, problems exist because the data collected from EEG could not provide quantified numerical raw data and therefore result difficulties when analyzing the displayed plots. Therefore, this work was done to design a vision system that will incorporate the data of EEG in order to provide more information to the end user.

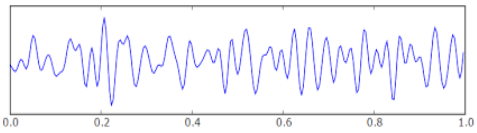
Analysis of EEG Signal:

Alpha Brain Waves are a sign of relaxed activity in your brain. Alpha brainwaves are defined as brain waves that cycle between the frequency 8 Hz – 12 Hz.

Alpha brainwaves are the dominant brain wave activity when your body and mind are able to relax.



Beta rhythms occur in individuals who are alert and attentive to external stimuli or exert specific mental effort, or paradoxically, beta rhythms also occur during deep sleep, REM (Rapid Eye Movement) sleep when the eyes switch back and forth. This does not mean that there is less electrical activity rather that the “positive” and “negative” activities are starting to counterbalance so that the sum of the electrical activity is less.



When astronomers refer to these specific colors of light, they refer to this as the “optical” or “visible” portion of the electromagnetic spectrum. As I mentioned briefly before, radio waves are also light waves. Infrared radiation is a kind of light wave (usually abbreviated as IR). The same is true of ultraviolet waves (UV), x-rays, and gamma-rays

Conclusion:

Electroencephalography belongs to electro biological imaging tools widely used in medical and research areas. EEG signal consists of different brain waves reflecting brain electrical activity according to electrode placements and functioning in the adjacent brain regions. The frequency of brain waves plays a major role in diagnosing the different wave patterns (Alpha, Beta and Gamma) and also in the classification of brain status of the patient (Sleep, Dreamy, Active). In future enhancement a lot of research is currently being carried out in order to make EEG devices smaller, more portable and easier to use. So called "Wearable EEG" is based upon creating low power wireless collection electronics and ‘dry’ electrodes which do not require a conductive gel to be used. Such prolonged and easy-to-use monitoring could make a step change in the diagnosis of chronic

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conditions such as epilepsy, and greatly improve the end-user acceptance of BCI systems.

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