

PCA: THE DETECTION OF INTUITIVENESS

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ABSTRACT:

The study of science brain continually receives information which it processes, evaluates, and compare to the stored information and makes appropriate decisions. This technology serves to detect information in the brain using P300 mermer algorithm along with pattern classification algorithm as a means of detecting the attention, information processing, and memory-related responses to these presentations as revealed by brain waves with the help of biological neural network.

KEYWORDS: P300 Mermer algorithm, Pattern classification algorithm, Biological Neural Net

I. INTRODUCTION:

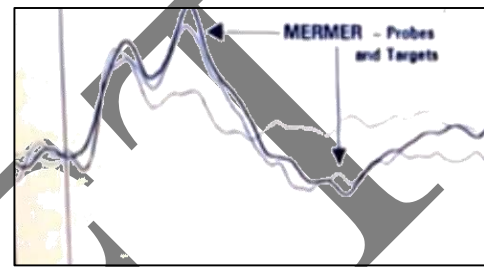
Human brain has to store an ocean of information that is received in each conscious moment of life. The brain is a simple stimulus-response box which is capable of handling highly complex information-processing activities based on the state; understand tasks, tactics, strategies, and information-processing algorithms. The memory of human who do various types of crimes needs to detect information in the brain as a means of detecting participation in specific organizations, acts, or criminal activity. The purpose of Brain Fingerprinting is to fetch information from memory after immediate from human brain.

Brain Fingerprinting is a new computer-based technology to detect the record of a crime within few hours stored in the brain of a perpetrator accurately by measuring brain-wave responses to crime-relevant information in a pictorial format [1].

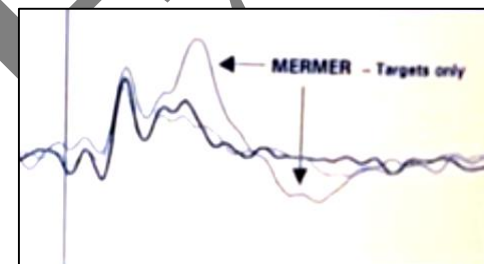
Pattern classification system with artificial neural networks recognizes the character in a pictorial way. Thus it allows providing information from brain in a picture format [2].

II. LITERATURE REVIEW:

Brain fingerprinting system mathematically computes a research by comparing the responses to the different types of stimuli.



INFORMATION PRESENT:



INFORMATION ABSENT:

When a person is exposed to a rare, but meaningful information, there is increase in neuron activity which results in an increase in voltage, within 300-1000msec after the stimulus, and that response with increases voltage is known as P300.

It allows the tester to determine if the measured brain responses to test stimuli, called probes are more similar to the relevant or irrelevant responses. Therefore P300-MERMER is emitted in terms of target or probes [5].

The consideration of Brain Fingerprinting was proposed by Neuroscientist Dr. Lawrence Farwell invented Brain Fingerprinting (BF) based on the fact that only the guilty party and the investigators are aware of the certain specific details of the crime. With the help of P300 response brain provides automatic recognition response with respect to subjects are presented with image, words etc. (Senate 2007). The two most important methods of Brain Fingerprinting are EEG and FMRI which are correlated with the brain activity. (Daniel 2008) [6].

The current Brain Fingerprinting System measures the scalp electrodes and brain activity with

relevant words, pictures or sounds are presented to a subject by a computer. The brainwave responses measured with patented headband equipped with the help of EEG sensors. Brain Fingerprinting method is based on an electric signal known as MERMER (memory and encoding-related multifaceted electroencephalographic response). The technique is said to be more effective than a lie detector test and also it does not measure the guilty or innocence of subconscious mind [7].

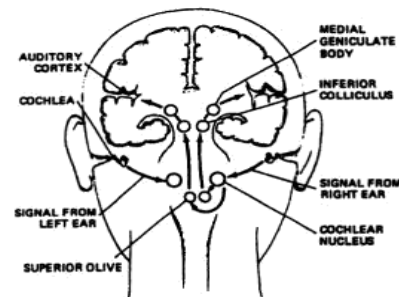
The proposed system uses two most used methods of Brain Fingerprinting (BF) that are electroencephalography (EEG) and functional magnetic response imaging (fMRI). EEG measures brain electrical activity that reaches scalp electrodes, and fMRI measures regional blood oxygenation in the brain which is correlated with the brain activity [6], in this research the tester can detect data from subconscious mind using Pattern Classification Algorithm. PCA can detect the data from subconscious mind can be represented in a pictorial format.

III. METHODOLOGY BRAIN FINGERPRINTING:

Brain Fingerprinting is a study in the field of neuroscience helps in data analysis for the retrieval of concealed information stored in the brain. The algorithm used in this paper will be proved effective for detecting data from brain. The P300 is a measurable brain response emitted by the brain of a subject who has the relevant information in his brain and MERMER observes the stimulus response up to 1,400 milliseconds after the stimulus [5]. Pattern classification algorithm is used for the detection of concealed data in brain, and also the pictorial representation of the information detected can be displayed.

As the data detected using P300 MERMER [1], the pattern classification is a highly effective algorithm for the pictorial representation of the data detected from the brain using Biological Neural Network. The pattern classification algorithm inherits the basic concepts of the Pattern Recognition [2].

In Pattern Classification the pictorial representation of the data from the brain including not only from conscious mind but also the detection of data from subconscious mind using the basic Biological Neural Network. The Pattern classification most probably used for the detection of subconscious mind by the classification pattern of human brain through the emotions, behaviours the subconscious mind concepts basically depends on habitual of the human brain [3].



Using Biological Neural Network the classification of the habitual of human being for example the emotions including fear, sadness, love, embarrassment etc. can be classified using this pattern classification algorithm from the subconscious mind. In the limbic system the neurons in one of the most important of the brain hippocampus play a role in emotions [4]. On the basis of the human emotions the detection of the data for the subconscious mind can be successfully done.

IV. PCA ALGORITHM:

The "PCA" (Pattern Classification Algorithm) collectively form a stimuli vector which receives data in the form of raw measurements. The main approach of PCA is Statistical pattern classification. Statistical pattern classification techniques use the results of both statistical and estimation theory which obtains from the representation to interpretation space. The critical information regarding pattern class and attributes contained in the structural relationship among the features.

Applications involving pictorial patterns fall into this approach which is characterized by recognizable shapes such as character recognition, chromosome identification, elementary particle collision photographs [2].

Step1.

The pattern can be represented by n-dimensional pattern or measurement vector, Z assumes appropriate grey level from 16 possible values:

$$Z = Z_1, Z_2, \dots, Z_{Nm}$$

Step2.

Feature vector X, may be derived from the pattern vector

$$X = X_1, X_2, \dots, X_N$$

The pattern can be viewed as a point in N_m -dimensional measurement hyperspace or N-dimensional feature hyperspace where x_1, x_2 represents a pattern.

Step3.

The decision-making process in pattern classification can be summarized by n-dimensional feature vector represented as

$$X=(x_1, x_2,\dots,x_n)^T$$

where T indicates a transpose.

For example, an image is represented by an m*m array of pixels with 16 grey levels of pattern vector $n=m^2$.

Step4.

Regions in the pattern space provided by the decision functions are stated as individual classes. A decision function for n-dimensional pattern space is:

$$d_k(x)=w_k l(x) \text{ where } k=1,2,\dots,M$$

Where 'w' are coefficients of decision function and l(x) are single-valued function of the pattern, x

Step5.

To establish M decision functions $d_1(x), d_2(x),\dots,d_k(x)$, for each class, if pattern x belongs to class C_i then

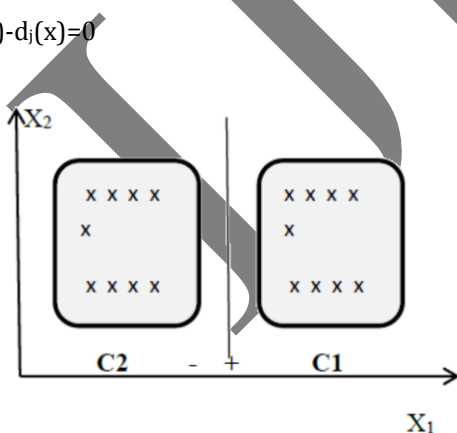
$$d_i(x) > d_j(x) \quad j=1,2,\dots,M, j \neq i$$

Now we have a relationship that specifies a decision rule.

Step6.

To classify given pattern it is first substituted into all decision functions and assigned to the class with largest numeric value. Therefore the equation of decision boundary is:

$$d_i(x) - d_j(x) = 0$$



Step7.

In two-dimensional pattern space each pattern are characterized by two measurements such as height and weight which consist of pattern class C1 and C2. A linear decision function can be used to separate disjoint pattern classes

$$d(x)=d_1(x)-d_2(x)$$

Step8.

The two measurements are performed on each entity yielding two-dimensional pattern space allows to visualize easily [2].

$$d_1(x) > d_2(x) \text{ and}$$

$$d_2(x) > d_1(x)$$

This algorithm is used to detect each and every actions and activities of human brain in order to provide an output in an image format effectively and efficiently.

CONCLUSION:

After the deep study in neuroscience, the PCA is a controversial technique in the Brain Fingerprinting which will prescribe for the effective perception of concealed data from the brain at the stage of sub consciousness. Using the P300 MERMER technology the PCA algorithm will prove effective for the detection of the concealed data from the brain nervous activities in the sub consciousness and also PCA will help in the enhancement of the previous BFP technology and analyse in terms of performance.

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