International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 04 | Apr-2018 www.irjet.net p-ISSN: 2395-0072

DEAP BASE DETECTION OF EPILEPSY AND SLEEP PARALYSIS THROUGH COMPUTED EEG AND FACE EXPRESSION ANALYSIS

Mrs. Buvaneswari B[1], Deephika R[2], Mythreyee N[3], Preethi R[4], Shilpa Sundar[5]

[1]*Associate Professor of B.Tech, Information Technology Department, Panimalar Engineering College, Tamil Nadu, India.*

[2,3,4,5] *Students of B.Tech, Information Technology Department, Panimalar Engineering College, Tamil Nadu, India.*

Abstract - *Emotion assumes a vital part in our day by day life and work. Ongoing evaluation and direction of emotion will enhance individuals' life and improve it. Another case, in the treatment of patients, particularly those with articulation issues, the genuine emotion condition of patients will help specialists to give more suitable medicinal care. As of late, emotion acknowledgment from EEG has increased mass consideration. Different highlights and extraction techniques have been proposed for emotion acknowledgment from EEG signals, including time space systems, recurrence area procedures, joint time-recurrence investigation methods, and different methodologies. Here we proposed a dependable technique which is proficient in identification of person's wellbeing like whether they are influenced by Epilepsy or Sleep Paralysis by utilizing (1)Face Expression (2)EEG information. This plan can identify the state of the distinct individual utilizing picture classifier and EEG analyzer utilizing versatile limit recognition strategy*

Key Words: **Emotion, EEG, Real-time datasets, Face Expression, Brain Computer Interface**

1. INTRODUCTION

Brain-computer interface (BCI) has been one of the most interesting biomedical engineering research fields for decades. It provides a promising technology allowing humans to control external devices by modulating their brain waves. Most BCI applications have been developed for non-invasive brain signal processing which is practical to implement in real-world scenarios. There are plenty of successful EEG based BCI applications such as word speller programs [1] and wheelchair controllers [2]. Not exclusively can BCI be utilized to rationally control gadgets, yet in addition it can be actualized for understanding our psychological states. Emotion acknowledgment is one of such applications. Programmed emotion acknowledgment calculations possibly cross over any barrier amongst human and machine connections. A model of emotion can be portrayed by two primary measurements called valence and excitement. The valence is the level of fascination or abhorrence that an individual feels toward a particular protest or occasion. It ranges from negative to positive. The excitement is a physiological and mental condition of being wakeful or receptive to boosts, extending from uninvolved to dynamic.

2. METHODOLOGY

2.1 System Architecture

We proposed a technique which is productive in recognition of person's wellbeing like whether they are ordinary or strange by utilizing two factors fundamentally (1) Face Expression (2) EEG data. This outline can distinguish the state of the unique individual utilizing picture classifier and EEG analyzer utilizing versatile edge recognition technique. The real emotion state of patients will help doctors to provide more appropriate medical care. Real-time assessment and regulation of emotion will improve people's life and make it better. Here we propose an efficient algorithm using SURFSIFT method to detect the face expression of the patient better to tell the patient is affected by Epilepsy or sleep paralysis. Epilepsy is a kind of abnormality held in patient at any time during day or night or at work they keep on showing abnormal face expressions .The symptoms can be occur throughout the day and hold for so many days. The emotion analysis work enables the patient to be supervised for a period of time for further analysis. Using this algorithm, the results are much accurate and stable. Since, the real time EEG datasets are used we assure to provide the results effectively and accurately.

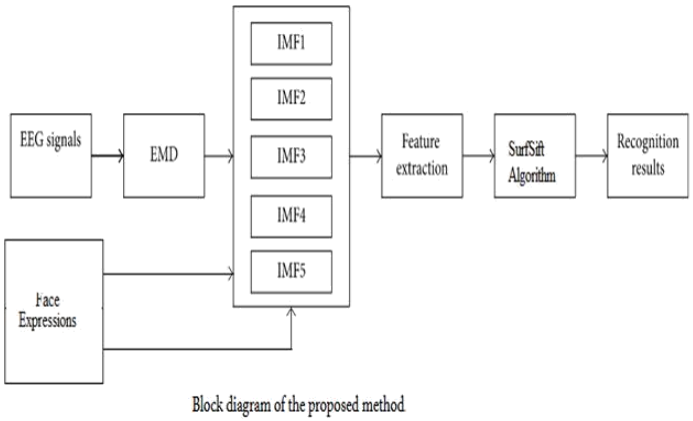

Fig 1: Block Diagram

2.2 Feature Extraction and Images preprocessing

The info RGB picture is resized to a tallness of 320 pixels. The resized picture experiences two separate preparing

pipelines: an immersion based one and shading surface one. In the first, the picture is initially gamma adjusted and after that the RGB esteems are changed over to HSV to extricate the immersion channel. These qualities are naturally limited and morphological tasks are connected to tidy up the paired picture. A moment handling in view of the division calculation that chips away at both shading and surface highlights. The info picture of the face is recognized and after that it is removed independently. The eyes, nose and the mouth of the patient's picture are isolated. The isolated pictures are put away in the database. These isolated pictures are put away in the database. These isolated pictures are utilized for correlation.

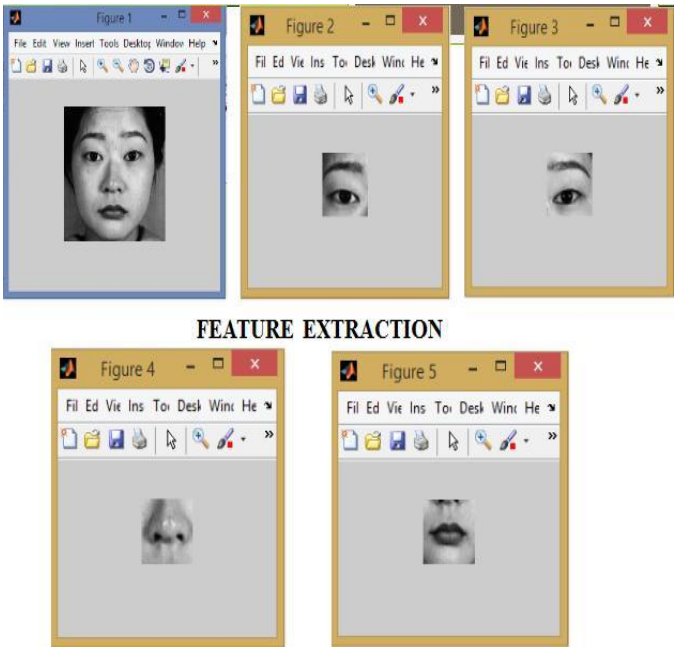

Fig 2: Extracted features

2.3 EEG dataset Creation & Group Segmentation

This module comprises of techniques associated with getting the EEG informational indexes which coordinates the individual age gathering and feelings related with the age and emotional episodes. The EEG informational index is handled in the MATLAB condition to section it better by their alpha, beta, Gama, theta ranges. The electrical signs from the cerebrum are gathered. The signs are preprocessed and put away. The features are extracted and classified into Alpha, Beta, Gamma, Theta, and Delta accordingly. The EEG signals are been generated.

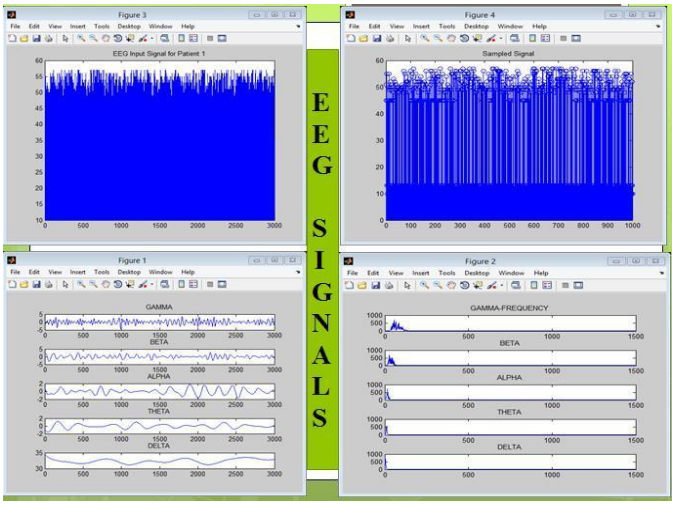

Fig 4: EEG signal generation

2.4 Classification

This module is utilized to characterize using the real time EEG dataset and face expressions to detect the patient is normal or abnormal and happy or sad . These highlights are additionally utilized for examination motivation behind the person's passionate conditions and emotional episodes for mental investigation. It is used to classify the EEG information with respect to the face expression images to identify whether the patient is normal or abnormal. If abnormal then it recognizes whether he is affected by epilepsy or sleep disorder.

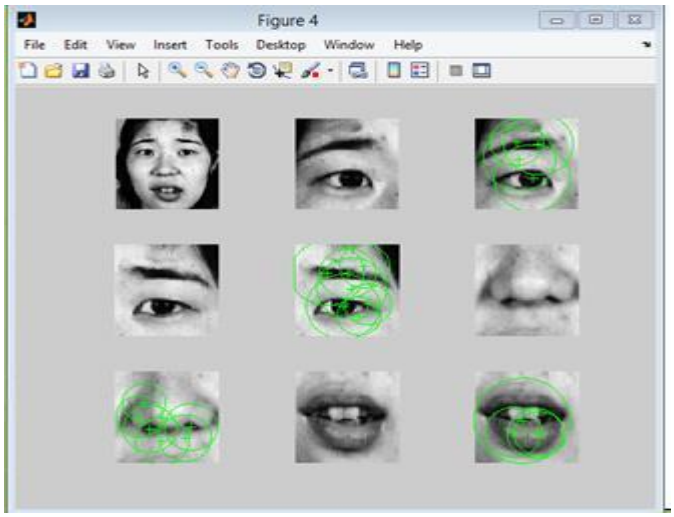

Fig 4: Interest point detection

3. IMPLEMENTATION

The algorithm used here is SURF SIFT algorithm. Both SIFT and SURF is thus based on a descriptor and a detector.

SIFT is Scale Invariant Feature Transform (SIFT)

The SIFT algorithm has 4 basic steps.

[1]Estimate a scale space using the Difference of Gaussian (DoG). [2]Key points are localized and refined by eliminating the low contrast points. [3] Key point orientation in light of nearby picture angle. [4] Description generator to register the nearby picture descriptor for each key point in view of picture inclination extent and introduction. It requires a vast computational many-sided quality.

The SURF algorithm is Speed up Robust Feature (SURF) technique which is an approximation of SIFT, performs faster than SIFT without reducing the quality of the detected points.

SURF approximates the DoG with box filters. Instead of Gaussian averaging the image, squares are used for approximation. The SURF uses a BLOB detector which is based on the Hessian matrix. For orientation assignment and feature description SURF uses the wavelet responses.

The interest points of the megapixel image are detected in the detection step using the Determinant of Hessian matrix. In the description step a descriptor is built for the neighborhood of each point of interest. In Image matching task the local descriptors from several images are matched. Exhaustive comparison is performed by computing the Euclidean distance between all potential matching pairs. A nearest-neighbor distance-ratio matching criterion is then used to reduce mismatches.

4. RESULTS AND DISCUSSION

There are several methods to identify the emotion detection using three emotion detection. But it would not provide the accurate results and they are not optimistic and unstable. And also, it does not detect the EEG related diseases.

Table 1: Accuracy level (%)

METHODS	ACCURACY
Time-frequency analysis, artificial neural network	56.65%
Multi wavelet transform, MLPNN	76.89%
Time frequency analysis, KNN	89.87%
HMS analysis, SVM	95.20%
Adaptive threshold analysis, SURF SIFT	98.75%

5. CONCLUSION AND FUTURE ENHANCEMENT

In this project, we are using the EEG results and the face expressions to detect whether the patient is normal or abnormal. If abnormal we are obtaining the result as whether he is affected by Epilepsy or Sleep Disorder. Here, we are using the Surf Sift algorithm for feature extraction and to find out the interest points. Using this algorithm, the results are much accurate and stable. Since, the real time EEG datasets are used we assure to provide the results effectively and accurately.

The future enhancement of this project is to find out other EEG related diseases such as Migraine headache, Encephalopathy, Sleep Apnoea, Hypersomnia, in an effective manner.

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