

Advanced Design of Lie Detector System using EEG Signals Acquisition

R.Kishore Kanna, R.Vasuki

Abstract: Polygraph is tool which is used detect lie spoken by a person in various situation. It is also used as best tool for investigation purpose to check whether a person speaks truth or lying when answering to certain questions shoot to them. by calculating the EEG signals one can find the relationship between the lying and frontal lobe during performing certain task. For bio-signal classification multiplayer neural network are used. Short-time Fourier transform (STFT) are calculated for each channel for each group subject. To differentiate between deception and truth types of EEG multi-layer perception (MLP) is used. The activation of the frontal cortex is associated with mental processes. A set of questions are framed as stimulus for the subject. The main aim is to find difference in state of truth and deception by calculating the alpha waves from two midline electrodes and four frontal electrodes.

Keywords: EEG, NEURO, STFT, MLP.

I. INTRODUCTION

The account of electrical mind movement from the human scalp is called electroencephalography (EEG). Electrical voltages created inside the cerebrum is the EEG delivered as result in the human scalp. EEG machine is utilized for seizing the neuro signal which has been assessed to check the subject in the case of coming clean or double dealing. There are two states, they are misleading and lie which has been separated on base of the EEG designs while the subject were countering to "Set of inquiries confined as progress" paying little heed to whether the response is correct or not. At long last the EEG signals are gathered as information from the subject while playing out the errand and it has been put into investigation to discover distinction among the two states (truth and lie).The principle of point and the aim of this examination is to assess the falsehood identification by utilizing the EEG. There are a few untruth location strategies utilized distinguish the falsehood. Counting polygraph, neuroscience, FMRI yet the outcome got in these techniques are not exact and not admissible in courtroom. in neuroscience imaging strategy different viewpoint like feeling, conduct, insight, and so forth., mind movement are analyzed. Henceforth it is less opportunity to acquire the precision of two state (untruth and truth). FMRI which utilized halfway yet it is non-compact and high specialized ability required for different components. Despite the fact that there are a few technique for identifying the untruth EEG strategy is impeccable than FMRI over these components and it is satisfactory and better strategy. ordinary falsehood location strategies are not secure but rather in EEG method the gadget attempts to gather the EEG design subsequently

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It could be effectively utilized consider asymmetry example to locate the different knowledge levels and it additionally tent to confirmation that alpha waves and frontal flap are dynamic amid the subject are lying. Initial one ought to see data about detail procedure of EEG and identification systems in this manner different methodology were put into act to do the examination work. Amid EEG process three strategies are engaged they are estimation procedure of EEG, sign of mind are recorded and securing the information from subject and assessing and computing the records. All the gathered records are examined and detailed. This paper shows the accompanying; it starts with a presentation and related works. Philosophy is discussed. The preprocessing work were disclosed to the members utilized in the analysis. At that point the paper continue with strategy and afterward extraction of highlight. Finally make an inference and carryout by reference.

II. METHODOLOGY

Above figure demonstrates the framework's abnormal state structure. The figure represent the full procedure and the comparing signal states.the framework configuration comprise of four wide segments and during the time spent information securing the human scalp EEG information has been acquired. after the information gathering the information is pre-prepared to channel it from undesirable curios and sound from the EEG information gathered to get a clean information.next step is to separate the component from the clean data.after the extraction of highlight a few sorts of strategies are utilized. which draw morphological,singnal ghasly, a featurevector and couple of measurable component.

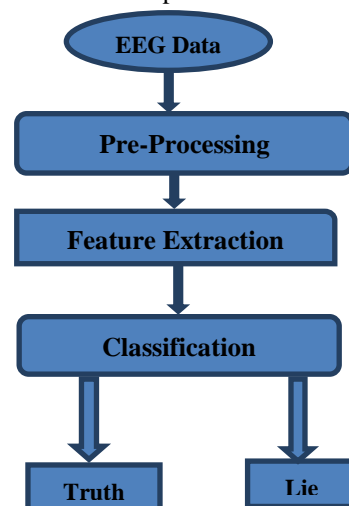


Figure 1: Diagram of EEG signal system, related result lie and Truth



Classifier is fed with feature vector based on the features and to differentiate it some classification methods are used in the classification process. The features are classified and a decision are concluded by this

III. PREPROCESSING

Eight channel EEG machine is utilized to gather the brainwave data. EEG estimation were grabbed at the frontal projections.

To get sifted EEG information pre-preparing is done in the wake of catching the EEG data. using elliptic channel the band-pass separated the information at removed alpha-groups and IIR channel alpha band (8-13) Hz

IV. PROCEDURES

The eight channel Emotive EPOC/EPOC+ is utilized to obtain the brainwave information which is uncommonly intended for contextualized inquire about applications. As indicated by the extended International 10-20 situation, sensor sites gathered are Fp1, Fp2, F7, F8, F3, AND F4.

Test seat programming and SKD are a portion of the product which is introduced in the PC and it was interface with remote to the Emotive EPOC. with the utilization these product thick array, high quality, crude EEG information are gotten to by the master channel. At the frontal area of mind the estimation of the Emotive EPOC were captured. EEG is such gadget which is utilized to examine and record the sign of the subject are being honest lying, or effectively being tricky. Under various condition to separate double dealing and truth, the EEG information amid testing part is utilized.

V. FEATURE EXTRACTION

In bio-signal preparing Short Time Frouier Transform (STFT) Is one of the strategies that are broadly used. EEG sign can be considered as a stationary inside brief time window dependent on supposition and afterward Fast Fourier change can be connected with it brings about plotting the EEGs sign to its frequencies and time domain. the standard of the recurrence with time which is exhibited from crafted by extricated highlights. A one moment fragment of each class has been prepared with STFT and afterward 60 highlights are gotten for each channel. In the element level, there is clear separation among classes and it is not the same as subject to subject.

Subject-Round 1

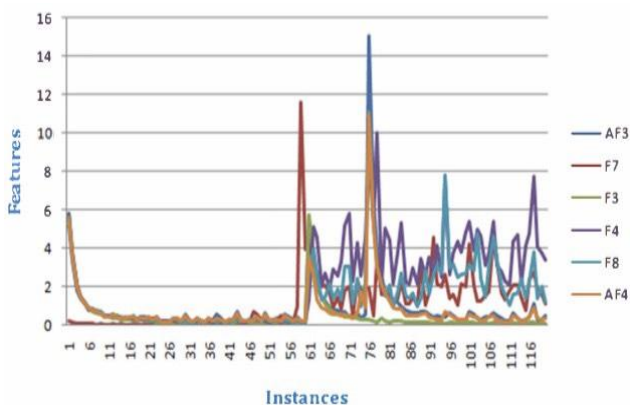


Figure 2: alpha power wave within 1 minute for each class

Subject-Round 2

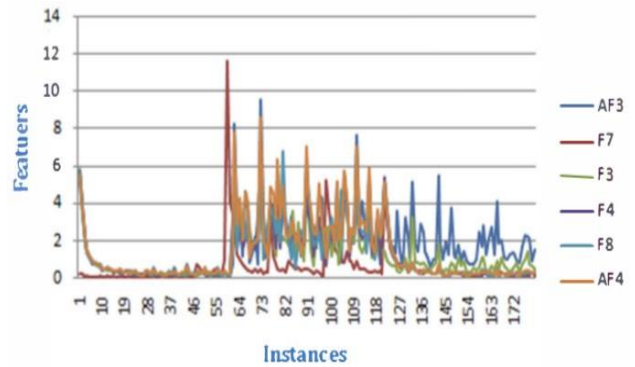


Figure 3: alpha power wave within 1 minute for each class

Subject-Round 3

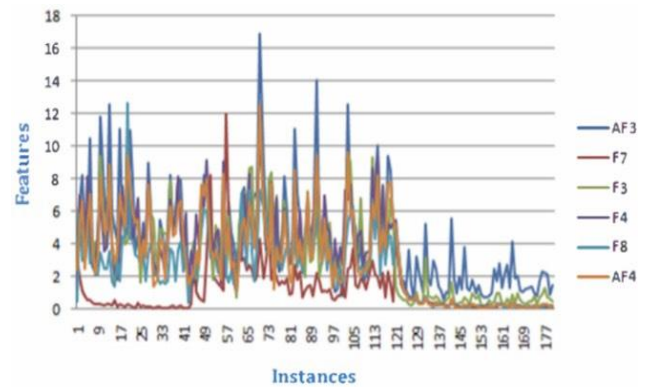


Figure 4: alpha power wave within 1 minute for each class

VI. CONCLUSION

The examination has effectively accomplished its targets and speculations in the exploration. The exactness of discoveries has been obviously expressed with great precision. In this examination, in spite of the fact that mind initiation have been unmistakably appeared normal contrasts among duplicity and truth, the fundamental trouble with the legitimacy of location and misdirection system is totally emotional. The characterization technique is equipped for recognizing complex examples of cerebrum action related with misleading appropriately. The connected falsehood identification in people. Since the quantity of members was moderately constrained in these analyses, we envision that presentation will improve fundamentally with progressively broad preparing [3].

The machine itself is powerless to bargain the unwavering quality of people. Hence, to get increasingly solid outcome; teacher should offer guidance to subject in the process through reconciliation of strategies by means of clarifying the procedure unmistakably. Particularly in second round, the teacher saw that subject were powerless of disavowal to the second arrangement of inquiry which was picked by the educator.

Electroencephalogram (EEG) was utilized to demonstrate that particular locales which are particularly frontal projections were actuated when subject misdirected.



While utilizing an EEG, the subject denied seeing either object which were picked by members or educator, accordingly coming clean with positive reactions, and lying with others. Examples of mind action amid double dealing had been portrayed with EEG on the distinctive age gathering. The test aftereffect of EEG in falsehood discovery was controlled by the capacity to recognize misleading in subject.

Consequently, the test convention and conditions honestly controlled. An exactness of 80-96 percent is the best that has been accomplished. In member playing out a constrained decision trickery task, the genuine and false reactions were segregated accurately, and only for the third round of subject three, around 40% precision was accomplished. Including STFT highlights indicated high ability to segregate among untruth and truth session of EEG designs.

The outcomes demonstrate that the superior of our model additionally demonstrate that alpha movement in frontal area is identified with the untruth conduct of the person.

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