December 31, 2015

INTERNATIONAL JOURNAL OF ADVANCED STUDIES OF COMPUTER SCIENCE AND ENGINEERING

IJASCSE Volume 4, Issue 12, 2015

Survey on Methods and Therapies for Psychologically Depressed People

Ruchira R. Talekar[1], Kaustubh Waghavkar[2], Hrishikesh Wattamwar[3], Deepak Mane[4]

[#]*Department of Computer Engineering, Savitribai Phule Pune University*
Akurdi, Pune- 411044

***Abstract*— The present life style of human beings across globe is full of activities performed with stress due to competition, volume of work, travel needs, preplanning and desired performance. The survey shows that one of five individual carry depression which may lead to non-performance or the attempt to destroy self from life. The informed system which can monitor the level of depression and identify causes to further provide remedy is need for today. Some therapy and the algorithms are useful for this proposed system is seen through this survey paper. The concept of Artificial intelligence can be integrated to solve above problem, where in we will lead to solution for psychologically affected individuals.**

***Keywords*— Depression, Prediction, Therapy, Machine learning, Artificial Intelligence**

I. INTRODUCTION

The present modern lifestyle brings about common cold of mental disorder – either directly or indirectly. This can be termed as depression which is affecting all the individuals at some point of time. The major causes are volume of work, change in lifestyle, stress, and competition. Statistics say that 15% of the population are victim of suicide due to depression.

Youth are the most prone to depression and major suicides are due to depression of some kind. Among young people 20 to 24 years of age, there were 2,384 deaths among 17,512,000 people in this age group. In order to fight the ever increasing global cause affecting 120 million people word wide, certain remedial actions are to be bought in. Refer the diagram given below (Fig.1.1) to understand the statistics of depressed person as per age group.

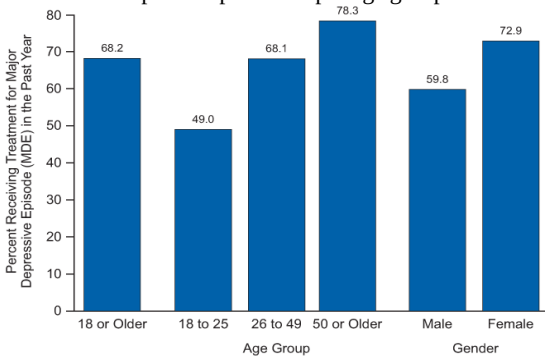

Figure.1.:Statistics of psychologically depressed people according to age group in the recent years.[6]

According to this figure we can conclude that the young age group shows the maximum depression level. Between male and female, female are more psychologically depressed than male. Reason of this is given in our survey. Statistics says that one in five individuals globally is victim of depression. According to the National Mental Health Association about one in every eight women will develop depression at some point during her lifetime.

Depression is the 4th level global problem. According to WHO, depression will become the 2nd level global problem. It can occur at any age. But there are less chances of occurring at the age of children in preschool. Depression is not "one size fits all". Depression is a mood disorder that causes a persistent feeling of sadness and loss of interest Depression in adolescents especially, can have a greater impact, both, at personal as well as at social level. So it is very necessary to develop some solution which will very help to world to reduce the depression completely.

II. LITERATURE SURVEY

The author has introduced and discussed a detection of stage of depression by combining both EEG and facial analysis. Using eye moments it is detecting the stages of depression. Data preprocessing is done using ICA i.e. Independent component analysis. It is used to remove the useless data or extra data like blinks, muscle noise etc. In short reduction of EEG signals is done through ICA. Artificial Neural Network (ANN) is one of the important factor used to emulate the structure and operation of the biological nervous system. It is used for classification of EEG signals.

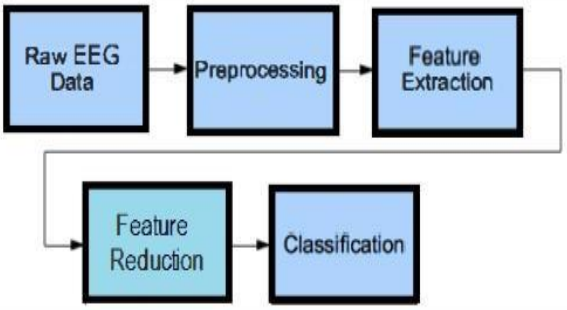

Figure 2: The block diagram for EEG analysis

It has two most important property such as, ability to learn i.e. determine function using input data and ability to produce output using huge input data set. EEG signals divided into various frequency ranges. By checking difference between depressed and normal person's data set, average data is created. So using this

average data as threshold, the values falls above is considered as binary value one and the values falls below is considered as binary value zero. Using video camera, the changes in emotions of the persons are detected as he/she is subjected to the stimuli. Then these emotions are encrypted into binary value i.e. "0" for happy and "1" for sad. So value 1 is categorized as person is depressed [1].

The author has introduced and discussed about range of depression severity is revealed by using vocal prosody. Sps mean and variability and F0 mean and variability is used to find the ranges of depression using vocal prosody. Depressed people have high trait neuroticism and low trait extraversion. First they found the Sps means interpersonal timing if depression is less severe than Sps are shorter and less variable. They investigated on vocal prosody in depressed participants and their interviewer. Author says that the finding for interpersonal timings i.e. pauses between utterances is strongly related to depression. Changes between these two timings i.e. interpersonal and intrapersonal timing are useful for understanding, monitoring, and treating depression. If patient recovered from depression then the F0 became higher and more variable. They suggests that F0 is a better marker of personality traits than of fluctuating changes in depression severity. If depression becomes less severe than interviewer F0 became higher and less variable. The combination of participants and interviewer vocal timings and F0 proved a powerful predictor of both numeric depression score and range of depression severity. They accounted together for 60 percentage of variation in depression score. These findings suggest that vocal prosody is a powerful measure of change in severity over the course of depressive disorder [2].

The author has introduced and discussed about identification of adolescents at high imminent risk of clinical depression. First of all they conducted depression prediction test with conversation of speech data collected from 30 adolescents diagnosed as non-depressed at the time when speech data were acquired. After two years the 15 out of 30 individuals had developed symptoms of clinical depression. This survey is depends upon the acoustic speech analysis and classification into two classes i.e. AR means at "risk" and NAR means "not at risk" performed on collected data. The accuracy of classification is 73% in the person based approach. There are total four different types of acoustic parameters are as follows: Glottal (G), Prosodic (P), TEO and Spectral (S). They are used to examine depression related changes in speech character. They conclude that prosodic and glottal feature are highly correlated with the AR speech character whereas the TEO and glottal parameters shows the highest correlation with the NAR character.

Also the glottal and prosodic features were effective on their own (a single channel approach) in predicting depression with a desirable specificity/sensitivity ratio and specificity, sensitivity, and accuracy higher than the chance level. The multichannel classification approach and a weighted classification decision procedure are used for the second step. Above four types are used individually to predict the depression in adolescents. In the case of the person based depression prediction method with two sets of weights (2W), the new approach provided very promising results. It showed high accuracy level of 73% and a desirable sensitivity-to-specificity ratio of 79%/67% [3].

III. EXISTING SYSTEMS

Various algorithms which are useful in our proposed system and for prediction are given below:

Machine Learning Algorithms: Machine learning is a type of artificial intelligence (AI) that provides computers with the ability to learn without being explicitly programmed. Machine learning focuses on the development of computer programs that can teach themselves to grow and change when exposed to new data. The process of machine learning is similar to that of data mining. Both systems search through data to look for patterns. However, instead of extracting data for human comprehension -- as is the case in data mining applications -- machine learning uses that data to improve the program's own understanding. Machine learning programs detect patterns in data and adjust program actions accordingly. Machine learning algorithms have two types. They are as follows:

1) Data Analysis.
2) Predictive Modeling.

***Data Analytics*:** Data analytics is distinguished from data mining by the scope, purpose and focus of the analysis. Data miners sort through huge data sets using sophisticated machine learning algorithms to identify undiscovered patterns and establish hidden relationships. It is the discovery and communication of meaningful patterns in data. It is the science of examining raw data with the purpose of drawing conclusions about that information. Data analytics focuses on inference, the process of deriving a conclusion based solely on what is already known by the researcher. It is used in many industries to allow companies and organization to make better business decisions and in the science to verify or disprove existing models or theories.

Predictive Modelling: The area of data analytics concerned with forecasting probabilities and trends is the predictive modelling. A predictive model is made up of a number of predictors, or variables, that are likely to influence future behaviour or results. Predictive modelling techniques are often iterative involving the collection of data, the formulation of a statistical model, and the approximation of an outcome. The process is refined and validated as more data becomes available. Applications of predictive modelling include: Spam filtering, customer relationship management (CRM), capacity planning, disaster recovery, engineering, meteorology, insurance risk, credit score, and marketing.

B. K-means algorithm: A centroid-based partitioning technique uses the centroid of a cluster, Ci, to represent that cluster. Conceptually, the centroid of a cluster is its center point. The centroid can be defined in various ways such as by the mean or medoid of the objects (or points) assigned to the cluster. The difference between an object $p \in Ci$ and ci, the representative of the cluster, is measured by dist (p, ci), where dist(x, y) is the Euclidean distance between two points x and y. The quality of cluster Ci can be measured by the within

cluster variation, which is the sum of squared error between all objects in Ci and the centroid ci, defined as

$$E = \sum_{i=1}^{k} \sum_{p \in C_i} dist(p, c_i)^2,$$

Where, E is the sum of the squared error for all objects in the data set; p is the point in space representing a given object; and ci is the centroid of cluster Ci (both p and ci are multidimensional). In other words, for each object in each cluster, the distance from the object to its cluster center is squared, and the distances are summed. This objective function tries to make the resulting k clusters as compact and as separate as possible.

Working of the k-means algorithm: The k-means algorithm defines the centroid of a cluster as the mean value of the points within the cluster. It proceeds as follows. First, it randomly selects k of the objects in D, each of which initially represents a cluster mean or center. For each of the remaining objects, an object is assigned to the cluster to which it is the most similar, based on the Euclidean distance between the object and the cluster mean. The k-means algorithm then iteratively improves the within-cluster variation. For each cluster, it computes the new mean using the objects assigned to the cluster in the previous iteration. All the objects are then reassigned using the updated means as the new cluster centers. The iterations continue until the assignment is stable, that is, the clusters formed in the current round are the same as those formed in the previous round [5].

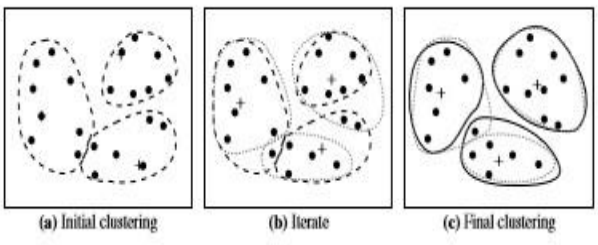

Figure1 : Clustering of a set of objects using the k-means method; for (b) update cluster centers and reassign objects accordingly (the mean of each cluster is marked by a+)

III. THERAPIES FOR DEPRESSION RECOVERY

We have studied various literatures about the therapies related to recovery from depression which are mentioned below:

A. **Musical Therapy**: Music is considered as instant reliever in all fields where depression is associated. The best approach to treat depression comes in two packets: active and receptive. Active techniques come into pictures when the patients are unable to articulate particular feelings. Receptive Techniques includes recomposed music which can be a tool for relaxation, reflection and leisure mood state. These therapies are an hour of need and hence require sound research. A recent study conducted at Queen's University Belfast has come up to a conclusion that music therapy can be effective to treat depression in adolescents and children dealing with emotional, developmental and mental problems.

B. **Meditation**: The next big heap in treating depression includes mediation which is an increasing practice worldwide. It is an anti depressant in all age groups since it deals with emotional state of an individual. According to the study meditation helps fight anxiety and unstable emotional state. We can integrate this therapy in treating depression which optimistically helps people fight depression in all age groups. Meditation can be considered an active training of mind to increase awareness among us. This can be sound concept to treat depression since it has been suggested since many years from the experts in the domain.

C.**Yoga**: The natural anti- depressant therapy which has been a boon to the recent world is yoga. Studies shows that higher levels of amino acid and GABA are reported in the people constantly associated with yoga, which are significantly low in depressed people. Yoga contains different yoga poses which are extremely useful in not only in healthy habitat but also in fighting depression, various emotional and anxiety disorders. Yoga can be mainly emphasized upon because it is gentle, calming and fluid in nature.

D.**Talking therapy:** During a certain point of time it is better to talk to a stranger than to our relatives to get solutions to the questions hovering in our mind. This therapy includes talking to a therapist crying, shouting and yelling. This may help individuals to find solutions to their problems by giving them a chance to express themselves without judging them. This may be useful to look at your problems in a different way. There will be one to one conservation with the therapist. Although, there are many types of talking therapy, the main aim is to make suffering people better.

IV. CONCLUSIONS

This paper is totally based on the depression which is a global level problem. Our main aim of this paper is study of detection methods used in various systems. Some algorithms are used to detect the level of depression like k-means algorithm, machine learning algorithm, and prediction algorithm. Methods like EEG signals, face recognition, vocal prosody are used to detect depression in people. Some therapies as a remedy on the depression recovery are also given in this paper.

III. References

[1]. EEG Signal and Video Analysis Based Depression Indication.Yashika Katyal1'Suhas V Alur2,Shipra Dwivede'Menaka R4 1,2,3,4ECE, VIT University,Associate Professor, VIT ,Chennai, India

[2]. Detecting Depression Severity from Vocal Prosody Ying Yang, Catherine Fairbairn, and Jeffrey F. Cohn, Associate Member, IEEE

[3]. Multichannel Weighted Speech Classification System for Prediction of Major Depression in Adolescents Kuan Ee Brian Ooi, Margaret Lech, and Nicholas B. Allen

[4]. Stuart Russell and Peter Norvig (1995), \Artificial Intelligence: A Modern Approach," Third edition, Pearson, 2003.

[5]. Jiawei Han, Micheline Kamber, \Data mining: concepts and techniques", Morgan Kaufmann Publisher, second edition

[6]. Results from the 2013 National Survey on Drug Use and Health: Mental Health Findings U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES Substance Abuse and Mental Health Services Administration Center for Behavioral Health Statistics and Quality

[7]. Yoga and Depression Written by Brian Krans | Published on December 10, 2013 Medically Reviewed by George Krucik, MD, MBA on December 10, 2013

[8]. B.B. Chaudhuri, U. Bhattacharya, "Efficient training and improved performance of multilayer perceptron in pattern classification", in Neurocomputing 34 (2000) 11-27.

[9]. L. Fausett, "Fundamentals of Neural Networks Architectures, Algorithms, and Applications", in Prentice Hall, Englewood Cliffs, NJ, 1994.

[10]. S. Haykin, "Neural Networks: comprehensive Foundation" ,in Macmillan, New York, 1994.