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# Bipolar Disorder Activity Recognition Using Deep Learning

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**ABSTRACT:** Deep Learning is used for identifying the facial expression of the bipolar disorder affected persons. Here the microcontroller used is Raspberry Pi. The camera is fixed inside the room for monitoring the patients continuously. The image capture is sent to the microcontroller and the state of the patient is identified by the deep learning technique according to that detected emotion the light settings, music, and wall paper is changed to make them normal. It will reduce the pressure of the bipolar disorder patient's care taker.

**KEYWORDS:** Raspberry pi, Deep learning, Bipolar disorder.

## I. INTRODUCTION

Bipolar disorder is a complex disorder of mental chronic illness, it is characterized by the alternating phases of mood changes from depression to hypomania. Symptoms like sadness, hopelessness, loss of interest and loss of energies are experienced by the patients during the depressive state. The mood swing to the hypomania, the patients experience symptoms ranging from full of energy and hyperactive. This disorder affects the millions of people in the world. With the use of deep learning we can help both patients and doctor to get a better diagnosis from this illness. Bipolar disorder is a very common disorder. The interval and the duration time of mood states occurs in various moments of the life and also it differs from patients to patients. Deep learning concept is used to get a relief from this illness. Deep learning is a growing segment of Artificial Intelligence. Now a days Deep learning is present in all the systems. It gathers the information, collects large amount of data through the many layered deep neural network for better abstraction of image, that ensures to make the sensing of images easy and it is mostly used in the application of software development. In this project using deep learning the features and tasks are learned directly from the image. Emotions of the patients were already stored, depending on the facial expression captured by the camera module the neural network extracts the features and gives the exact output like music in speaker, different kind of light setting and various types of images in wallpaper. The entire process was controlled by the Raspberry Pi controller.

## II. RELATED WORK

1. Jonas Busk and Jakob E. Bardon has proposed a machine learning system for mood prediction of patients suffering from bipolar disorder. Daily mood state of the patients data was collected by using smartphone based data sensor. The sensor detects the patients emotional states in a development generic and personalized model. They compare the states of depression and mania displays the output in the form of report. The collection of data is in the report of Randomized Clinical Trial. Through the report they found the strategy, emotion state of patients report and performance affects.
2. Surjya Ghosh and Bivas Mitra has proposed a system of deep learning concepts. The patients data are stored by using the smartphones. Large amount of data storage consists of Compute Neural Network model. The model consists of some special features speed, character and typing mistakes. The typing data are collected using keyboard and their emotions are recorded as self-reported. Typing data consists of relaxed, happy,

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stressed, and sad. The emotions are taken from the different quadrant they are non-overlapping. Recording option are available as a self-report. The neural network that has stored the amount of data collected through the system in the smartphones .

3. Andrey Kormilitzin and Terry Lyores has proposed a system to detect the depression and mania using the self-reported data mood. It is an experimental clinical application that extract the data and compares the data from the baseline model. The element of signature level features are used in the extraction level of data. The self-reported data is determined in longitudinal partitioned level. The data collected is compared with the several linear, nonlinear levels of data and predict the patients depression and mania .
4. Chryssa Thermolia has proposed a patient monitoring system using semantic web technology and health record electronic technology to support the intelligent clinical records. The data collected through the Electronic Health Record [EHR].It consist of four layers. The presentation layer is consider as top layer of the system it provides the current status of the patients in the form of statistical graph. It also responsible for the data representation in the form of human computer interaction. Application layer controls the entire operation it consists of sublayer business, security and data access.It consist of the mechanism and the data must be stored in a encryption formate. Intelligence layer identifies the key components of bipolar disorder. The data base layer is used to hold the information. Through the block diagram the data can be extracted and monitoring the levels.
5. Gaetano Valenza and Antonio Lanatz has proposed a nonlinear dynamic methods for predicting the bipolar disorder patients using heartbeat. It is a mood prediction chain between euthymic state and non-euthymic state of proposed signal processing scheme. The data of the patients could be compared with time, frequency domain and nonlinear analysis. The past and current observation states of the mood changes was taken and it could be predicted. Every mood states of the hypomania, depression and mixed state of bipolar disorder was analyzed.
6. Soheil Khorram and John Gideon has proposed a system for recognition of depression. This paper mainly depends on the focus of depression like excluded, euthymic and depressed. This system is mainly depends on the speech signal. Captures both cohort and specific subject variation in speech to detect the bipolar disorder. Rhythm detection are done by the i vector it is useful for the unlabeled person call assessment. Learning weight in subject specific variation is depends on the concentration of fusion experiments.
7. Turker Tekin Erguzel has proposed an artificial intelligence system for predicting the patients who are affected by the bipolar disorder. The patients EEG was recorded. The property of artificial neural network in the method of artificial intelligence is used for the functional and structural features of computational model of biological network. The prediction process is depends on the neural network. The network consist of input layer, hidden layer and output layer. The functional activities is depends on the parameter of the system. Less amount of features ate eliminated and specific amount of features are taken for the preliminary action
8. Michel Valstar and Bjorn Schuller has proposed recognition challenge for visual emotion and depression. It is a human computer recognition of interaction task maintained by the webcam. Only one person clip was taken if more than one features clip wants to take means the speaker is recorded over the one and fourth times of data. The data of the images are extracted through the video extraction the face and the eyes images are detected based on the location. The blocks of histogram is separated into 4 and the features are computed with the single histogram .
9. Mozghan Mohammed Ghasemi has proposed an artificial neural network for recognition of bipolar disorder. The network layer of multilayer perception that maps the input data and thus it sets the output data. It consist of nodes of multiple layer that connect to each layer of one another network in a directed format. They uses machine learning algorithm and RBF model. The application of neural network was analyzed. Depending on the parameter used in the algorithm the bipolar disorder was diagnosed. The data that can be collected and the features are extracted through the algorithm.
10. Marina Marcus and Dan Chisholm has proposed a global burden depression challenge for health care in both economic, social and clinical levels. Depression that can be managed through the primary care of the patients. Cognitive behavior therapy and interpersonal treatment that makes the functioning of the diagnosis in bipolar disorder. The depression test was analyzed and data collected .

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## DEEP LEARNING

Deep learning is a technique of making the machine to take decision. this is done by giving training to the machines, by training the machine it will take decision the deep learning consists of an convolution neural network, which is same as the humans neural network, the main advantage of the deep learning is the input can be given directly given in image, it is used in many fields such as medical industries etc, it will give the approximate solution and also cost efficiency and time efficiency. The deep learning can also predict the future.

The machine is trained by giving the different types of face in different emotion by training continuously the machine will detect the emotion when the new image is given it will done by the convolution network of deep learning.

## III. EXPERIMENTAL RESULTS

The below figure shows the result obtained in facial recognition using deep learning. The different images were captured and the emotions were identified,

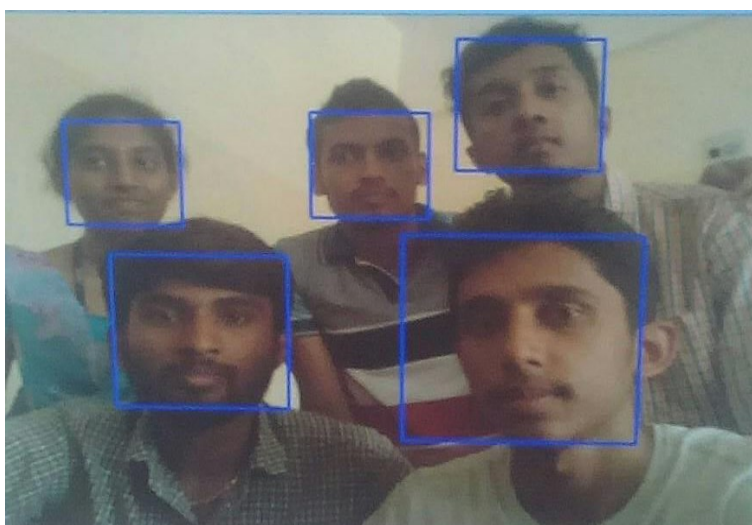


Fig a identifying the image

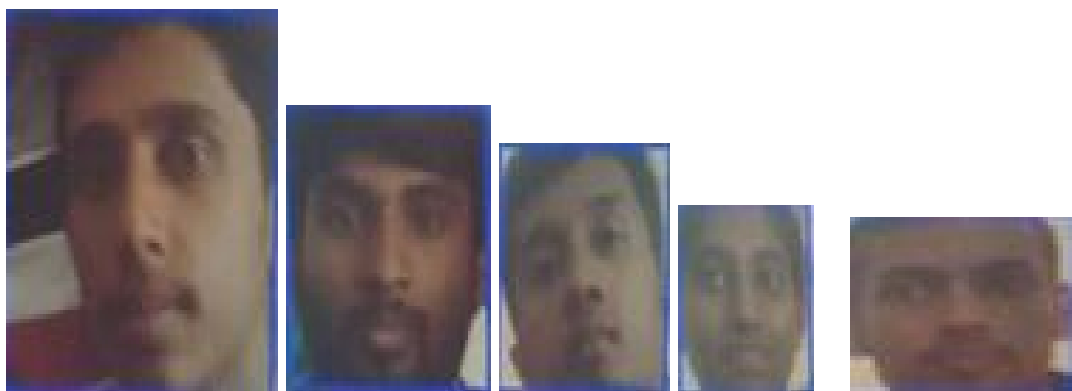


Fig b different emotions of face.

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Fig c ambient light for changing the patient mood

## IV. CONCLUSION

The bipolar disorder activity recognition system using deep learning is implemented successfully, and the deep learning concept used here gave good result. The camera detects the image the raspberry pi with deep learning identifies the emotions and the music, light, and wallpaper were automatically changed according to the mood.

## REFERENCES

- [1] Marina Marcus and Dan Chisholm, "Depression A Global Public Health Concern", Department of mental health and substance, 2014.
- [2] Mozghan Mohammed Ghasemi, "The Effect Of Neural Network Models On Diagnosis Of Bipolar Disorder" International journal of engineering and research, Volume 3, Issue 5, 2014.
- [3] Michel Valstar and Bjorn Schuller, "The Continuous Audio Visual Emotion and Depression Recognition Challenge", 2015.
- [4] Turker Tekin Erguzel, "Artificial Intelligence Approach to Classify Unipolar and Bipolar Depressive Disorder", The natural computing application forum, 5 June 2015.
- [5] Soheil Khorram and John Gideon, "Recognition of Depression in Bipolar Disorder: Leveraging Cohort and Person-Specific Knowledge", Department Computer Science and Engineering, 2016.
- [6] Gaetano Valenza and Antonio Lanata, "Predicting Mood Changes in Bipolar Disorder Through Heart Beat Nonlinear Dynamics", Department of Information Engineering with Research center, 2016.
- [7] Andrey Kormilitzin and Terry Lyores, "Detecting Early Signs of Depressive and Manic Episodes in Patients with Bipolar Disorder using the Signature Based Model", Aug 3 2017.
- [8] Chryssa Thermolia, "Designing a Patients Monitoring System for Bipolar Disorder using Sematic Web Technology", IEEE, 2017.
- [9] Jonas Busk and Jakob Bardon, "Personalized Versus Generic Mood Prediction Models in Bipolar Disorder", Department of Computer Science and Engineering, October 8, 2018.
- [10] Surjya Ghosh and Bivas Mitra "Effectiveness of Deep Neural Network Model in Typing based Emotion Detection on Smartphones", Nov 2, 2018.