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Tracking and Detecting depression level using facial recognition and PEN & IQ test

Nutan Balu Bolgir, BE.Student
Department of Information Technology
Sandip Institute of Technology & Research Center,Nashik-422213
Email-nutanbolgir@gmail.com

Prajwal Hari Thorat, BE,Student
Department of Information Technology
Sandip Institution of Technology & Research Center,Nashik-422213
Email-prajwalthorat694@gmail.com

Sakshi Gopal Narkhede, BE Student
Department of Information Technology
Sandip Institute of Technology & Research Center,Nashik-422213
Email-nsakshi321@gmail.com

Disha Diwakar Tribhuvan, BE Student
Department of Information Technology
Sandip Institute of Technology & Research Center,Nashik-422213
Email-dishatribhuvan20@gmail.com

Mr.Vivek.N.Waghmare, Project Guide
Department of Information Technology
Sandip Institute of Technology & Research Center,Nashik-422213
Email- vivek.waghmare@sitrc.org

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Abstract - In this study, we propose a novel approach for monitoring and tracking depression levels by making use of facial recognition technology, PEN test and IQ test. The hypothesis underlying our methodology is that there may be certain specific changes in face expressions related to depression along with an overall decline in cognitive function which are measurable using these tests. This technique involves two phases - firstly it analysis the depression related changes in the facial expressions and then second phase uses PEN and IQ test for determining its depression level. The proposed approach suggested by research focuses on tracking and detecting depression levels, so using this we can potentially aid in early diagnosis and treatment of depression.

Key Words: — Facial Recognition, Mental health, classification, algorithms, artificial intelligence, CNN.

INTRODUCTION

Depression is a serious mental health condition that affects millions of people worldwide. and it can have a profound impact on an individual's quality of life. Early detection and intervention are critical to effectively managing depression, and there is a growing interest in using technology to aid in the diagnosis and treatment of mental health disorders.

One such approach is using facial recognition technology, PEN testing, and IQ testing to track and detect depression levels. The idea is to use facial recognition software to analyze an individual's facial expressions for signs of depression, while also administering PEN and IQ tests to assess their mood and cognitive functioning.

LITERATURE SURVEY

Depression is a common mental health problem in our society. [1] Many people suffer from it and we need ways to detect it early. To do that, we need data about depression. This paper summarizes ten different datasets that researchers can use to study depression. It includes information about how the data was collected, what it measures, and how it was labeled. There is also a table that makes it easy to compare the different datasets.

Depression is a serious mental health condition that can affect daily life.[2] Researchers have been using machine learning models to detect emotions in audio, visual, and text data. They are now working on a model that uses images and videos to determine the level of depression in individuals. The model will classify people into categories based on their level of depression: Minimal, Mild, Moderate, or Severe. The two important parts of this model are the video input and the Beck Depression Inventory II, a questionnaire used to diagnose depression. By analyzing these components and comparing them to emotion and inventory vectors, the model will produce visual graphics to represent the individual's level of depression.

Mental health is a very important issue, especially for people who work.[3] The busy lifestyle and workload can lead to mental health problems like mood disorders and anxiety disorders. This means that working professionals are more at risk of developing mental health problems. Companies provide mental health care benefits to their employees, but that is not always enough. In this research paper, we looked at data from a mental health survey in 2019 that included information from working professionals in both tech and non-tech industries. We analyzed the data to find out which personal or professional factors can affect an employee's mental health or predict the likelihood of

them developing mental health problems. We used machine learning algorithms to build models that can accurately predict an employee's mental health based on the identified features. We measured the performance of these models using precision and recall. Overall, the goal of this research is to better understand how working conditions affect mental health and to develop tools that can help companies support their employees' mental health.

Facial expressions are an easy way to show how someone is feeling.[4] The Facial Expression Recognition system has many uses, such as understanding human behavior, detecting mental health problems, and creating synthetic human expressions. This research paper is a quick study of facial expression recognition and compares different methods of recognizing facial expressions using two datasets: JAFFE and CK. The paper focuses on appearance-based techniques, which means analyzing the visual appearance of facial features. Recently, a feature extraction technique called HOG has become popular for facial expression recognition. The paper found that using HOG feature gives good recognition rates in facial expression recognition. Combining LBP with LGC and combining HOG with other features like LDP and wavelets also improved recognition rates. Overall, this research aims to find the best ways to recognize facial expressions, which can be useful in many areas of study.

The popularity of social networking sites has grown rapidly, [5] but it has also led to problematic usage. Psychological disorders like cyber relationship addiction, information overload, and net compulsions are becoming more common. These disorders can be hard to detect early because they are passive, which means it takes a long time for clinical intervention. However, researchers argue that online behavior can be used to actively recognize these disorders. The challenge is that mental states cannot be observed directly from online activities. So, the researchers propose a framework that uses machine learning to identify possible cases of social network psychological disorders by extracting features from social network data. They tested their system with users in online social networks and improved accuracy by using a random forest classification model. The research analyzed large datasets and identified characteristics of three types of mental disorders. These results can help identify users of social networks who may have possible mental disorders.

This paper describes a computer system that can recognize facial expressions in pictures and videos.[6] It uses a technique called Histogram of Oriented Gradients (HOG) and Support Vector Machine (SVM) to analyze the face and its parts, and identify distinctive features. The system was tested on two well-known databases of facial expressions, and it achieved accuracy rates of 97.62% and 98.61%.

This study [7] aimed to investigate whether seeing faces covered by a Hijab evokes any special neural activity in people from the same cultural tradition. Nine volunteers were shown pictures of faces with and without a Hijab, as well as neutral pictures, and their brain activity was measured using EEG. The results suggest that there was no special neural response to Hijab-covered faces in the volunteers. However, the volunteers paid more attention to faces than to Hijab-covered faces, as indicated by differences in brain activity in certain areas of the brain.

Technological advancements have changed how people communicate, with social networks like Twitter, Facebook, Telegram, and Instagram becoming popular platforms for sharing thoughts and emotions. Researchers use these platforms to detect depression-related behavior and activity, analyzing text to extract important information. [8] Social networks provide valuable data on the onset of depression, such as low sociability, self-focused behavior, and high activity rates during both day and night. In this study, researchers used five machine learning classifiers to detect depression in tweets, and found that the LSTM classification model outperformed other baseline models for both balanced and imbalanced data sets.

Depression is affecting university students and mobile health applications were created to improve treatment options. [9] However, recent studies show a lack of proven therapeutic outcomes associated with these applications. Insufficient heuristic designs have also been reported, leading to the main focus of identifying features/functions needed in a Depression Detector Application and applying psychological measures for accurate detection. This study involved 30 participants and two experts in developing a depression detector mobile application using the Depression, Anxiety, and Stress Scale (DASS-21). The objective is to gain knowledge about using psychological measures on mobile depression detector applications and enhancing usability aspects in future studies.

Mental health problems like depression and anxiety can have serious consequences if left untreated, and the way people write can reflect mental well-being. Social media provides a source of user-generated text to study, which can help with early detection. [10] The eRisk shared task was created to detect early signs of depression on Reddit. The UNED-MED group proposed two approaches: feature-driven classifiers with TF-IDF terms, sentiment analysis, and depression terminology; and a Deep Learning classifier with pretrained Embeddings. The official task results showed modest results, indicating the difficulty of working with depression data.

Model explainability is crucial in the medical domain, as it helps build trust by providing insight into the model prediction. [11] However, many existing machine learning methods lack explainability, which is concerning. To address this issue, we propose a Multi-Aspect Depression Detection model with Hierarchical Attention Network (MDHAN) for automatic detection of depressed users on social media. Our model uses two levels of attention mechanisms to encode user posts and calculate each tweet and word's importance. Additionally, our hierarchical attention model captures semantic sequence features from user timelines, which helps in achieving explainable results. Our experiments show that MDHAN outperforms several robust baseline methods and improves predictive performance when detecting depression in users who are posting messages publicly on social media. Overall, MDHAN achieves excellent performance and ensures adequate evidence to explain the prediction.

PRPOSED SYSTEM

Mental illness has a profound impact on peoples functioning, health and quality of life. detecting early warnings of depression or any other mental illness is challenging. The proposed system provides a hybrid architecture of facial based emotion and PEN and IQ tests. combination of above technologies providing promising results for depression, mental state and self control. In our system the emotions are continuously monitored based on which the information for classification of mental illness of the person is obtained. using the information obtained, it conducts psychology test to diagnose the severity of the mental condition. the output of the combination of these two parameters are classified to determine the probabilities of identifying the mental state and depression level. and provide recommendation such as "Lacks of concentration", "Need to be focused", "Need some entertainment".

BLOCK DIAGRAM

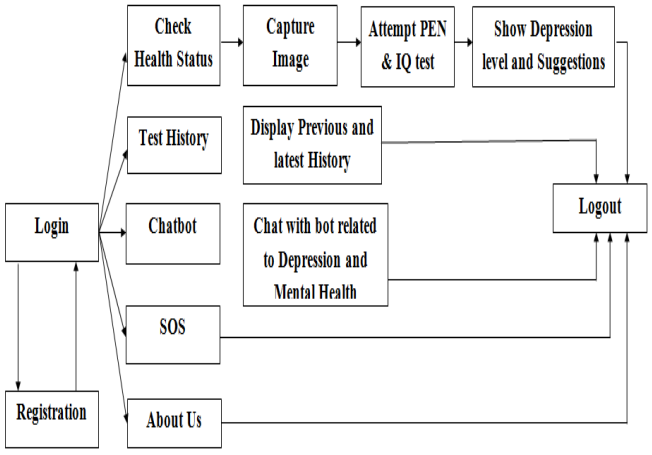

Fig -1: Block Diagram

OBJECTIVE OF SYSTEM

The proposed system will be developed to provide promising results for detecting depression and mental health. The system will use a hybrid architecture of facial emotion recognition and psychometric tests to identify mental disorders and depression levels, allowing users to input real-time data for processing.

ADVANTAGES

- System can easy to used.
- Used application from anywhere

SYSTEM REQUIREMENTS

- **Software Used:**

1. Software - Android Studio
2. Technologies - Android(java,xml), python, cloud, ml
3. Database - firebase realtime db
4. Datasets - default firebase ml kit
5. API - Brainshop api (Chatbot)

- **Hardware Used:**

1. Processor – i3 or above
2. Hard Disk – 150 GB
3. Memory – 4 GB RAM

ALGORITHMS

A Convolutional Neural Network (CNN) is a type of neural network that has revolutionized image processing-based machine learning tasks. In the past, many methods of image processing relied on hand-selected features, which often required significant effort and expertise to construct. CNNs, on the other hand, learn the features directly from the dataset.

A CNN is comprised of a series of layers, starting with the raw image pixels. Each layer performs a simple computation and passes the result to the next layer. The final result is fed into a linear classifier, which produces the classification decision. The computations performed by each layer are based on a set of parameters that are learned through a process called back propagation. Back propagation involves computing the gradient of the classification loss with respect to each parameter and then updating the parameter in order to minimize the loss function.

The tunable hyperparameters of the network include the update rule for the parameters and the choice of loss function. By adjusting these hyperparameters, researchers can fine-tune the performance of the network for a particular task.

CNNs have been shown to be highly effective at a wide range of image processing tasks, including object recognition, segmentation, and detection. They have also been applied to other types of data, such as speech and natural language, with great success. As a result, CNNs have become a foundational technology in the field of machine learning and are widely used in industry and academia.

CONCLUSION

In conclusion, tracking and detecting depression levels using facial recognition, PEN, and IQ tests can be a valuable tool for early detection and intervention for individuals at risk of developing or already suffering from depression. The proposed system utilizes facial recognition technology to detect changes in facial expressions and mood, as well as PEN and IQ tests to analyze cognitive function. By integrating these technologies, the proposed system can provide a comprehensive assessment of an individual's mental state, allowing for early detection. , this project has the potential to provide a cost-effective and efficient method for detecting and monitoring depression levels in individuals. This can lead to timely intervention and treatment, improving the quality of life of individuals suffering from depression

REFERENCES

[1] Malaysia,Teddy Surya Gunawan, Ulfiah " A Summarization of the Visual Depression Databases for Depression Detection" , 2021.

[2] Anagha Dhekne, Rasi Wani, Akshada Mulay, Pranjali Deshpande "Automatic depression level detection through visual input", 2020.

[3] Rahul Katarya , Saurav Maan " Predicting Mental health disorders using Machine Learning for employees in technical and non-technical companies" , IEEE INTERNATIONAL CONFERENCE ON ADVANCES AND DEVELOPMENTS IN ELECTRICAL AND ELECTRONICS ENGINEERING (ICADEE 2020).

[4] Jyoti Kumari, R. Rajesh and Abhinav Kumar, " Fusion of Features for the Effective Facial Expression Recognition", International Conference on Communication and Signal Processing, April 6-8, 2016, India.

[5] Jayshree N Lavhare, M.A Kulkarni "Mental Disorders Detection using Social Networking Sites", Proceedings of the Third International Conference on Intelligent Communication Technologies and Virtual Mobile Networks (ICICV 2021), IEEE Xplore Part Number: CFP21ONG-ART; 978-0-7381-1183-4.

[6] Sushanta Roy Supta , Md. Rifath Sahriar , Md. Golam Rashed , Dipankar Das, Rubaiyat Yasmin "An Effective Facial Expression Recognition System" 2020 IEEE International Women in Engineering (WIE) Conference on Electrical and Computer Engineering (WIECON-ECE), 2020.

[7] Tahamina Begum, Faruque Reza, Alwani Liyana Ahmed, Safira Elaina**,** Hanif Che Lah, Hazim Omar, J. M.Abdullah, Fardaus Ara Begum. "Neural Stimulants to N170 Event Related Potential (ERP) Component of Hijab Covered Faces: An ERP Study, IEEE EMBS International Conference on Biomedical Engineering and Sciences | Langkawi | 17th - 19th December 2012.

[8] Sonam Gupta, Lipika Goel, Arjun Singh, Ajay Prasad and Mohammad Aman Ullah " Psychological Analysis for Depression Detection from Social Networking Sites."

[9] Dinna N. Mohd Nizam1, Nurul Hidayah Ahmad1, Aslina Baharum1, Zaidatol Haslinda Abdullah Sani1, Carolyn Salimun1, Razif Bin Abas , "Developing a Depression Detector Application by integrating the DASS-21 measures: A Preliminary Study", International Journal of Advanced Trends in Computer Science and Engineering. https://doi.org/10.30534/ijatcse/2020/7691.42020

[10] Elena Campillo-Ageitos, Juan Martinez-Romo and Lourdes Araujo, "UNED-MED at eRisk 2022: depression detection with TF-IDF, linguistic features and Embeddings" *CLEF 2022:* Conference and Labs of the Evaluation Forum, September 5–8, 2022, Bologna, Italy

[11] Hamad Zogan, Imran Razzak, Xianzhi Wang, Shoaib Jameel, Guandong Xu, "Explainable depression detection with multi-aspect features using a hybrid deep learning model on social media". https://doi.org/10.1007/s11280-021-00992-2