DEPRESSION DETECTION USING EMOTIONAL ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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Abstract - **The psychological health of college students proves a vital role in their overall academic performance. Neglecting this can result in several problems such as stress, anxiety, depression, etc. These problems need to be detected and controlled at the initial stages itself for the better mental health of the student. Detecting depression in a vast no of college students is a challenging task. Most of the students are totally unaware that they may be having depression. If at all they are aware of it, some students conceal their depression from everyone. So, an automated system is required that will pick out the students who are dealing with depression. A system has been proposed here which captures frontal face videos of college students, extracts the facial features from each frame, and analyses these facial features to detect signs of depression in them. This system will be trained with frontal face images of happy, contempt, and disgusted faces. The presence of these features in the video frames will be analyzed to predict depression in the students.**

Key Words: **Image processing, Feature Extraction, Facial Features, Depression Detection, feedback**

INTRODUCTION:

Depression can occur in people of all ages. It can be very risky and can lead to anxiety attacks, death after a heart attack, and problems like blood pressure and diabetes. Therefore, it is very important to detect it and find causes of the same that can lead to appropriate treatment. There is also a need to remove the stigma around depression and mental health therefore Social Network Mental Disorder Detection can be performed which can help in de-stigmatizing it. Tests can be performed based on various artificial intelligence and machine learning algorithms under different scenarios to detect emotional imbalance. With the rise in technology, various AI-based approaches are evolved to make machines emotionally intelligent to detect emotions in human beings. Mental wellbeing may be a combination of the mental, emotional and social state of an individual. Depression is one of the mental wellbeing issues that show demotivated mood, interest withdrawal, low vitality or self-worth, feeling blameworthy, destitute concentration, etc. Depression can result in noteworthy misfortunes in numerous frameworks such as social, instructive, financial or equity systems. Depression is recorded as the fourth most critical cause of need of capacity by world health organization (WHO). Suicide hazard among depressed individuals is 30 times higher than common people. In this way for better exactness and in time appraisal, there is a need to create an automated machine system

MOTIVATION DEPRESSION

Depression is a prevalent mental disorder that can have a significant impact on people's mental health as well as their day-to-day lives. Depression and mental illness are key problems in society nowadays. It can cause a loss of interest in general activities, leading to suicidal thoughts. Hence, the need for an automated system to help detect depression in people of various age groups is being realized.

PROBLEM STATEMENT

To design a system that predicts depression status using machine learning and natural language processing to combine the results of facial expression and question answering

PROJECT SCOPE

In mental health research machine learning and artificial intelligence with mathematical modelling are progressively used for problem-solving. The machine-based health estimation systems with the help of human-machine .To create an efficient and practical depression detection system visual-based expression plays a very important role. With the help of facial expressions, people can effectively communicate their emotions. The Facial Action Coding System (FACS) is a dictionary containing the modelled facial expressions in detail that are created by the psychologist. Facial expressions such as right eyebrow, left eyebrow, veraguth folds, etc can be used. Even though better results to analyze depression can be obtained if audio-visual fusion is used instead of visual data only, our work concentrates on visual-based data also with the BDI-II inventory questions without using the audio.

GOALS AND OBJECTIVES

- To make a system which is user friendly.
- Security providing to important data of user.

- To study how facial expressions, images, Q and A, and texts on social media platforms can be effective in detecting one's emotions and then depression.
- To detect emotions in human beings to identify depression using machine learning.

LITURATURE SURVEY

Pampouchidou et al., "Automatic Assessment of Depression Based on Visual Cues: A Systematic Review", IEEE Transactions on Affective Computing, vol. 10, no. 4, pp. 445- 470, 1 Oct.-Dec. 2019. Automatic depression assessment based on visual cues is a rapidly growing research domain. The present exhaustive review of existing approaches as reported in over sixty publications during the last ten years focuses on image processing and machine learning algorithms. Visual manifestations of depression, various procedures used for data collection, and existing datasets are summarized. The review outlines methods and algorithms for visual feature extraction, dimensionality reduction, decision methods for classification and regression approaches, as well as different fusion strategies. A quantitative meta-analysis of reported results, relying on performance metrics robust to chance, is included, identifying general trends and key unresolved issues to be considered in future studies of automatic depression assessment utilizing visual cues alone or in combination with vocal or verbal cues.

G. Stratou, S. Scherer, J. Gratch and L. -P. Morency, "Automatic Nonverbal Behavior Indicators of Depression and PTSD: Exploring Gender Differences", Humaine Association Conference on Affective Computing and Intelligent Interaction, Geneva. 2013 In this paper, we show that gender plays an important role in the automatic assessment of psychological conditions such as depression and post-traumatic stress disorder (PTSD). We identify a directly interpretable and intuitive set of predictive indicators, selected from three general categories of nonverbal behaviors: affect, expression variability and motor variability. For the analysis, we introduce a semi-structured virtual human interview dataset which includes 53 video recorded interactions. Our experiments on automatic classification of psychological conditions show that a genderdependent approach significantly improves the performance over a gender agnostic one.

Z. Madhoushi, A. R. Hamdan and S. Zainudin, "Sentiment analysis techniques in recent works", 2015 Science and Information Con5 ference (SAI), London, UK, 2015, pp. 288-291. Sentiment Analysis (SA) task is to label people's opinions as different categories such as positive and negative from a given piece of text. Another task is to decide whether a given text is subjective, expressing the writer's opinions, or objective, expressing. These tasks were performed at different levels of analysis ranging from the document level, to the sentence and phrase level. Another task is aspect extraction which originated from aspect-based sentiment analysis in phrase level. All these tasks are under the umbrella of SA. In recent years a large number of methods, techniques and enhancements have been proposed for the problem of SA in different tasks at different levels. This survey aims to categorize SA techniques in general, without focusing on specific level or task. And also to review the main research problems in recent articles presented in this field. We found that machine learning-based techniques including supervised learning, unsupervised learning and semi-supervised learning techniques, Lexicon-based techniques and hybrid techniques are the most frequent techniques used. The open problems are that recent techniques are still unable to work well in different domain; sentiment classification based on insufficient labeled data is still a challenging problem; there is lack of SA research in languages other than English; and existing techniques are still unable to deal with complex sentences that requires more than sentiment words and simple parsing.

Rahul, S. Adhikari and Monika, "NLP based Machine Learning Approaches for Text Summarization",2020 Fourth International Conference on Computing Methodologies and Communication (ICCMC), 2020, pp. 535-538, doi: 10.1109/ICCMC48092.2020.ICCMC00099. This review paper presents various approaches to generate summary of huge texts. Various papers have been studied for different methods that have been used so far for text summarization. Mostly, the methods described in this paper produce Abstractive (ABS) or Extractive (EXT) summaries of text documents. Query-based summarization techniques are also discussed. The paper mostly discusses about the structured based and semantic based approaches for summarization of the text documents. Various datasets were used to test the summaries produced by these models, such as the CNN corpus, DUC2000, single and multiple text documents etc. 6 We have studied these methods and also the tendencies, achievements, past work and future scope of them in text summarization as well as other fields

Z. Zeng, M. Pantic, G. I. Roisman and T. S. Huang "A Survey of Affect Recognition Methods: Audio, Visual, and Spontaneous Expressions"," in IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 31, no. 1, pp. 39-58, Jan. 2009. Automated analysis of human affective behavior has attracted increasing attention from researchers in psychology, computer science, linguistics, neuroscience, and related disciplines. However, the existing methods typically handle only deliberately displayed and exaggerated expressions of prototypical emotions despite the fact that deliberate behaviour differs in visual appearance, audio profile, and timing from spontaneously occurring behaviour. To address this problem, efforts to develop algorithms that can process naturally occurring human affective behaviour have recently emerged. Moreover, an increasing number of efforts are reported toward multimodal fusion for human affect analysis including audiovisual fusion, linguistic and paralinguistic fusion, and multi-cue visual fusion based on facial expressions, head movements, and body gestures. This paper introduces and surveys these recent advances. We first discuss human emotion perception from a psychological perspective. Next we examine available approaches to solving the problem of machine understanding of human affective behavior, and discuss important issues like the collection and availability of training and test data. We finally outline some of the scientific and engineering challenges to advancing human affect sensing technology

SYSTEM ARCHITECTURE

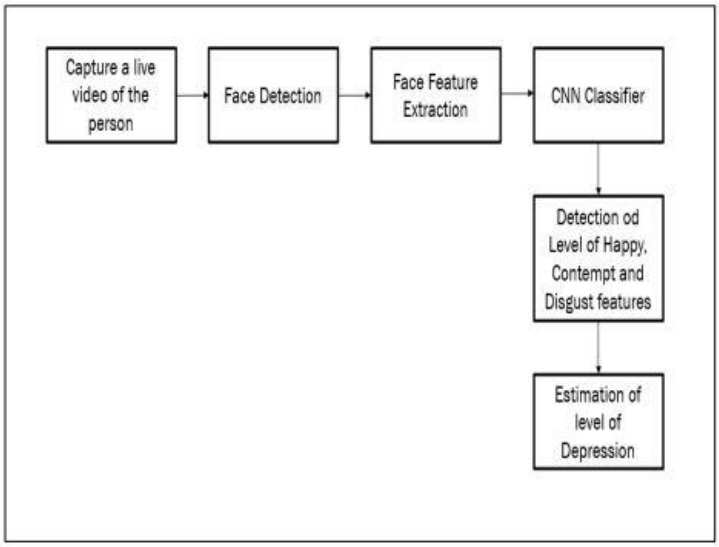

Fig -1: System Architecture Diagram

APPLICATION:
Social
Public sector
Schools and Colleges

FUNCTIONAL & NON-FUNCTIONAL REQUIREMENTS
Functional requirements: may involve calculations, technical details, data manipulation and processing and other specific functionality that define what a system is supposed to accomplish. Behavioral requirements describe all the cases where the system uses the functional requirements; these are captured in use cases.
Nonfunctional Requirements: (NFRs) define system attributes such as security, reliability, performance, maintainability, scalability, and usability. They serve as constraints or restrictions on the design of the system across the different backlogs.
Functional requirements

- Registration
- User Login
- Creation of database: Users Mandatory Information

Design Constraints:
1. Database
2. Operating System
3. Web-Based Non-functional Requirements

Security:
1. User Identification
2. Login ID
3. Modification

Performance Requirement:
1. Response Time
2. Capacity
3. User Interface
4. Maintainability
5. Availability

SYSTEM REQUIREMENTS
- **Hardware Requirements**:

1. RAM: 512 MB
2. Hard Disk: 80 GB

- **Software Requirements**:

1. Operating System: Windows 7 or higher
2. Eclipse IDE 2018 / pycharm
3. Software Technology: Java / Python.

CONCLUSION

The absence of happy features will give the amount of negativity in the video. The identification of the level of depression in each video can be done into three levels – high, moderate, and mild, based on the depression level estimation depicted. Depending on the overall negativity of the video the required counseling can be recommended.The key idea is to develop a video-based decision network system that can detect the depression of the user. The system provides the result to the user in the form of document consisting the detected depression level. The web application is a media to collect visual input and display the results with demographic, temporal graphical analysis. The convolutional 3D model can learn, resulting in detection of salient features from an input image to provide an emotion vector categorized as: Angry, Sad, Happy, Surprise, Fear and Neutral.

REFERENCES:

1. A. Pampouchidou et al., ”Automatic Assessment of Depression Based on Visual Cues: A Systematic Review,” in IEEE Transactions on Affective Computing, vol. 10, no. 4
2. C. Jyotsna and J. Amudha, ”Eye Gaze as an Indicator for Stress Level Analysis in Students,” 2018 International Conference on Advances in Computing, Communications and Informatics (ICACCI), Bangalore, India, 2018, pp. 1588-1593.
3. S. Song, L. Shen and M. Valstar, ”Human Behaviour-Based Automatic Depression Analysis Using Hand-Crafted Statistics and Deep Learned Spectral Features,” 2018 13th IEEE International Conference on Automatic Face Gesture Recognition (FG 2018), Xi’an, China, 2018, pp. 158-165
4. S. Alghowinem et al., ”Multimodal Depression Detection: Fusion Analysis of Paralinguistic, Head Pose and Eye Gaze Behaviors,” in IEEE Transactions on Affective Computing, vol. 9, no. 4, pp. 478-490, 1 Oct.-Dec. 2018
5. A. Pampouchidou et al., ”Facial geometry and speech analysis for depression detection,” 2017 39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Jeju, Korea (South), 2017, pp. 1433-1436..
6. M. Deshpande and V. Rao, ”Depression detection using emotion artificial intelligence,” 2017 International Conference on Intelligent Sustainable Systems (ICISS), Palladam, India, 2017, pp. 858-862
7. M. M. Aldarwish and H. F. Ahmad, ”Predicting Depression Levels Using Social Media Posts,” 2017 IEEE 13th International Symposium on Autonomous Decentralized System (ISADS), Bangkok, Thailand, 2017, pp. 277-280.
8. M. Hooda, A. R. Saxena, D. Madhulika and B. Yadav, ”A Study and Comparison of Prediction Algorithms for Depression Detection among Millennials: A Machine Learning Approach,” 2017 International Conference on Current Trends in Computer, Electrical, Electronics and Communication (CTCEEC), Mysore, India, 2017, pp. 779-783.
9. Pampouchidou et al., ”Automatic Assessment of Depression Based on Visual Cues: A Systematic Review,” in IEEE Transactions on Affective Computing, vol. 10, no. 4, pp. 445-470, 1 Oct.-Dec. 2019.
10. G. Stratou, S. Scherer, J. Gratch and L. -P. Morency, ”Automatic Nonverbal Behavior Indicators of Depression and PTSD: Exploring Gender Differences,” 2013 Humaine Association Conference on Affective Computing and Intelligent Interaction, Geneva, Switzerland, 2013, pp. 147-152.
11. Madhoushi, A. R. Hamdan and S. Zainudin, ”Sentiment analysis techniques in recent works,” 2015 Science and Information Conference (SAI), London, UK, 2015, pp. 288-291.
12. Z. Zeng, M. Pantic, G. I. Roisman and T. S. Huang, ”A Survey of Affect Recognition Methods: Audio, Visual, and Spontaneous Expressions,” in IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 31,