

Tracking and Detecting Depression Level using Facial Recognition and PEN&IQ Test

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Abstract: *These Human facial expressions convey a lot of information visually rather than articulately. Facial expression recognition plays a crucial role in the area of human-machine interaction. Automatic facial expression recognition system has many applications including, but not limited to, human behaviour understanding, detection of mental disorders, and synthetic human expressions. Recognition of facial expression by computer with high recognition rate is still a challenging task.*

Two popular methods utilized mostly in the literature for the automatic FER systems are based on geometry and appearance. Facial Expression Recognition usually performed in four-stages consisting of pre-processing, face detection, feature extraction, and expression classification. The human face is an important part of an individual's body and plays an important role in knowing the individual's mood. The face is where a human expresses all his basic emotions. In the existing system, they examine the mental state manually by assessing them but have many disadvantages like we cannot predict any accurate solutions based on the assessment score because we might be not sure what kind of emotions the human user would be all time. To overcome this problem, a novel system is proposed to suggest an effective solution for predicting the mental state dynamically, we propose a hybrid architecture invoking facial based emotion sequence, PEN test and IQ test. By consistent monitoring of a human's emotion and subjecting to PEN and IQ tests, the human's mental state is routed. Combination of the above three techniques provides promising results for mental state and self-control.

Keywords: Depression Level, Conventional Neural Network, classification, algorithms, artificial intelligence, Machine Learning

I. INTRODUCTION

Facial expressions can be considered not only as the most natural form of displaying human emotions but also as a key non-verbal communication technique. The processing of emotional facial expressions is modulated by personality; for example, neuroticism, a dimension of the five-factor model of personality has been found to play a role in this regard. Neuroticism is characterized by the tendency to be anxious, nervous, and hostile. Neuroticism is also considered to be a risk predictor for depression. Dementia, attention deficit hyperactivity disorder, schizophrenia and obsessive-compulsive disorder. In schizophrenia, cognitive impairments are often found in multiple areas, including visual information processing; attention; working memory; short-term memory and learning; executive functioning; speed of processing; reasoning and problem solving; context processing and social perception and cognition. The impairment of executive functions called "dysexecutive syndrome", are common in neurological patients and are related to brain dysfunction specifically in the prefrontal cortex. Individuals who have an impairment of executive functions shows problems of starting and stopping activities, a difficulty I mental and behavioural shifts, an increased destructibility and difficulties in learning new tasks. The executive functions, defined as higher order cognitive functions needed for performing complex tasks, are often impaired also in patients with Obsessive Compulsive Disorder (OCD) which are characterized by the impairment of several skills such as attention, planning, problem-solving and behavioural control. No single profile of cognitive deficits has been found to characterize all patients. The majority have impaired ability in at least one area of functioning and a standardized platform for assessing neurocognitive functioning is an important aspect of comprehensive treatment and research for this and other conditions. In this world, lot of people are facing

numerous problems which result in depression and mental illness and the users are motivated to innovate a solution integrating image processing and machine learning techniques to predict the mental illness by recognizing people's emotions and by conducting IQ and PEN tests to measure the mental illness and provide relevant suggestions

II. PROBLEM STATEMENT

The human face is an important part of an individual's body and plays an important role in knowing the individual's mood. The face is where a human expresses all his basic emotions. In the existing system, they examine the mental state manually by assessing them but have many disadvantages like we cannot predict any accurate solutions based on the assessment score because we might be not sure what kind of emotions the human user would be all time. To overcome this problem, a novel system is proposed to suggest an effective solution for predicting the mental state dynamically, we propose a hybrid architecture invoking facial based emotion sequence, PEN test and IQ test. By consistent monitoring of a human's emotion and subjecting to PEN and IQ tests, the human's mental state is routed. Combination of the above three techniques provides promising results for mental state and self-control.

III. PROPOSED APPROACH

In this world, lot of people are facing numerous problems which result in depression and mental illness and the users are motivated to innovate a solution integrating image processing and machine learning techniques to predict the mental illness by recognizing people's emotions and by conducting IQ and PEN tests to measure the mental illness and provide relevant suggestions. Some of the people who have a mental illness are reluctant to seek help due to the negative stigma associated with having a psychological disorder; they may feel embarrassed, ashamed, or guilty when they first experience the symptoms of a mental health condition. The possibility of being spotted arriving or leaving an appointment discourages many from getting the help they need. The use of herapeutic apps would allow them to receive treatment within the convenience and privacy of their own homes, which is essential for those who want to be discrete. Having this alternative as an option would courage more ill people to seek therapy.

IV. PROPOSED SYSTEM

Mental Illness has a profound impact on people's 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 invoking facial based emotion sequence, PEN test, IQ test. By consistent monitoring of a human's emotion and subjecting to PEN and IQ tests, the human's mental state is routed. Combination of above three techniques provides promising results for depression, mental state and self-control. In our proposed system, the emotions are continuously monitored based on which the information for the classification of mental illness of the person is obtained. Further, using the information obtained, it conducts a psychology test to diagnose the severity of the mental condition. It combines these outputs with a psychometric study which consists of an IQ test and a Personality test.

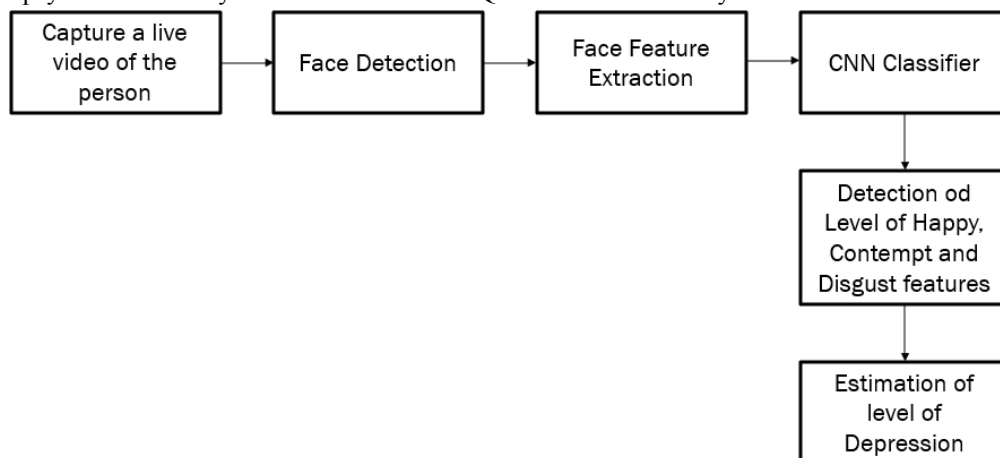


Fig. 1. Proposed System Architecture

The output of the combination of these three parameters are classified to determine the probabilities of identifying the mental and provide recommendations such as " lacks concentration ""Need to be focused""Seems depressed need some entertainment" a person can hold.The advantages of the proposed system are having PEN and IQ tests with a set of evaluating questions. It uses a web-cam to capture the emotion of the current users. Based on the final report, the suggestion are given to suppress the users mental state.

V. WORK FLOW

The steps of Mental Health Monitoring system using Facial recognition, PEN test and IQ test are:

1. Face Detection
2. Feature extraction-Eye Extraction, Eyebrow Extraction and Mouth Extraction
3. Facial Emotion Recognition
4. Mental State Detection
5. Evaluation of Psychometrics
6. Classification of mental illness

VI. SOFTWARE TESTING

Testing is the process of evaluating a system or its component(s) with the intent to find whether it satisfies the specified requirements or not. Testing is executing a system in order to identify any gaps, errors, or missing requirements in contrary to the actual requirements.

6.1 Types of testing

A) Manual Testing

Manual testing includes testing a software manually, i.e., without using any auto- mated tool or any script. In this type, the tester takes over the role of an end- user and tests the software to identify any unexpected behavior or bug. There are different stages for manual testing such as unit testing, integration testing, sys- tem testing, and user acceptance testing. Testers use test plans, test cases, or test scenarios to test a software to ensure the completeness of testing. Manual testing also includes exploratory testing, as testers explore the software to identify errors in it.

B) Automation Testing

Automation testing, which is also known as Test Automation, is when the tester writes scripts and uses another software to test the product. This process involves automation of a manual process. Automation Testing is used to re-run the test scenarios that were performed manually, quickly, and repeatedly.

C) Black Box Testing

The technique of testing without having any knowledge of the interior workings of the application is called black-box testing. The tester is oblivious to the sys- tem architecture and does not have access to the source code. Typically, while performing a black-box test, a tester will interact with the system's user interface by providing inputs and examining outputs without knowing how and where the inputs are worked up.

D) White Box Testing

White-box testing is the detailed investigation of internal logic and structure of the code. White-box testing is also called glass testing or open-box testing. In order to perform white-box testing on an application, a tester needs to know the internal workings of the code.

VII. CONCLUSION

It is essential to get accurate and reliable identification of stress and it requires a valid analysis and experimental methodology framework. The main contribution of the proposed system is developing an experimental model for successfully identifying stress at multiple levels. This proposed system uses python packages to give accurate results

for our research on facial emotion based system along with psychometric tests such as IQ and PEN to evaluate the problem solving capability and the nature of users character in this world and if the user is facing some mental disturbance they are provided with relevant suggestions so that they can change their view in the things they face and try be happy in all the situations. The proposed system can be enhanced to detect more disorders. Also, the system can be enhanced to help doctors, counsellors, therapists to identify and detect stress in patients using the framework. The proposed system can also be made into a complete software for the companies to identify their employees mental health on a daily basis.

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