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Health Assistance Application for Employee Wellbeing using Computer Vision Technology

R. Sivaranjani B.sc.,
Pursuing M.C.A. Krishnasamy College of Engineering & Technology

Mr.S.Barath.,M.C.A
M.Phil., Assistant Professor Krishnasamy College of Engineering & Technology

Parthiban Kannan Chief Executive Officer
Aatomz ResearchCuddalore

ABSTRACT:

The factors like challenges at work, longer task duration, toxic collaboration and cold wars between colleagues affect the employee's mental health, directly impacting productivity. Also, an employee's mental health is one of the significant factors for employee attrition rate in any organization. so every organization wants to build a healthy environment to keep their employees mentally strong and engaged in the workplace. But most of the employees were diplomatic to deal with their problems. Hence, there is a strong need for a solution to help the employees to assist with their mental health. We are proposing a computer vision solution to identify the employees' mental health by recognizing their facial expressions while working and assisting them to be aware of their mental health in a day-to-day manner using a data analytics dashboard.Also, our solution helps them know when to take a rest and when to do work for more productivity with a machine learning recommendation system.

Introduction:

We know that emotions play a major role in a Human life. At different kind of moments or time Human face reflects that how he/she feels or in which mood he/she is. Humans are capable of producing thousands of facial actions during communication that vary in complexity, intensity, and meaning. Emotion or intention is often communicated by subtle changes in one or several discrete features. The addition or absence of one or more facial actions may alter its interpretation. In addition, some facial expressions may have a similar gross morphology but indicate varied meaning for different expression intensities. In order to capture the subtlety of facial expression in non-verbal communication, I will use an existing simulator which will be able to capture human emotions by reading or comparing facial expressions. This algorithm automatically extracts features and their motion information, discriminate subtly different facial expressions, and estimate expression intensity.To cope with negative emotions in daily life and to improve emotional states, we designed a healthcare system that focuses on emotional aspects. Our system integrates emotion detection to recognize users' current emotional states to provide services to increase their positive emotions and reduce such negative emotions as sadness, anger and fear.

Problem Definition:

As described in the overview, the purpose of this paper is to analyze the limitations with existing system Emotion recognition using brain activity which is toughest task to do as it become expensive, complex and also time consuming. They have used existing data and the result of their analysis were 31 to 81 percentage correct and from which even by using Fuzzy logic 72 to 81 percentage only for two classes of emotions. Apparently the division between different emotions is not (only) based on signals it depend on some another. I am going to purpose a system (by using an existing simulator) which is capable for achieving up to 97 percentage results and easy than Emotion recognition using brain activity system. My purposed system depends upon human face as we know face also reflects the human brain activities or emotions. In this paper I have also try to use neural network for better results by using a existing simulator.

Emotional Healthcare System:

In this section, we summarize our proposed system [11], which is designed as a web-based system to support users in workplaces by easily accessing the system using the web browsers on personal computers. While users are working on personal computers, tablets, or smartphones, webcams and microphones detect their faces and voices to recognize and classify their emotions. When these emotions are negative, our system suggests that they take a break and provides services with augmented reality (AR) to improve their emotional states. After selecting a service,

users can choose the application they wish. To process each application, users must showan AR marker to the camera to display a virtual object that encourages such positive emotions as relaxation, amusement, and excitement. For some applications, interaction with virtual objects may decrease negative emotions. One of the most critical features of our healthcare system is emotion recognition by facial expression, as explained in next section.

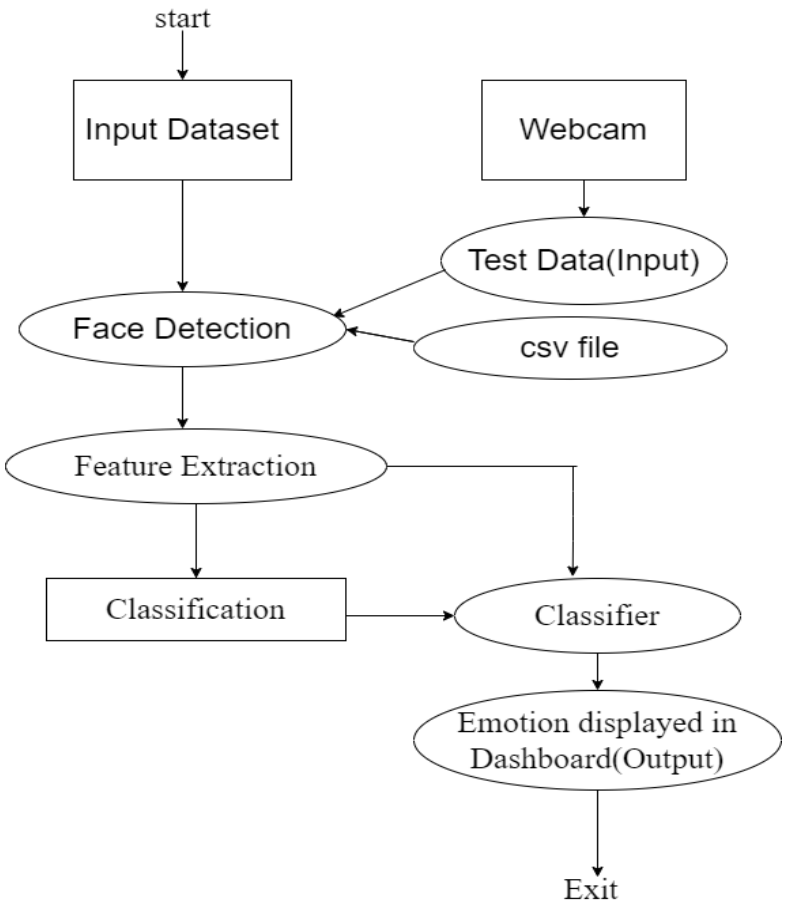
Emotion Detection by Facial Expressions:

Emotion detection by facial expressions recognizes and interprets human emotions from facial textures, and the movement of facial muscles, eyes, mouth or eyebrows. The workflow of real-time emotion detection by facial expressions. The emotion detection finds a user's face from the video frames (input). The detection extracts the facial features and normalizes them to form feature vectors. It then classifies the user emotions into one of seven classes (neutral, happiness, sadness, anger, disgust, fear and surprise) using a classifier that is generated from a training process. Finally, it calculates the percentage of each emotion for further analysis. we explain the processes of face detection, facial feature extraction, and the classification method, all of which are important for recognizing emotions from facial expressions.

Convolutional Neural Network (CNN):

A Convolutional Neural Network (CNN) based architecture for facial expression recognition called LeNet architecture (Real Time Emotion Recognition). They got 0.0887 as training loss, training accuracy as 96.43%; validation loss as 0.2725 and validation accuracy as 91.81%. As per confusion matrix, the proposed LeNet model was more exact at expectation of surprised, fear, neutral emotion states and less precise at forecast of sad emotion state. RohitPathar et.al. discussed the categorization of a facial image into one of the seven emotions by building a multi class classifier. In this paper they used convolutional neural networks (CNNs) for training over gray scale images obtained from FER2013 dataset. The first to eight convolution layer is increasing 32 3x3 filters, which increases 32 filters for each layer. FC layer concludes the class scores. The dataset contains around 35,887 well-structured 48x48 pixel grayscale images. As a result of comparing the accuracy at different depths they achieved 89.98% as maximum accuracy. There are comparatively less number of images for particular emotion like disgust in FER2013 dataset that results in average performance of the model in recognizing the disgust emotion.

Block Diagram:



Existing System:

Identify unique feature from the face image, extract and compare. The purpose of the project is to compare the face image of a person with the existing face images that are already stored in the csv file.Classification system designed to output one emotion label per input utterance may perform poorly if the expressions cannot be captured by single emotional label. Multiplealgorithm needs for finding the human emotion.

Experimental Results:

a. Dataset:

The FER-2013 dataset consists of 28,000 labelled images in the training set, 3,500 labelled images in the development set, and 3,500 images in the test set. Each image in FER-2013 is labelled as one of seven emotions: happy, sad, angry, afraid, surprise, disgust, and neutral.

b. Model Implementation:

The live classroom video fed into the model. The video is read from frame to frame. The video frame will label the student with his emotion and then overall emotion of the classroom will be generated as a pie chart. Figure 1 and 2 is the output of implementing the model.

CONCLUSION:

In this paper we have analyzed the limitations of existing system Emotion recognition.Even when they have used existing data their result of analysis were 31 to 81 percentages correct and from which even by using Fuzzy logic 72to 81 percentages only for two classes of emotions were achieved. This paper also gives us idea that we can sense human emotions also by reading and comparing the faces with images or data which is stored in knowledge base. In this paper by using a system which is trained by neural networks we have achieved up to 97 percent accurate results.

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