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Facial Emotion Recognition for Students Using Machine Learning

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Abstract–*Nowadays, machine learning and artificial in intelligence is having a major impact on humans,CNN has be used for facial recognition in students .In our work, we developed a system that recognizes students' emotionswhich will help us in getting information about their mental wellbeing. Our projecthas threesteps: face logging in to the model,giving camera permission and emotion recognition using machine learning using seven types of expressions. Obtained results can then be shared with the school or college management. Emotion recognition is a way of identifying human emotions, most commonly from facial expressions. If a student is showing the emotion of sadness or fear for a very long time an alert can be sent to the school counsellor in order to check on the student. In this paper, we have also compared various other studies in the field of FER and noted down the improvements and drawbacks from other papers. We intend on focusing on the mental health of other students and prevent of suicide. In this project we have used machine Learning using deep learning. Deep learning using CNN. Using libraries like NumPy, pandas and deep face and also used technologies like flask and java script.*

Index Terms -*Details based on facial emotionprediction, sklearn.*

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I. Introduction

Our face is a key body part which can help us to communicate without reading or writing anything.FER identifies emotions from face. In the past, Psychologists defined six fundamental emotions (anger, fear, disgust, sadness, surprise, and happiness), that are alikeeverywhere. Facial expression recognition has come into thelight, in the past it has impacted in clinical practice, social robotics and education, defence, and a lotkey sectors. According to diverse research, emotion plays animportant role in education and in observing the mental health of various students.Currently, a teacher use exams, questionnaires, and observations as a way of feedback but these methods often have not good efficiency. Using FER in students the teacher or professors can amend their way of teaching and help them in focussing a lot on their mental health. The purpose of our research is to carry outemotion recognition in educational institutions by acquiring a pre-programmed systemthat detects students' facial emotionalexpressions using Convolutional Neural Network (CNN), which is part of deep learning algorithm that are universally used in world for image classification. It consistsof a multi-step image processing to pull out feature representations. The algorithm is composed of three primary stages: image processing stage and facial feature extraction stage, and lastly emotion detection stage.Emotion recognition that should be one of these five emotions: neutral, anger, fear, sadness, happiness.

Although FER can be conducted using multiple image data set our study focuses on capturing real life image through the webcam. This paper provides an overview of researches in the area of FER conducted in the past years. At the starting, conventional FER approaches are described along with a summary of the previously developed Facial Emotion Recognition systems and their main algorithms.

By manyimportant evaluation studies, we found that human beings recognise anger, happiness, surprisebytheir visual appearance, compared to vocal only detection.

As we described, the existing system required placing all marker points on important facial features manually. To automate this, we want to detect the initial location of the human face automatically and use this information to place the marker points near their landmark features. We do this by placing a scaled version of the landmark model of the face on the detected face location. In our model we have mainly used Deep Learning, CNN, Open CV, Flask.

Problem Statement

Emotions are a very important of a human. Generally, these emotions are often mis understood with attitude, temper, character, inclination, and inspiration. These emotions can easily be used to identify the mental state of a person. Due to Covid 19 Pandemic the human interaction became very less, which affected the mental

health of students. In order to keep a track of their mental health we intend on using FER. If a student showcases a constant emotion of fear or sadness an alert will be generated and sent to the councillor of that respective institution. This will give an opportunity to the institution to investigate the student's wellbeing and mental health. This model can help many students and teachers. It will make a tremendous change in the education sector.

II. Literature Review

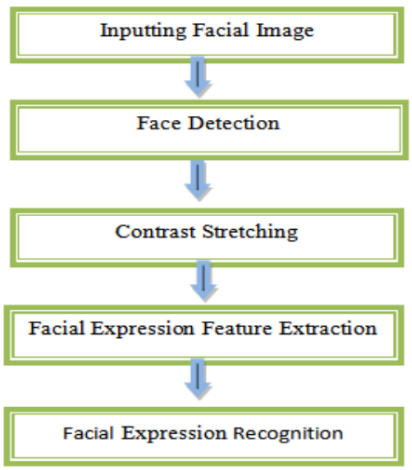
The literature review will show various previous results on FER conducted by different methodology and means of Facial EmotionRecognition,researchers have developed various predictive models that use ML to predict FER. The authors suggest a system to identify the critical causes that cause of mental health to a studentwith the help of facial emotion.

Also, inan intelligent system consisting of smartphones and web cameras for monitoring facial emotion, with help of machine learning algorithms, is explained. The intelligent system gets data from face emotion using several classification models from supervised machine learning. As results show, the suggested algorithm, namely the ML and deep face.

Name	Drawbacks	Improvements
Methods for Facial Expression Recognition with Applications in Challenging Situations **Date of Publication**- 25 May 2020 **Publisher** -Hindawi	The problem is that every human has separate facial features as well as other challenges like shadow on the face as well as the orientation. FER can also show basic emotions and not emotions other than that.	Text images can only use big eyes and smaller faces, but adding symbolized faces to the network will correct correctness when using smaller images.
A Survey of AI-Based Facial Emotion Recognition: Features, ML & DL Techniques, Age-Wise Datasets and Future Directions Authors-1Symbiosis Centre	People of different ethnicities have varied faces keeping that in mind and creating a mechanism of FER is difficult and time taking. Catering for people of varies ages.	To show a proper analysis of all the research taken place till now people of varied age groups to be considered.

Proposed Work

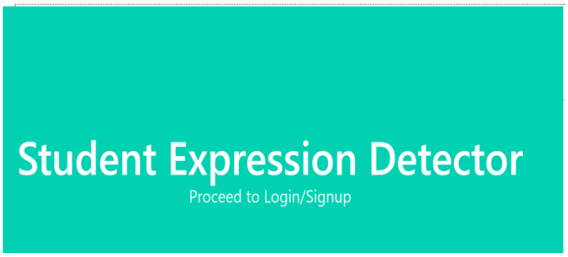
In our work, we can recognize face recognition and facial emotion from the input image. Investigative work he carries out in the required stages. Image pre-processing, mouth region segmentation, and emotion identification. The emotion will be recognized using CNN with respective steps. After the emotion is identified the database will store the data of student and the emotion in a new dataset. If an emotion coming under the red flag is being observed for a really long time then an alert via email or any other substitute to be sent to the respective authorities.

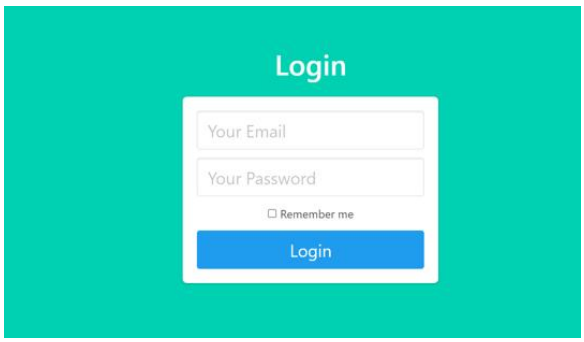


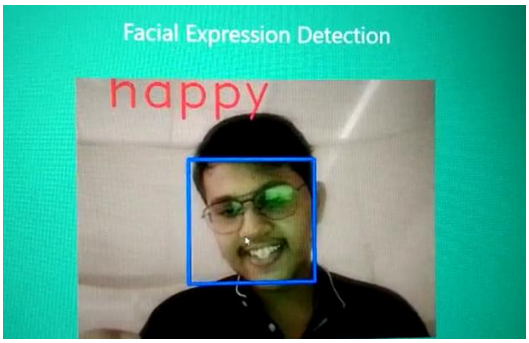
Modules

Our first Module will have a login page where in students can create a new id using their name and email as their credentials or directly login. This data will be stored in the database for further use. Second module would include the usage of webcam order for the camera to assess facial features and inform about the emotion that particular person is experiencing. Third module would include storing the expression of that

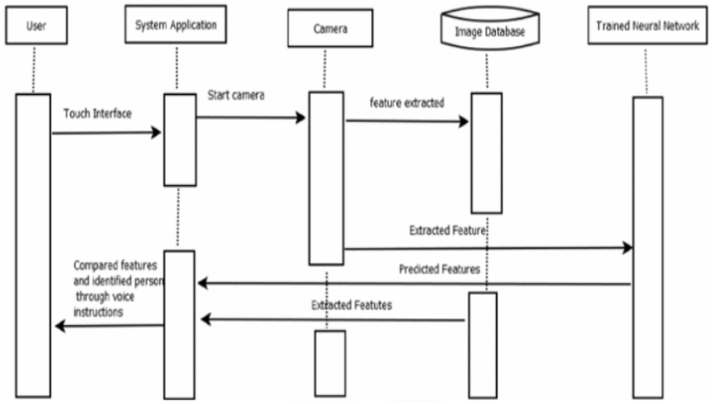
student in the database and giving alert to the concerned authorities if any red flag is raised. Red flag would be raised if the student has shown constant emotion of sadness or fear for a long period of time.







SEQUENCE DIAGRAM



III. ALGORITHMS USED

3.1 SUPPORT VECTOR MACHINE

A SVM is a supervised ML algo which can be used for classification andregression purposes as well. SVM is often used in classification relatedproblems. SVM is based on the ideation of finding out a hyperplane that best divides the dataset into two classes.

3.2DEEP LEARNING

Deep learning enables computational models,which consist of multiple processing layers to learn representations of data with multiple levels of abstraction. These methods have really improved thespeech recognition, object relocation and various other domains such as medicinefinding. Deep learning finds intricate format in large data collection by the help of backpropagation algo to show how a machine should correct its internal parameters that are used to calculate the representation in each layer from the representation in the last layer.

3.3CNN(convolutional neural network)

Used for taking out signals and make a prediction. The results can be seen out by scanning the person's image with the help of a webcamera and then match it with a training dataset to predict one's state of emotions.

IV. Materials And Methods

Tech Stacks Used:

- Python
- Flask.
- HTML
- CSS
- Bootstrap

Libraries Used:

- SKLearn - Scikit-learn is a very important library for the Python programming lang. that is typically used in ML Projects
- Scikit-learn is based on ML tools that include mathematics, statistics and other purpose algo that form the basis for variousML technologies.
- Numpy - NumPy is a Python lib which is used mainly for working with array..
- Pandas - The pandas. Is used to get a descp.statssummary of a given data in a specified frame. This includes mean, count, std deviation, percentiles, and min-max values of all the features.
- Tensorflow- Deep Learning (CNN- Convolutional Neural Network).
- OpenCV - Keras is a DL API developed by Google for making use in neural networks.

For Frontend:
HTML
CSS
Bootstrap

For Backend:
Flask
SQLAlchemy Database

V. Implementation

In manyFER tasks, face feature extraction is astandard pre-processing stage. Provided a traditional set of training data, the very first step would be to detect the face of the human, followed by deleting non-facial parts, including surroundings. As show below, there are so many of ways for detecting faces of students. The student will first login to the page and then with webcam the emotion will be processed of that student. Then it will save the emotions in the dataset created and will look for abnormality.

VI. Conclusion

The research is focused to detect the emotionsfrom the face of various humans. Our research has only focussed on students. The emotions detected by them has be used to determine their wellbeing and mental health. It will thus have a great impact on suicide prevention. Mental health has taken a toll due to online studies in the pandemic. While accessing the webcam the emotions will be stored in a database and an alert will giveto the respective councillor .

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