FACIAL EMOTION RECOGNITION

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Abstract - *Human emotions are mental states of sentiments that occur without conscious effort and are accompanied by physiological changes in facial muscles that result in facial expressions. As a result, this study provides an approach for real-time recognizing facial emotion using image processing and AI techniques. Emotion recognition relies heavily on face detection. Sad, glad, surprise, fear, anger, neutral, and other emotions are all characterized as such. The Haar cascade method and the Convolutional Neural Network are used here. In the CNN technique, processes such as pooling and followed by flattening, whereas the Haar cascade algorithm uses Haar feature selection and cascading classifiers. Face emotion recognition is more effective nowadays, and many applications use it in real time for security purposes.*

Key Words: Facial emotion recognition,CNN,Haar Cascade

1.INTRODUCTION

Facial Emotion Detection is a technique that analyses facial expressions in photos and videos to disclose information about a person's emotional state. People use facial expressions and verbal tones to infer other people's emotional states, such as joy, sadness, and rage. We're using a trained dataset which includes constant dynamic graphics, photographs collected from videos or in real time. Those dataset picture classifiers appear to be basic, yet they are extremely sensitive to each individual's facial emotions. Since the dawn of the smartphone era, the security of unlocking a phone has been steadily improving. As technology advances, we choose colour image face expression recognition as our project to detect a person's emotion, such as happiness, rage, melancholy, and so on. Emotions have a vital influence not only in our interpersonal relationships, but also in how we utilise computers.

Some traits, such as elevated lip corners and cheeks, creases, and muscular tightening around the eyes, can be used to identify a happy emotion. Similarly, angry features can be expressed by pulling up the upper lids, tightening the lips, and pulling up the lower lids. Eyebrows pulled down, upper lip pulled up, and nose furrowed are all disgusting traits. Eyelids pushed up, mouth hangs open, and full eyebrow pulled up are all unexpected traits. All features are placed in their proper placements as neutral features. Eyebrows drawn up, upper eyelids drawn up, and lips extended are all signs of fear.

2. LITERATURE SURVEY

Paper Title	Conference Name and year	Technology used	Results	What you infer ?
Hybrid Local Binary Pattern with Haar Cascade Method for Face Expression Recognition	Publication Year: 2020	Face detection uses the Haar-Cascades classifier while face recognition uses the Local Binary Pattern Histogram (LBPH) technique.	It will tell you which expression the image has and what percentage of the emotion it contains.	The main goal of the study is to create a simple way for presenting the percentage of each emotions with each individual facial image in static photographs.
Convolutional Neural Network Algorithm for Effective Facial Emotion Recognition	February 2019	The idea of real time facial expression detection using image processing and AI technique is presented in this research.	Emotion is detected by scanning (static) photographs or by listening to (dynamic) recordings. For face detection, features such as eyes, nose, and mouth can be extracted.	The project's goal is to show each individual the proportion of each emotion classifier, resulting in a 66 percent accuracy rate.
Facial Expression Recognition Using Convolutional Neural Networks	February 2019	We offer a facial expression identification method based on Convolutional Neural Networks (CNN).	We used various post-processing and visualisation approaches to evaluate the performance of various CNNs for a facial expression identification task.	The hybrid feature sets had no effect on model accuracy, implying that convolutional networks can learn essential facial traits naturally using only raw pixel input.
Haar cascade and LBP classifiers for facial identification	2021 November	Recognition of faces Cascade of Haar Open CV Radio-frequency identification (RFID) Support-vector machine Local binary pattern (LBP); (SVM)	The number of photos is used to execute both the Haar cascade and the LBP classifier.	The current study compares the two methods Haar Cascade and Local Binary Pattern Classifiers in a face recognition system.

3.METHODOLOGY

Image pre-processing are the steps we take to clean our raw images into a format that best improves our model. Image pre-processing refers to processes on images at the most fundamental level. If strategies reduce rather than increase image information content. Pre-processing is used to improve image data by removing undesired distortions or increasing specific visual features that are relevant for further processing and analysis. The photographs' processing steps are.

1. Look at the source image.
2. Image pre-processing (vocal elimination and formatting).
3. In the input image, extraction functions
4. After processing, the outcome is an image classification.

There are two forms of image processing:
1. analogue picture processing and
2. Digital picture processing.

Pre-processing, polishing, and recovering information are all key strategies in image processing. To perform a certain duty, an image is transformed to grayscale, then shown in RGB (colour) for the user's viewing pleasure.

4. PROPOSED METHODOLOGY

Different algorithms are used in this project namely CNN and Haar cascade .

4.1. CNN

The approach starts with a static input image and a convolution layer, flatten layers, pooling layer, and dense layer will be added to the CNN model. The dataset, fer2013, was obtained via Kaggle.

There are 48 grayscale photos of faces in this dataset. It includes happy, sad, and other emotions. furious, surprise, and terror with 27,859 training images and 3765 testing images purpose. We used a big dataset to train for improved accuracy, and the outcome is an object class for an object. Picture input For training and testing, we used two picture generators.

Then all of the tests and training are pre-processed. Model structure was designed by us. By building a model with the.h5 extension, the features will be retrieved using the pooling method.

The model that was built for testing purposes is then used. For facial recognition, we use OpenCV. Real-time testing requires recognition.

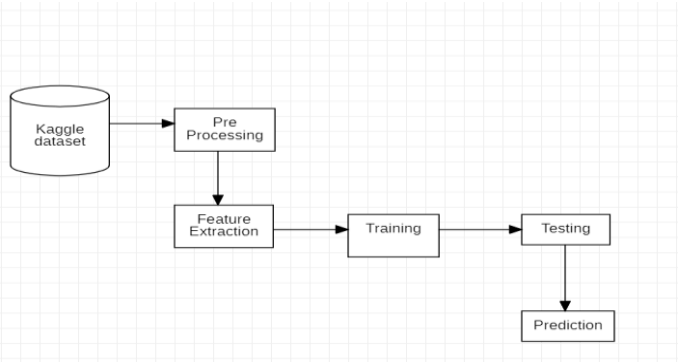

Fig-1: Block diagram of CNN

4.2. HAARCASCADE

The work starts with initializing the Haar Cascade model by taking an input image (whether it may be static or dynamic) by pre-processing the input images.

Two directories are available. Raw images can be found in the images directory. These are raw materials.

The data directory contains training-related files.

A collection of photographs used to categorise facial expressions. This repository contains a collection of face expressions that can be used to train machine learning algorithms.

Kaggle was used to collect the data. Now you may improve the accuracy of this vast dataset by training it, and the output will be the object class of the input image. The job of the training stage is to collect samples that can be labelled as positive or negative.

Anger, happiness, neutrality, and surprise are the four categories here. Haar cascade classifier is used to detect the items. This, above all, comprises the legend. csv, which associates a face expression with an image in the photos directory.

Local binary patterns (LBP) is a visual descriptor used to identify image characteristics in texture form determined by LBP.

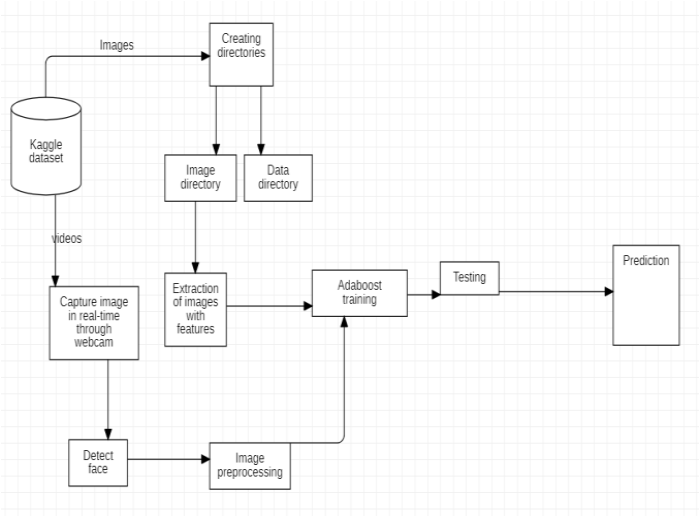

Fig-2: Block diagram of haar cascade

5.EXPERIMENTAL RESULTS:

The following figures shows some of the emotions which were detected.

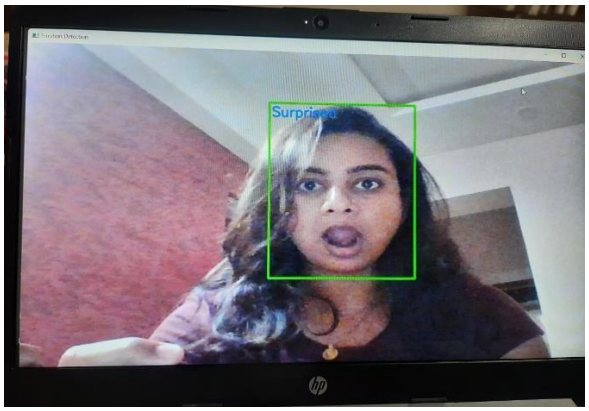

Fig-3: Surprise Emotion

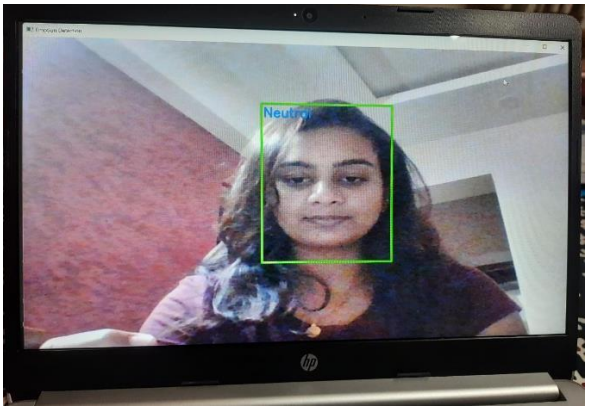

Fig-4: Neutral Emotion

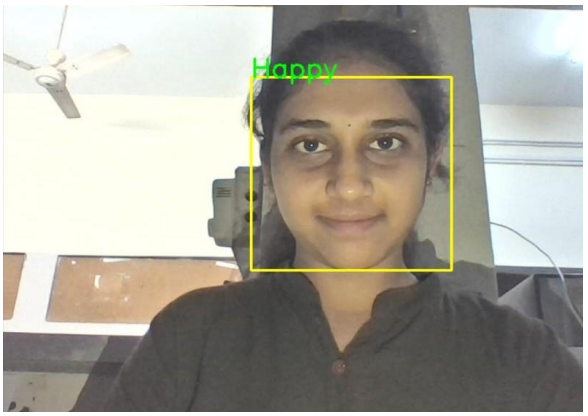

Fig-5: Happy Emotion

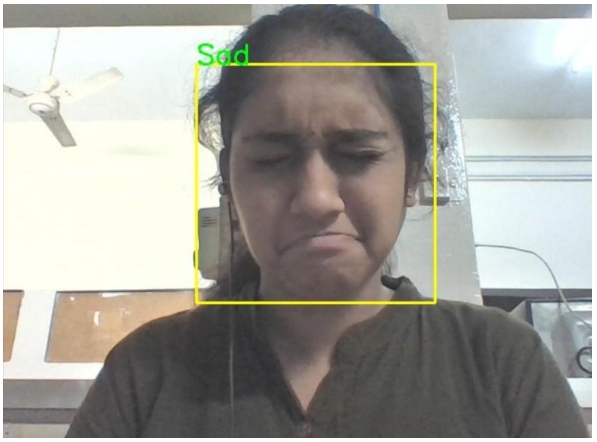

Fig-6: Sad Emotion

6.COMPARISON OF TWO ALGORITHMS

Proposed algorithm	Accuracy
CNN(Convolutional neural network)	89%
Haar Cascade	98%

Table 1: Comparison of two algorithm

Comparison of the above mentioned algorithms which are convolutional neural network and haar cascade are shown above.

The overall accuracy calculation for all algorithms have been calculated using accuracy prediction formula which is given by:

$$\text{Accuracy} = \frac{\text{True positive + True negative}}{\text{True + False + True + False}}$$

Positive positive negative negative

7. CONCLUSIONS

The main conclusion of our project deals with detecting emotions from face by using both static images and real time videos which can be seen from the above figures. This is achieved using CNN and Haar cascade algorithm.

Detection of emotion-The system detects the emotions such has happy ,fear ,sad ,surprise and so on within the images that users have uploaded along with real time emotions also with accuracy and percentage of a particular emotion a face has.

The system gives information that our user can appropriately understand and gain insight from it.

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