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Analyzing Real Time Human Emotions using Deep Learning Technique in Machine Learning

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Abstract: ***As we all known that understanding human facial expressions is a major part in understanding human emotions. As it is mainly used in the field of human machine interaction. For analyzing real time human emotions, we used Convolutional neural network for recognizing facial emotions from real time videos using TensorFlow as backend. The system without fail detects the face using HAAR classifier then it crops and resize the image to a specific size and give it to the model for predicting the current human emotion. Here we used Kaggle dataset for our work.***
Index Terms: Convolutional neural network, Facial Emotion recognition, HAAR classifier, Kaggle dataset, TensorFlow.

I. INTRODUCTION

Facial Emotion Recognition mainly predicts the emotion from facial expression. (That is neutral, sadness, happiness, surprise, fear, and angry) from the human face. It can be noted that 60% of communication is contributed by facial expression, 32% by voice, and 8% by language. Since emotion on the face plays a major role in communication and it is major exposed part of the body, it qualifies the computer vision system's usage (usual cameras) for analyzing the face from the image for emotion recognizing. Mainly there are two factors that impact the trait of the emotion detection system that is illumination on the face and location of the face in the image. As it is obvious that recognition of an emotional state of a person is done immediately by humans, but it is very much necessary to train the computer to detect the emotion of a person at real time. This made the path for researchers to implement the work on the methods that best fit the system for training purpose. Mainly, recognition of emotion is used in mood-based video players, human-abnormal behavior detection, and computer-human intelligent interactions like instructor, helper and tutor.

II. LITERATURE SURVEY

In [1], author aims to detect six basic facial expressions of humans for this he makes the use of ADFES-BIV data set for his work to be trained on it, which is freely available upon request for scientific research. He uses various approaches to finish his work such as histogram Equalization (HE),Viola-Jones(VJ) which is used for detecting faces in the frames and later DCNN.
Through his work he finally achieved 95.12% recognition rate accuracy. In [2], author proposed facial expression algorithm which contains 6 phases such as preprocessing, it coverts image into gray scale and apply HE on it and detects eye and mouth region using HAAR. Extract features form regions using Gabor-wavelet. And applies ELM to classify their pattern. In [3], Authors fought for a system for emotion detection from facial expressions using deep neural networks. This proposed frame work includes Haar feature based classifier, saliency mapping and CNN architecture are implemented. This experiment gave accuracy of 96.07% which is more accurate when compared to other similar experiments.

III. PROBLEM STATEMENT

This paper's objective is to design software that takes as input real time video of users, and finds the expression made with a high rate of accuracy. The real time videos are input from a webcam and are processed to satisfy the functional requirements such as face detection and emotion detection.

A. Face Detection

Face localization : To detect the face existing in an video taken from the webcam.
Region of Interest Detection: To divide the face into regions of interest for feature extraction in each region.
Feature Extraction: To detect the features present in each region of interest.
Feature Classification: To relegate the features detected predicated on their relative and absolute distances on the face.

B. Emotion Detection

Expression Recognition: To identify the expression made based on the feature movements.

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IV. EXISTING SYSTEM

Not many takes a shot at human feeling location have so far been announced in the present writing on machine insight. A few of the analysts have proposed the plans, yet they have not however been actualized. Scientists, for example, Ekman and Friesen proposed a plan for the acknowledgment of outward appearances from the developments of cheek, jaw, and wrinkles. They watched the development of facial muscles to perceive feelings. Yamada proposed another strategy for perceiving feelings through the arrangement of visual data. Cohen thought about worldly varieties in outward appearances, which are shown in live video to perceive feelings. She proposed another engineering of concealed Markov models to naturally section and perceive outward appearances. Presently accessible human–PC interfaces don't exploit of the significant informative media and in this manner can't to give the full advantages of common communication to the clients. Human–PC connections could essentially be improved if PCs could perceive the feeling of the clients from their outward appearances.

V. PROPOSED SYSTEM

In this project we are relied upon to make model, to identify 7 various feelings from person faces. Profound learning rules PC vision concentrates as of late. Indeed scholastic PC vision gatherings are firmly changed into Profound Learning exercises. Thus, we would apply convolutional neural systems to handle this assignment. Furthermore, we will build CNN with Keras utilizing Tensorflow backend.

VI. SYSTEM STRUCTURE

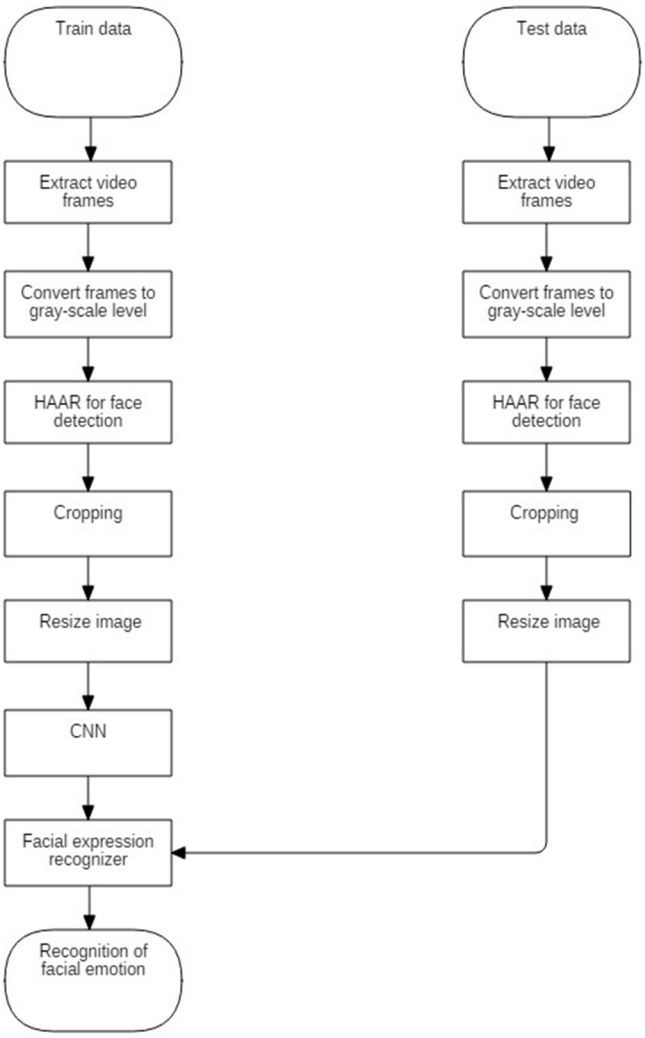

Fig. 1.System structure

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VII. ANALYSIS

A. Experiment

The process involved in this project is, user interacts with the emotion recognition system through web camera, then the system significantly detects the face in real time video provided by the user by using HAAR classifier which is nothing but a machine learning object detection algorithm used to detect objects.

This involves the following process

1) *Preprocessing:* Extracted frames are converted into grey-scale.
2) *Face Detection:* Faces in the video frames are detected using HAAR algorithm.
3) *Post Processing:* The face region detected by HAAR algorithm was cropped to obtain an actual face region. All cropped frames were then resized to a uniform size this step is compulsory to minimize the processing time.

After this process, the obtained images are stored in a folder to use them later by the CNN.

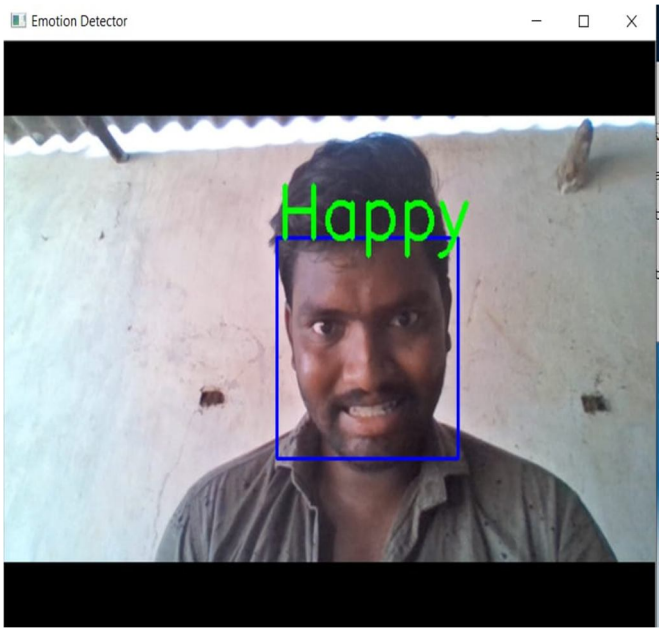
B. CNN Structure

With the end goal of this undertaking, we utilize the straightforward CNN. This organize has the 5 Convolution layers and 3 Pooling layers. It additionally contains the Standardization procedure for the each convolution process. The yield of each convolutional layer is standardized and afterward given to the following convolutional. The prepared model will be stacked and the that stacked model can be checked with the face in video stream from the web camera. At first the pixel estimations of the different pictures from the dataset can be gotten from the csv position. In that the pictures can be partitioned into 48 X 48 pixel esteems.. We will utilize the different open source libraries for the extraction of the different parameters of the pictures. Keras library will be utilized in this venture for the usage of the different calculations . Keras will be worked with the assistance of Tensorflow backend for the better enhancement of the grouping procedures. For train the pictures , we will need to indicate the different parameters, for example, revolution go, stature and width move extend for the pictures, Hoard determinations, and so forth,. For each time the blunder worth will be diminished. At first the mistake will be unendingness by doing the preparation the blunder rate will be diminished and the exactness of the expectation can be expanded. At long last the sort of demeanor can be show up close to the face in the spilling video.

C. Dataset Used

Kaggle dataset was used in this work.

VIII. RESULT



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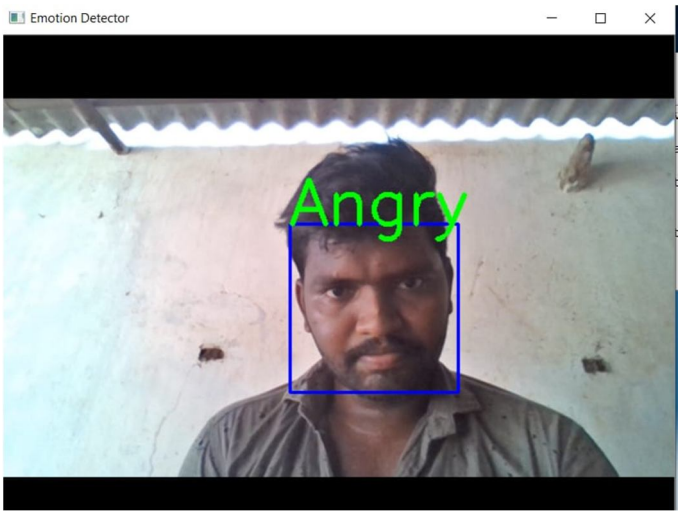

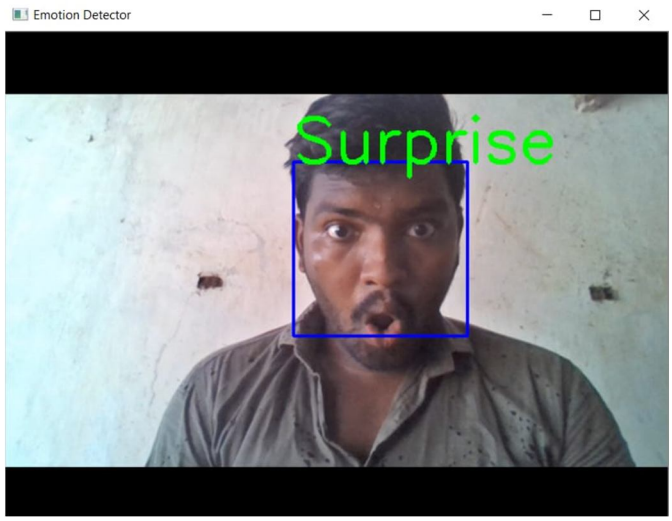

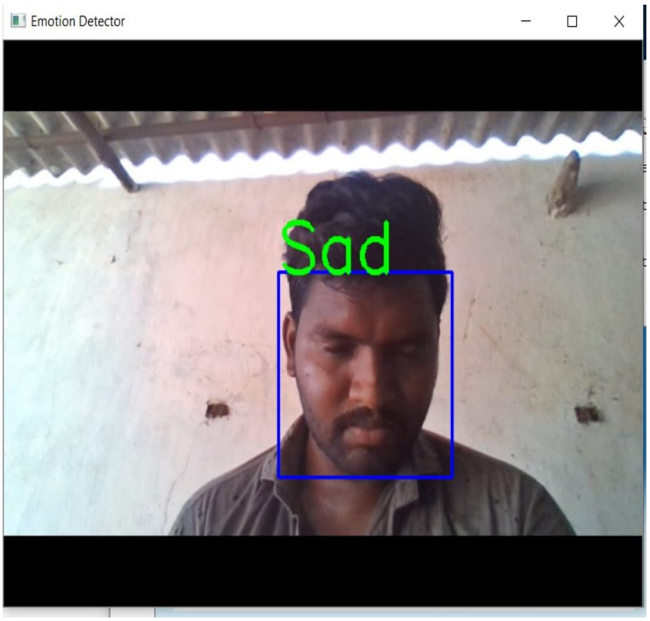

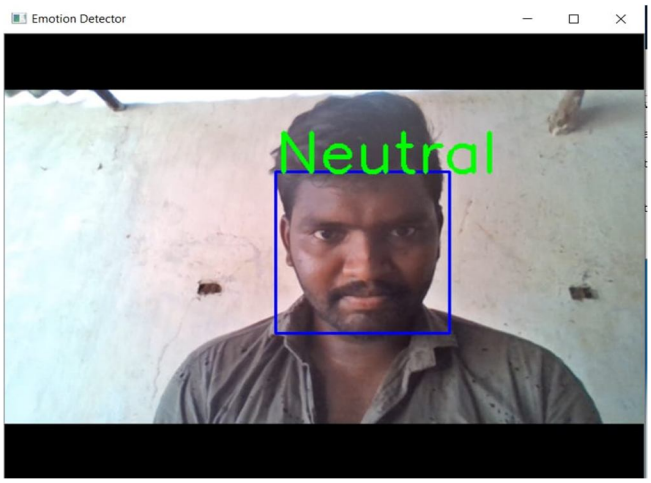

Fig. 2. Various facial expressions

IX. FUTURE SCOPE

High correct apperception rate, significant performance amendments in our system. Promising results are obtained under face registration errors, expeditious processing time. System is plenarily automatic and has the capability to work with video victuals as well as images. It is able to agnize spontaneous expressions. Our system can be utilized in Digital Cameras where in the image is captured only when the person smiles, or if the person doesn't blink his ocular perceivers. In security systems which can identify a person, in any form of expression he presents himself. Rooms in homes can set the lights, television to a persons taste when they enter the room. Medicos can utilize the system to understand the intensity of pain or illness of an auditorily impaired patient.

X. CONCLUSION

This project proposes a new approach for recognizing the category of facial expression Facial Emotion Recognition is accomplished using Convolutional Neural Network . Kaggle is a dataset, used for classification of emotion in static images and also for detection of the emotion in the real-time-based video as well as image. Finally we conclude that FER is a great step for human machine interaction.

XI. ACKNOWLEDGMENT

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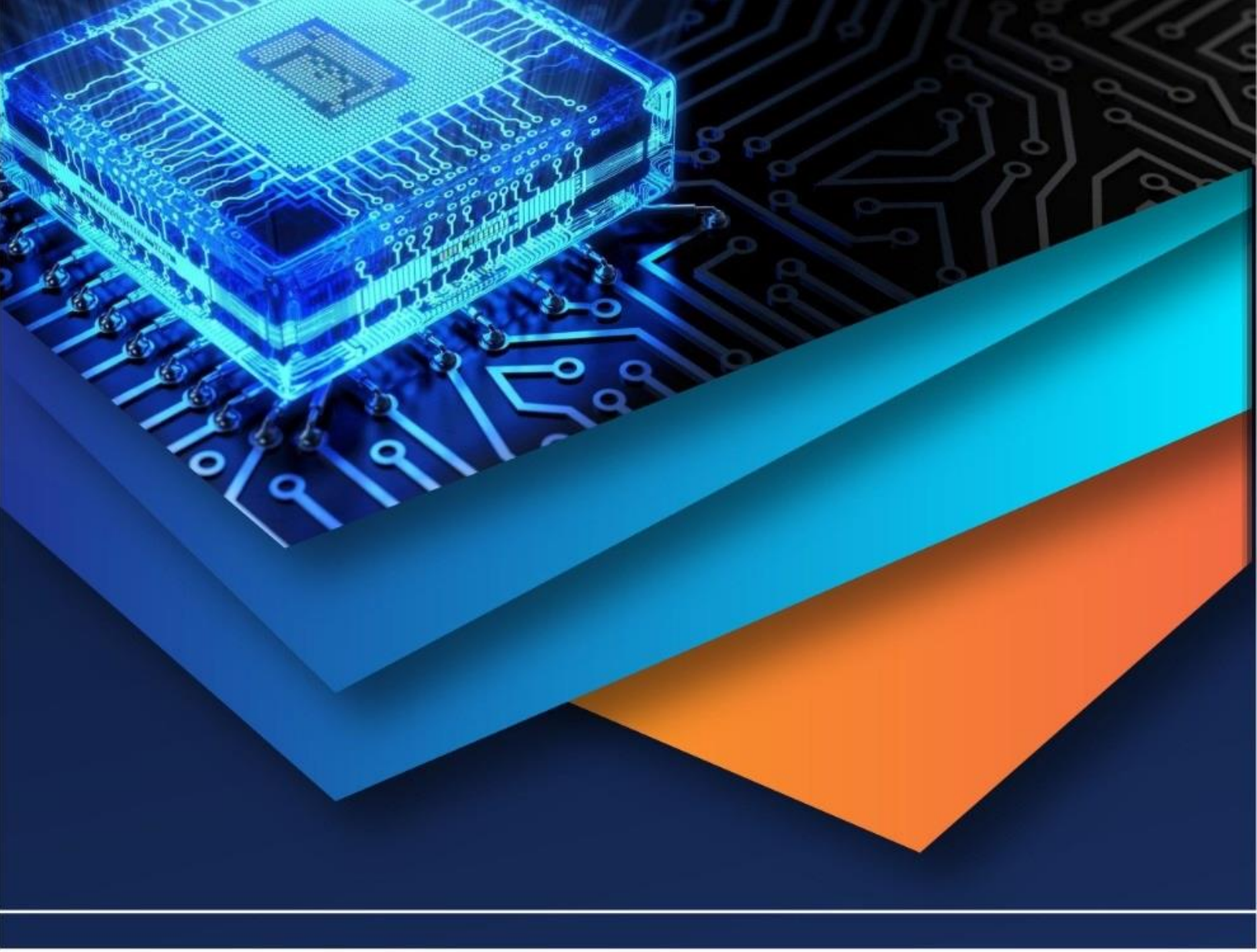

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