



EMOTION DETECTION USING REAL TIME VIDEO

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Abstract : Detecting the real-time emotion of the person with a camera input is one of the superior features of the Machine Learning (ML) procedure. The detection of the emotion of someone by using a digital camera in real-time is beneficial for diverse research and analytics purposes. The detection of the emotion of the person is made by using the machine learning concept. The work has been implemented using Python (3.10.4), Open Source Computer Vision Library (OpenCV), Tensorflow and NumPy. We can use the trained dataset to detect or hit upon the emotion of the individual. For detecting the specific emotions, first, we need to train those different emotions, or we may use a dataset already available on the internet. In this article, we are going to discuss developing Python software to detect the real-time emotion of an individual using a digital camera.

Keywords—ComputerVision, EmotionDetection, Tensorflow, OpenCV, NumPy, CNN, FUR-2013.

I. INTRODUCTION

In psychology, emotion is often defined as a complex state of feeling that results in physical and psychological changes that influence thought and behavior. Research on emotion has accelerated over the past two decades with many fields contributing together with psychology, medicine, history, sociology of emotions, and also in computer science. The numerous theories that try to provide an explanation for the origin, characteristics and other aspects of feelings have fostered extra intense studies on this subject matter. Current areas of research in the concept of emotion includes the development of materials that stimulate emotions. The numerous Emotion evaluation and Face Detection, in our opinion, have numerous use cases in nowadays global. We see object detection algorithms in public parking lots, visitors tracking structures, etc. that take photos of human beings riding vehicles to keep information. Emotion evaluation is furthermore used in therapy wherein physical conferences of the therapist and the affected person are not feasible They have a look at human cognition has also advanced drug treatments. On the technological, the front, digital assistants, profile evaluation assistants, and automation bots are constructed to imitate the moves of people and replace them with the desire of increasing accuracy and lowering errors. It is therefore a completely important part of the artificial Intelligence stimulated global we stay in nowadays. An extra engrossing and complicated method to laptop imaginative and prescient is by means of the use of cloud-based algorithms like Azure Cognitive services or Deep studying mechanisms, which we've got now not blanketed in this story, however, should come in handy for a complicated situation.

This paper proposes a method to create a model with the intention to detect emotion of a person by extracting some useful information out of his or her respective image taken from video, the method of picture processing is used here. It's by far a totally efficient way through which a picture can be transformed into its digital form in the end performing diverse operations on it. That is a method similar to the sign processing, in which the input given is a 2D photograph, which is a collection of numbers or better known as RGB values ranging from 0 to 255, which denotes the corresponding pixel values.

2. LITERATURE REVIEW

Some papers or reports were published earlier, followings are some of those examples:-

- Emotion detection using images and videos has already been studied for a few years. Distinct Strengths & Weaknesses have been stated in the emotion reputation device through Mr. Ashwini, Mr. Jacob and Dr. Jubilant [1] of St. Joseph's college of Engineering. Mr. ArunaChakraborty, Mr. Amit Konar, Mr. Uday Kumar Chakraborty, and Mr. Amita Chatterjee in. Emotion reputation from Facial Expressions and Its manipulation using Fuzzy logic [2] defined this fuzzy technique that has an accuracy of approximately 90%. Strengths and weaknesses of facial capabilities classifiers and acoustic emotion classifiers were analyzed through Carlos Busso, Zhigang Deng, SerdarYildirim, Murtaza Bulut,Ulrich Neumann, Chul Min Lee, Sungbok Lee, Abe Kazemzadeh and Shrikanth Narayanan [3].

3. METHODOLOGY

The methodology section gives us information about the plan and method that how the study is conducted. This includes a collection of the study, a sample of the study, Data and Sources of Data, study variables and an analytical framework. The details are as follows:

• **Data collection:**

Data collection is the process of accumulating and measuring statics from endless unique sources. In this project we have gathered the raw data as a form of real time image captured using our digital camera.

• **Image Processing:**

In order to get an enhanced image and to extract some useful information out of it, the method of picture or image processing is used. In this method, an image is converted into its digital form subsequently performing various operations on it. This step is categorized further into:-

1. Scanning the image - A raw photograph is acquired which has to be processed. It will be expressed in terms of pixels. The intention of this step is to extract records suitable for computing further.

2. Processing and Enhancing it – The photograph is digitalize by using the use of a digitizer which samples and quantizes the input signals. The rate of sampling have to be high enough for good resolution and high quantization level for human perception of various shades using different grey-scale.

3. Conversion of colour image to grey scale – Luminosity method is used here for the conversion. In this method, the value or presence of Red Colour is reduced and the value of Green Colour is increased and Blue Colour has the percentage in between these two colours. Then by the equation[1] : $Grey-Scale = ((0.3*Red) + (0.59*Green) + (0.11*Blue))$. We get the Grey-scale converted image.



Brief procedure of Image Processing [4]

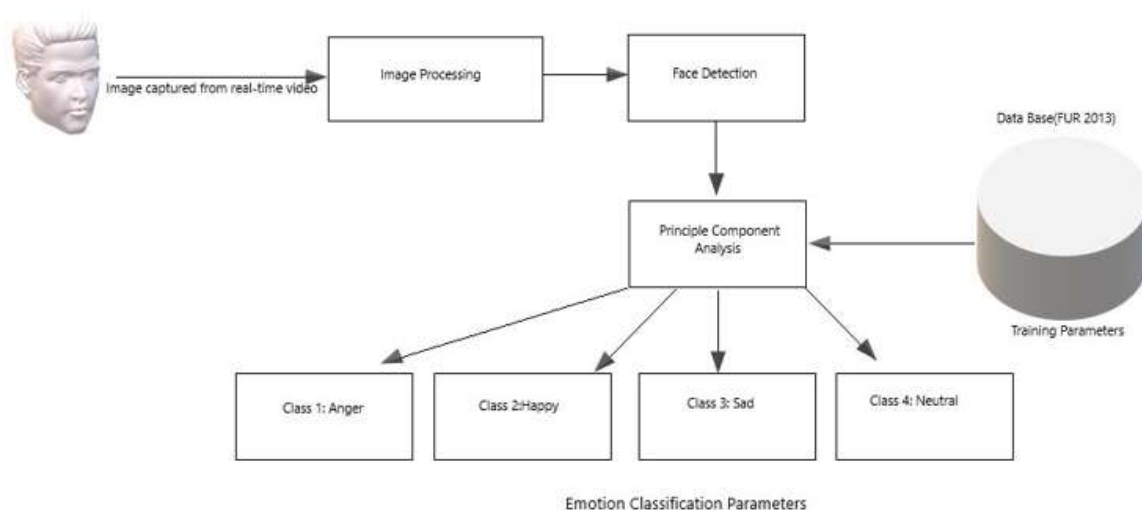
• **Face Detection:**

The region of images showing the person’s or user’s face is resized to 48x48px and is passed as an input to CNN.

• **Principle Component Analysis** –

The analyzed image from CNN now matched with the 4 emotions selected from our data-base named FUR 2013. Then the emotion with the maximum score is displayed on the screen as a result.

4. WORKFLOW



Workflow logic:

The flow of Logic: Although the underlying algorithm is comparable for both images and videos, there are some key changes that we are visiting follow for videos.

Video_Analyze():

This function is responsible for extracting the individual image frames from a video so analyze those independently. Each frame analyzed by this function is stored as a separate image by the algorithm within the basis directory folder where the code is running. Also, this function later creates a reproduction of the initial video by placing a box around the face and showing live emotions within the video. We then create a Pandas data frame from these analyzed values and plot this data frame using matplotlib. During this plot, we are going to see every emotion plotted against the clock. We can further analyze this data frame by taking individual emotion values that were recognized by the model and finding which sentiment was dominant across the whole video

5. RESULTS AND DISCUSSION

Emotion Detected of subject: Angry



Emotion Detected of subject: Happy



Emotion Detected of subject: Neutral

Our model worked quite well, as we can see in the above images that our model detected some of the emotional states of the subject with decent accuracy. Artificial Intelligence solved a convolute task such as Emotion Detection using Real-Time Video with ease. In the end, we are quite aware of the fact that accuracy sometimes is low or not up to the mark. We also know sometimes humans even make a mistake while recognizing someone's emotion so is our model. The average accuracy was nearly 75%-80%..

6. FUTURE SCOPE.

Computer Vision is a very vast area which remains in the development segment. Research work in this area is going at a speedy phase. Emotion Detection is one of the inseparable parts of computer vision. Loads of tasks and procedures can be performed if someone becomes aware of the endless opportunities offered in the sector of emotion detection.

In the future, the model can be upgraded with more sets of emotions from the data set and if it can be made more accurate then it can be used in the various fields for different purposes. One great example of the use of Emotion detection is its use in the Immersive Gaming Field where the game developers perform research with common human emotions of an individual to allure more and more players to it. [5]

7. CONCLUSION

In this research work, we have discussed the emotion recognition system from various aspects such as analytical treatment, features and technologies. Although the concepts are different, the implementation was widely done using the OpenCV platform. A comparison of several results obtained during facial feature extraction is also discussed. The results obtained are promising and have the potential for extending their use in a variety of image processing applications such as interactive systems like intelligent stress recognition etc. The proposed PCA or Principle Component Analysis method has greater accuracy with consistency. The rate of emotion recognition was quite good with the small number of images taken from real-time video, it works fast, is relatively simple, and works well in a constrained environment.

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