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# FACIAL EMOTION DETECTION USING CNN

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ABSTRACT —

Most automatic expression analysis systems attempt to recognize a small set of prototypic expressions (e.g., happiness and anger). Such prototypic expressions, however, occur infrequently. Human emotions and intentions are communicated more often by changes in one or two discrete facial features. We develop an automatic system to analyse subtle changes in facial expressions based on both permanent (e.g., mouth, eye, and brow) and transient (e.g., furrows and wrinkles) facial features in a nearly frontal image sequence.

In the article there are presented the results of recognition of 5 emotional states (neutral, joy, sadness, anger, fear) based on facial expressions. Coefficients describing elements of facial expressions, registered for 5 subjects, were used as features. To achieve this correlation, we combine the outputs of deep convolution neural networks (CNN) approach and the weighted feature extraction (WFE) approach.

**Keywords**: Facial expression, Emotion recognition, CNN, human emotion, neural network.

## INTRODUCTION

In understanding and recognising emotion, facial expressions play a crucial role. Even the word “interface” indicates how crucial the face of communication is Between two entities. between two entities. Studies have shown that reading Facial expressions may change the interpretation substantially what is being said and manage the flow of a discussion. The capacity of people to discern emotions is extremely essential for successful communication; for up to 93 percent of typical communication Talk relies on an entity's feeling. Ideal for children. Interfaces between human and computer (HCI) would want Man's emotion can be read by technology. This study is for this purpose how computers can correctly identify emotion from Its different sensors. This experiment was used as an experiment As a means to interpret human emotion, facial picture. The Human emotion studies may be traced back to Darwin's pioneering and has drawn a lot since then Researchers in this field. Seven fundamental emotions are universal To people. To people. Neutral, furious, disgusting, fearful, Happy, sad and surprising, and these fundamental emotions may be Recognized from the face of a human being. This study offers an efficient method to identify neutral, happy, sad and during the last decades, several techniques for emotional identification have been suggested. Many methods were proposed for the development of systems that can extremely effectively identify emotions. Computer applications may communicate better by altering answers in different encounters depending on human users' emotional state. A person's mood may be determined by words, expression or even gesture. The article examines the identification of expressions from the face. For the identification of facial emotions, conventional methods typically regard a face image that is separated from an information image and facial segments or milestones are identified in the facial districts. After that various spatial and worldly features are isolated from these face parts. Lastly, a classifier, for example, is trained at Keras library, the random forest, in order to provide recognition results.

Recognition of facial expressions is used to identify the basic human emotions. Facial expressions give important rules about emotions. Computer systems based on affective interaction could play an important role in the next generation of computer vision systems. Face emotion can be used in areas of security, entertainment, and human machine interface (HMI). A human can express his/her emotion through lip and eye. Generally, people have a large number of songs in their database or face. Thus, to avoid trouble of selecting a face expression, most people will just randomly select a dataset from their playlist and some of the songs may not be appropriate for the current mood of the user and it may disappoint the user. As a result, some of the expression is not matching to the user’s current emotion. Moreover, there is no commonly used application which is able to face expression based on the current emotions of the user. Text displayed a very important role in enhancing an individual’s life as it is an important medium of entertainment for facial lovers and listeners and sometimes even imparts a therapeutic approach.

### *1.1 Problem statement*

If we won't give the facial expression properly using webcam, then the output is not predicted successfuly.

### *1.2 Objectives*

In this project we are detecting the facial expressions such as anger, happiness etc using the webcam. Then the result predicted is with the bounded box of the face with the text of the facial expression.

### *1.3 Scope of the project*

In this project we are detecting the facial expressions such as anger, happy etc using the webcam.

## LITERATURESURVEY

The author is described that recognizing facial expression through computer is very crucial thing, for that the Author proposed two-level CNN frame with the help of matrices.
In author proposed an algorithm which can achieve an average recognisation rate of 88.56% with fewer iterations and training speed on the 13-training set is about 1.5 times faster than that on the constant algorithm. Haar classifier is used for Human detection and an integral graph method combined with AdaBoost algorithm.
Recognizing emotion using facial expressions is a key element in human communication. In this paper we discuss a framework for the classification of emotional states, based on still images of the face. The technique we present involves the creation of an active appearance model (AAM) trained on face images from a publicly available database to represent shape and texture variation key to expression recognition. Parameters from the AAM are used as features for a classification scheme that is able to successfully identify faces related to the six universal emotions. The results of our study demonstrate the effectiveness of AAMs in capturing the important facial structure for expression identification and also help suggest a framework for future development.

## METHODOLOGY

The method involved in this project is to train the CNN algorithm with multiple images which has expressions. Majorly the expressions considered are happy, sad, anger, disgust, fear, neutral. The data set images of the above expression are fed to the CNN algorithm to train for the same. The algorithm uses multiple data processing modules. Namely Open CV, Keras, Tensor Flow. Face detection is done with the help of webcam the detected image is classified for different emotions and then training of detected image is done by training it with dataset. Then training of collected image is done and compared with existing dataset and later live faces emotions are detected. For training purpose open source, Keras, and Tensor flow modules are used. Image Processing using linear and nonlinear filters is done. Transformation of image is done for image resizing. Video Analysis are used for background removal. 3d construction and camera calibration is useful for recognition of motion, and to detect multiple angles of faces using CNN algorithm. Detection of objects are done on the bases of eyes, scars, lips, eyebrows.

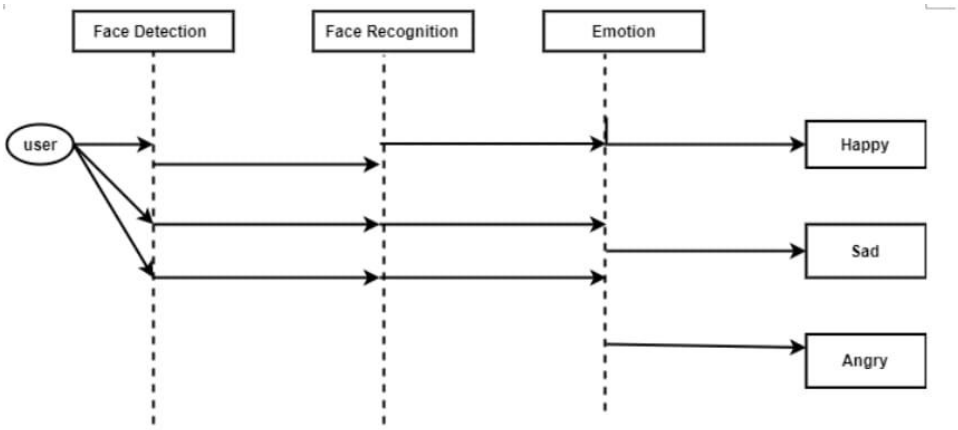


**Figure 1: Sequence Diagram**

## SYSTEM DESIGN

System design is the process of defining the architecture, components, modules, interfaces and data for a system to satisfy specified requirements. One could see it as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering. If the broader topic of product development "blends the perspective of marketing, design, and manufacturing into

a single approach to product development," then design is the act of taking the marketing information and creating the design of the product to be manufactured. Systems design is therefore the process of defining and developing systems to satisfy specified requirements of the user.

***4.1 System Architecture***

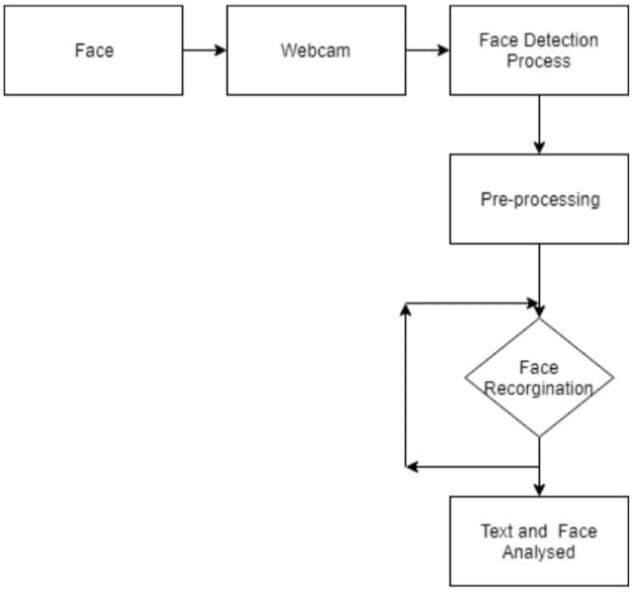


**Figure 2: System Architecture**

**IMPLEMENTATION PROCEDURE**

In implementation, we use following steps.

- Data acquisition
- Preparation of data
- Image Augmentation
- Model building
- Testing and training of model
- Use of webcam for detection
- Generating output

## 4.1 REQUIREMENTS

***4.1.1 Software requirements***

- Operating System– Windows / Linux / Mac (Any OS which supports Python)
- Software IDE – Python.
- OpenCV – To captured video.
- Keras – To work on the captured video.
- NumPy – To handle video operations.
- Pandas – is a data analysis library that includes dataframes.

***4.1.2 Hardware Requirements***

- RAM – 4 GB.
- Hard Disks – 20 GB.
- Floppy Drive - 1.44MB.
- KeyBoard – Standard Windows Keyboard.
- Mouse – Two or Three Button Mouse.

## RESULT AND DISCUSSION

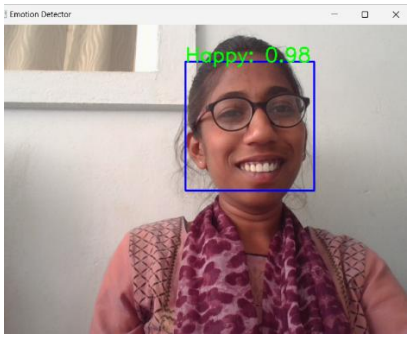


**Fig 6.1: Happy Face Result with Accuracy**


**Fig 6.2: Angry Face Result with Accuracy**

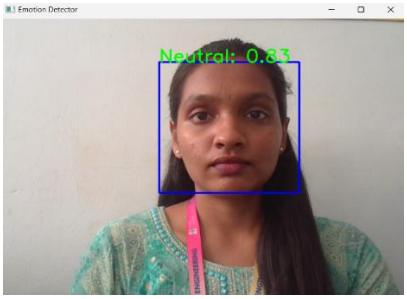


**Fig 6.3: Neutral Face Result with Accuracy**

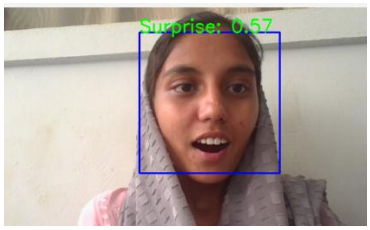


**Fig 6.4: Surprise Face Result with Accuracy**

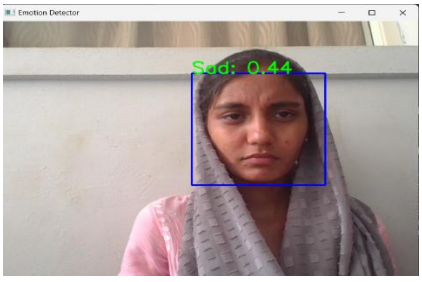


**Fig 6.5: Surprise Face Result with Accuracy**

## CONCLUSION

In the carried-out work, for 4 emotional states, we achieved a very good classification accuracy of emotions - 96% for random division of data and satisfactory classification accuracy - 73%, for "natural" division of data. This result was obtained classifier and "natural" division of data for all users (subject-independent). Experiments were carried out under the same conditions and at a fixed position of a user in relation to the Kinect unit. Certainly, the classification accuracy was influenced by the way users play specific facial expressions. In real conditions the classification accuracy can be affected by many additional factors. When you feel real emotions, facial expressions can vary greatly - may be exposed to a greater or lesser extent simulated noise in the data samples aims to test the resilience and effectiveness of the proposed machine learning models.

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