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Transformation of Facial Expression into corresponding Emoticons

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Abstract: ***There are many different ways to express and communicate our feelings. The two classified ways of communication are verbal and non - verbal. Facial expressions are a great way of communication involving the exchange of wordless intimations. It has enticed much research attention in the field of computer vision and Artificial intelligence. Many kinds of research have been done for grouping these expressions. It is chiefly done to acquire the sentiments of humans. In this project, an API can be employed to fetch images from any camera-based application in real time. HAAR cascade classifier is employed to extract the image features from the images fetched earlier. Support Vector Machines (SVM) is used to classify those features into corresponding expressions. And these expressions are then converted to their equivalent emojis, after that these emojis are get superimposed over the actual face expression as a mask. This project can be used to study the different facial expressions that a machine can understand and also it can be used as a filter used in social media apps like Facebook, Instagram, Snapchat, etc.***

Index Terms: Emotion Recognition, Face Detection API, SVM, HAAR, OpenCV, Emoji, Computer Vision

I. INTRODUCTION

Communication is an important act of exchanging information between two different persons or groups. The person sending the information is referred as sender while the person acquiring the information is referred as receiver. The non-verbal communication of messaging involves the exchange of wordless cues.

"Nonverbal communication is ubiquitous."[1]. They are always present in every communication process. It comprises of 93% of human communication and in this 55% consists of human gestures and actions [2]. Facial expressions like Laughing, crying, staring and body gestures like pointing, crossed-legs and some of the hand gestures like thumbs signals are some of the non-verbal communications. By looking at someone's facial expression, we can comprehend the other person's feelings. These non-verbal signs give more insights and meaning that is not provided by the verbal communication. A major chunk of non-verbal communication involves the facial emotions exhibited by a person. Emotions represent the mental state along with the facial expressions, actions or any physical changes. They are associated with the current mood but differs from it, in a way that emotions are temporary feelings over an issue while mood is a generalized sentiment what usually lasts longer. Primarily there are seven different form of emotions expressed by humans [3]. They include: Happiness, Sad, Anger, Surprise, Disgust, Fear and Neutral. All the other emotions are the inferences of these emotions.

Fig. 1. Classification of Emotions

In this paper, we will look into the detection of the faces in real time images using readily available APIs. Further after the detection of the faces, using HAAR Cascade, we can extract the features of the images and then process it. Followed by which the emotions are classified through SVM. These emotions are then transformed to their identical emoticons which will be later superimposed on the face.

II. EXISTING SYSTEM

The current systems are mostly based on neural networks which need require large number of datasets for computation. Designing of these neural networks are mathematically complex in nature. The processing and testing time if these networks consume a lot of time. Though they depict quite efficient results for the static images, their real time processing is low. For facial features extraction, the various machine learning algorithms such as Viola-Jones, HOG are used that are not as efficient as HAAR- Like features. Viola jones is slow in processing of image while HOG is for quality. HOG collects noisy information like background, blur, rotation changes and lighting of the entire image and followed by the generation of Histogram.

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III. PROPOSED SYSTEM

The idea of the proposed system is to employ an API that will detect the face after which the image can be processed using HAAR cascade for facial feature extraction. SVM Classifier is then used to categorize the emotions into its seven distinct types. Using HAAR of OpenCV package, the corresponding emojis of the emotions can get superimposed over the subjects' faces. In any camera module of any leading social networking apps, the use of APIs can reduce the processing time for face detection for which they have their in-built face detection algorithm which can detect the face smoothly and followed by which the emoticons can be implemented over the faces as filters.

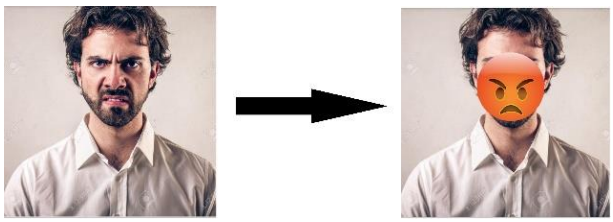

Fig. 2. Transformation of facial expression into corresponding emoticon

IV. ARCHITECTURE

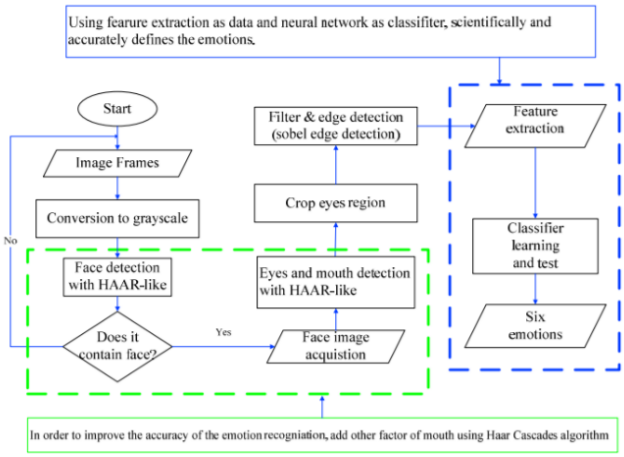

Fig. 3. Proposed System Architecture

A. *API IMPLEMENTATION*

An API acts as an interface between an operating system, application and the user [4]. The API design plays a significant role on its usage [5]. An API is designed in such a way that it hides the background details of modules from the users who do not have the knowledge of complexity of the modules. Thus, API facilitates the user-friendly interface [5]. A camera-based API can be used which automatically detects the face of the subject(s) regardless of the background and send this image to the model for processing after which the emoji will be superimposed over the face.

B. *HAAR CASCADE*

The image that is supplied by the API is then provided to the HAAR cascade in which some dataset has been given for training the data. For the development of a working model, we will use two datasets: Cohn-Kanade (CK+) [6][7] and Japanese Female Facial Expression (JAFFE) [8]. HAAR-Like features have high accuracy to detect faces from different angles [9].

It extracts the facial features from the face of the subject like eyes, eyebrows, and mouth expressions which we get through the API. These results are then delivered to the Support Vector Machines (SVM).

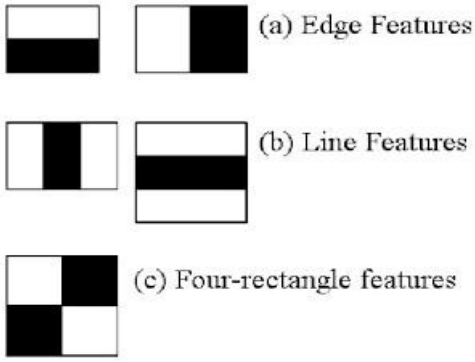

Fig. 4. HAAR-Like feature for face detection

C. *SUPPORT VECTOR MACHINE (SVM)*

Support Vector Machine is a supervised machine learning algorithm that is used for classification as well as regression problems. The SVM is used in many pattern analysis tasks with support of binary classifier that differentiates between the classifications of the expressions. It works by classifying data through the use of assessment of an optimal hyper plane which separates one class's data points from the other [10].

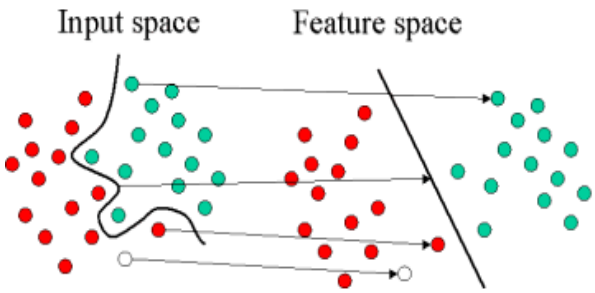

Fig. 5. SVM Classifier

The features of image that is given to the SVM after HAAR Classification, is then compared with the datasets which have been trained and then those images are categorized to the corresponding emotion variant. After this, the corresponding emoticon is superimposed over the image. The result is transferred back to the API that displays the corresponding new superimposed image with the emoticon.

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V. RESULTS

Our proposed model will detect a face using API and feature extraction is done through HAAR Cascade. Emotions are classified from the extractions through SVM. The Emojis are later superimposed over the faces according to the matching emotion exhibited by the subject. The final output will be as shown in the Figure 6.

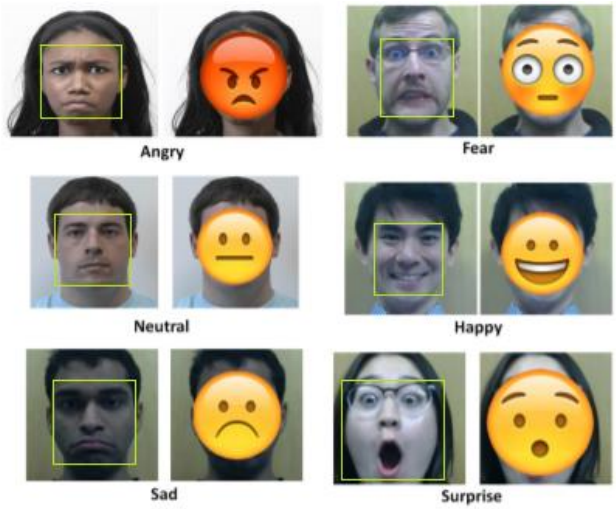

Fig. 6. Emotion indicated by the emoticon

VI. CONCLUSION

In this paper, Computer Vision has been used for the recognition of facial emotion and converting those emotions into their corresponding emoticons. Object face is detected using any camera-based API. The Features of the expressions of the detected face will be extracted using HAAR cascade that will supply the feature extractions of the expressions depicted in the image for further classification into seven emotions by employing Support Vector Machines (SVM) that exhibits a good accuracy value as compared to the other existing algorithms. This proposed model can be used by the leading social networking handlers like Facebook, Instagram, Snapchat for their camera-based applications involving various effects and filters.

There are many existing face-detecting neural networks that have good efficiency but their implementation may be difficult in some cases. Through our approach of using APIs instead of neural networks, we can make the implementation convenient.

REFERENCES

1. (Burgoon, J., Guerrero, L., Floyd, K., (2010). Nonverbal Communication, Taylor & Francis. p.3)
2. Carton, J.S., Kessler, E.A., Pape, C.L.: Nonverbal decoding skills and relationship well-being in adults. J. Nonverbal Behav. 23(1), 91–100 (1999)
3. Izard, C.E.: Human Emotions. Springer, New York (2013)
4. Lewine, Donald A. (1991). POSIX Programmer's Guide (PDF). O'Reilly & Associates, Inc. p. 1. Retrieved 2 August 2016.
5. Clarke, Steven (2004). "Measuring API Usability". Dr. Dobb's. Retrieved 29 July 2016.
6. P. Lucey, J. F. Cohn, T. Kanade, J. Saragih, Z. Ambadar, and I. Matthews, "The extended Cohn-Kanade dataset (CK+): A complete dataset for action unit and emotion-specified expression," in Computer Vision and Pattern Recognition Workshops (CVPRW), 2010 IEEE Computer Society Conference on, pp. 94–101, June 2010.
7. T. Kanade, J. F. Cohn, and Y. Tian, "Comprehensive database for facial expression analysis," in Automatic Face and Gesture Recognition, 2000. Proceedings. Fourth IEEE International Conference on, pp. 46–53, 2000
8. M. Lyons, S. Akamatsu, M. Kamachi, and J. Gyoba, "Coding facial expressions with gabor wavelets," in Automatic Face and Gesture Recognition, 1998. Proceedings. Third IEEE International Conference on, pp. 200–205, Apr 1998.
9. Rekha N., Dr. M. Z. Kurian, " Face Detection in Real Time Based on HOG," in International Journal of Advanced Research in Computer Engineering and Technology (IJARCET) Volume 3 Issue 4, April 2014.
10. Emotion Expression Recognition using Support Vector Machine, Melanie Dumas Department of Computer Science University of California, San Diego La Jolia, CA 92193-01

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