

Human Feelings Identification using Facial Gesture



Anita Jindal, Rashmi Priya

Abstract: This paper describes the approach for a real-time facial gesture is used for human feelings identification, human feelings Identification (HFI) is an essential research fields in computer visions and artificial intelligence systems. Human Face is an import part of the body; it is used for non-verbal communication. This paper proposes a practical working model of human feelings detection on a single as well as group feelings identification, and Group feeling identification is a challenging problem due to obscuration of the hidden body pose variation, occlusion, variable lighting condition, indoor-outdoor siting, image quality. The group feeling identification are used in crowd analytics', social media, marking, social event detection, public safety, human computing interaction and many more area. The proposed method consists of two-stage of detection: Face detection and Feelings identification. A Haar cascade method is used for detection of the input images and videos; the web camera is used to capture the real-time images and videos. This research is beneficial in the different area of applications Medical, Army, Navy, Airport and multiplex for security and virtual learning environments. Deep learning algorithm along with machine learning convolution neural network provides state of the art solution to classification, classification- localization, object detection, instance segmentation and image captioning. The significate percentage of seven human feelings identification rate in the form of accuracy is improving in emotions identification as compared to the previous schemes.

Keywords: Face detection, Human Facial Feeling Identification, deep learning algorithm, Convolutional Neural Networks.

I. INTRODUCTION

Human feelings play an essential role in day to day life for non-verbal communication. Emotion recognition from human speech [1]. They also show human feelings, allowing a human to express the feelings [2,3]. We can immediately identify the feelings of human. The information of the facial feelings is used in an automatic system of feelings recognition [4]. This research aims to identify the seven feelings using Facial gesture like angry, disgust, scared, happy, sad, surprised, neutral in a single face as well as the group of faces. In this paper used convolution neural network

(CNN) with modern deep learning architecture. The deep learning is the most popular and effective algorithm. Human feelings detection on a single face as well as a group of faces. Group feeling identification is less extensity studied, but it slowly going popular due to the massive amount of web sites data available on social media challenging problem due to obscuration of the hidden body pose variation, occlusion, variable lighting condition, indoor-outdoor siting, image quality. The group feeling identification are used in crowd analytics', social media, marking, social event detection, public safety, human computing interaction and many more area. CNN is the solutions to every image processing problem. The advantage of CNN is fully automatically detecting the features without any social support. CNN has the two types of layers, the hidden layers or Feature Extraction layer, it used convolutions and pooling function and the second one is the classifier layer. Convolution is a mathematical term, which involves a combination of two-term and produces a third term. We use a very powerful and efficient model for human feelings identification. Which performs automatic feature extraction with very high accuracy. CNN model performs image classification better than any humans. Figure 1 shows the working model of CNN. There is an image we work on to find out the facial feeling of an input image. Using the combination of function layers of convolution and then pooling function. Then connected by several fully connected layers. Here we are performing the find out seven feeling input images, so multi-class classification is used at the last output layer. The convolution layer is the heart of CNN. Convolution is a mathematical term that produces a set of two information. In our case, the convolution is applied to the input image using a convolution filter to produce the feature of face. This is also called a 3*3 convolution as per the shape of filter.

Manuscript published on January 30, 2020.

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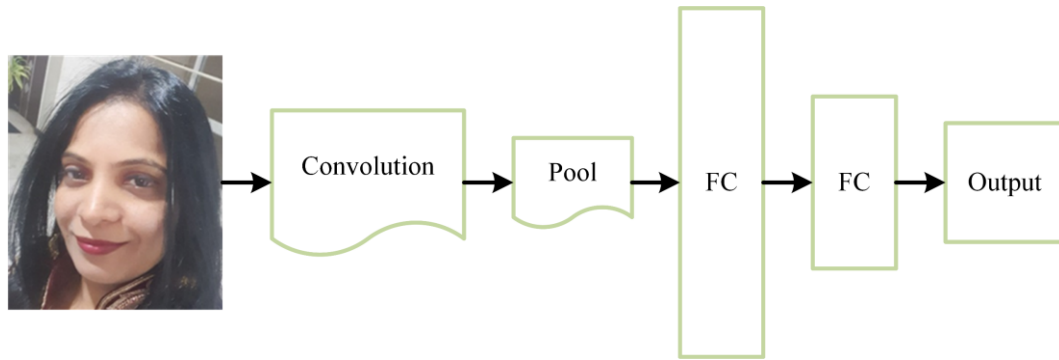


Figure 1: Architecture of working CNN model

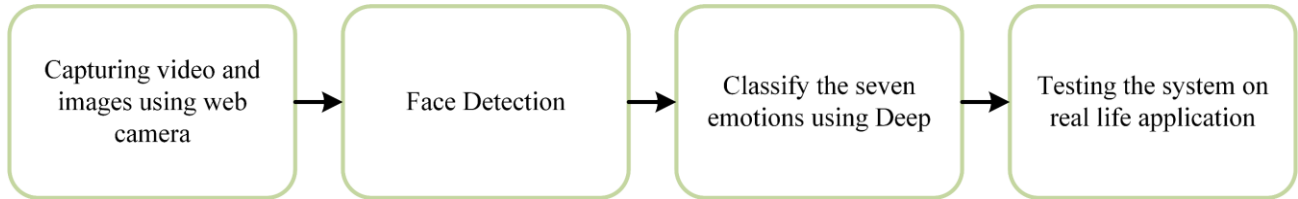


Figure 2: Architecture of Facial Expression Recognition System

A real time human feelings data can be taken from a real time of videos. Therefore, to achieve the better result of understanding of the real human feelings identification. To improve the accuracy, the large amount of real time data is required, to reduce processing time. On the other hand, we would reduce the accuracy which means collection of less feature data. The experimental results from the current solution shows that in some cases accuracy is high, but processing time is high, such as Salman [5] who used decision tree to identify real time human feelings. Other solution has to different limitations - for example, Chu [6] has provided low-cost facial feelings on a mobile platform by just extracting the human facial features like lip, spending less time but achieving less accuracy. To find out the best solution for the human facial feeling's identification, both accuracy and efficiency need to be achieved. The goal is to find the best solution for real-time facial feelings identification is based on the human facial gesture. To achieve the goal, it is necessary to improve the accuracy and efficiency of human facial feeling identification systems.

II. BACKGROUND AND RELATED WORKS

A facial feelings identification system in the current research used three steps for facial feelings recognition, i.e. Face detection, facial features detection, mouth, eyes, nose tips and eyebrows etc. and emotions classifier. Our approach for human facial feelings identification system comprises of three steps to two-step process i.e. face detection, Haar cascade classifier is used to detect the real-time faces from the videos as well as in the images. The difference between the pixel groups is used to find out the light and dark area. Two or three adjacent groups with a relative contrast difference form a Haar-like feature. Haar features can make easily to scaled using increasing or decreasing the size of the pixel group being examined. This features to be used to detect the real-time human face of various sizes.

III. THE PROPOSED SYSTEM

In the previous research, human facial feelings are recognition using three steps as face detection, facial landmark points detection and facial feelings classifier. In this paper we proposed the two-step of a working model, step 1: real-time face detect using Haar cascading method, step 2: seven feelings angry, disgust, scared, happy, sad, surprised, neutral identification on a single face as well as the group of faces using convolution neural network with deep learning. The proposed algorithm is tested over the real-time images and the social media images for accurate human feelings identification.

IV. DATABASE

The human feelings identification algorithm is aimed to focus on the challenging "in-the-wild" to handle several variations within specific categories. That is why we capture facial images within controlled conditions without significant variations, also taken in the uncontrolled environment because in real-world, facial images show varying facial poses in the extreme left and right side faces, different head poses, illuminations, facial occlusion illumination, colour, shadowing, self-shadowing, low resolution etc. The proposed algorithm is tested over (Facial Emotions Recognition) FER 2013 database. Which contents 35,887 grey and colour scale images. Where each image belongs to one of the following classes angry, disgust, scared, happy, sad, surprised, neutral.

V. EXPERIMENTAL RESULTS

Web camera is employed to capture real-time images and videos. The whole implementation has been done in python 3.0 environment, with open cv, Dlib for image processing. Libraries use as Numpy,

Scikit learning, pandas for numerical processing. Keras of deep learning framework order to train the neural network, below figure shows the seven human feelings as Angry, Disgust, Scared, Happy, Sad, Surprised, Neutral. The implementation results of the proposed technique. The seven

Human feelings identification results are shown in Figure 2. The different human feeling identification in a small group as well as in the big group the results are shown in Figure 3. The proposed algorithm is work efficiently in single face as well as the big group of faces.

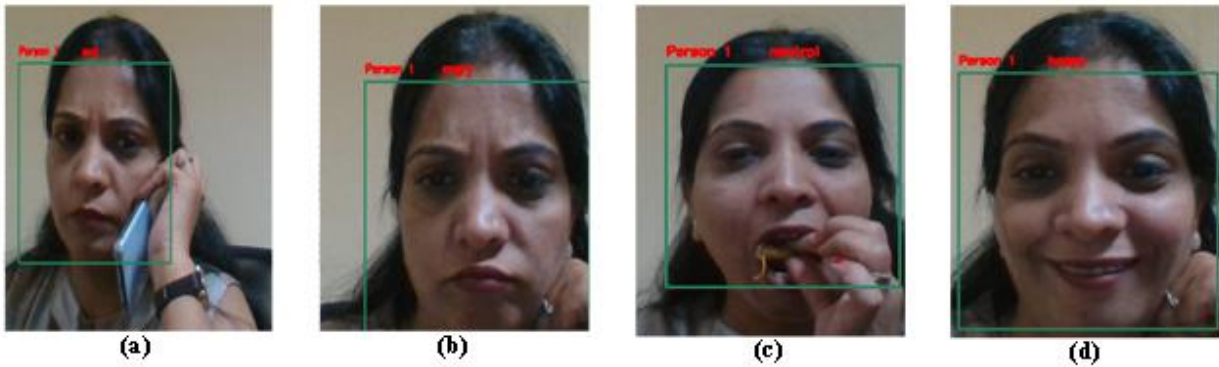


Figure 1: Different feelings identification, (a) sad, (b) angry, (c) neutral, (d) happy

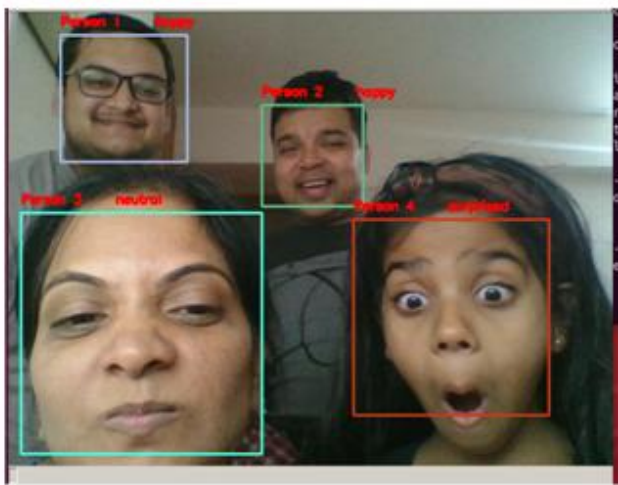


Figure 2: Human Feeling identifications in small group

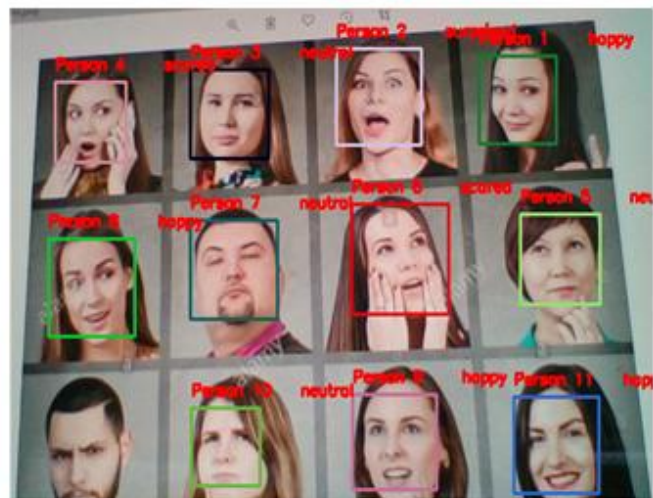


Figure 3: Human feeling identifications in very big group

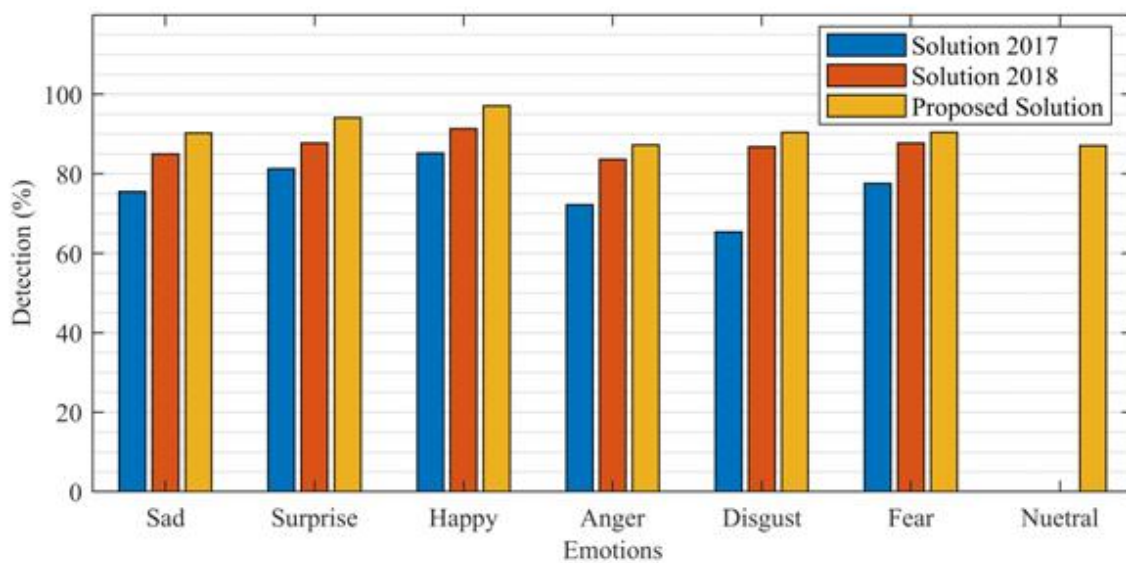


TABLE 1: RESULT ANALYSIS OF ACCURACY OF HUMAN FEELINGS

Seven Feelings	Sad	Surprise	Happy	Anger	Disgust	Fear	Neutral
Exiting solution 2017	75.53	81.27	85.24	72.21	65.32	77.58	0
Exiting solution 2018	85	87.72	91.36	83.66	86.76	87.73	0
Proposed Solution 2019	90.23	94.12	97.08	87.23	90.38	90.38	87.13
Improve accuracy	6.15	7.29	6.26	4.26	4.17	3.02	

VI. CONCLUSION

A real-time human feelings identification using facial gesture approaches consist of the two steps, face detection using Haar cascade algorithm and facial feelings identification using Convolution Neural Network with deep learning. Deep learning is a powerful algorithm. CNN algorithm with deep learning provides the best result of accuracy as well as the speed of seven human feelings identification time. CNN learning algorithm provides the state-of-the-art solution to many problems in image processing like real-time object detection and classification and localization. Human feeling identification is tested on real-time images and videos as well as social media images. The proposed algorithm achieves the improve accuracy 6.15 %, 7.29 %, 6.26%, 4.26 %, 4.17 %, 3.02 % in respective sad, surprise, happy, anger disgust and fear as compare to exiting algorithm.

REFERENCES

- Ira C., A. Garg, T. S. Huang, "Emotions Recognition from Facial Expression using Multilevel HMM", *Neural information processing systems*, in year 2000.
- Ratliff M. and Patterson, "Emotion recognition using facial expressions with active appearance models", *Proceedings of the Third lasted International Conference on Human Computer Interaction, ACTA Press, Anaheim, CA, USA*, page no. 138 to 143 in year 2008.
- Tian Y. I. and Cohn J. F., "Recognizing action units for facial expression analysis", *IEEE transactions on pattern analysis and Machine Intelligence*, 23, no. 2, page no. 97 to 115 in year 2000.
- Salman, Madaini and Kissi, "Facial Expression Recognition using Decision Tree", *IEEE International Conference on Computer Graphics, Imaging and Visualization*, page no.120 to 130 in year 2016.
- Chu & Hsihe, "Low Cost Facial Expression on Mobile Platform", *IEEE International Conference on Machine Learning and Cybernetics*, page no. 586 to 590 in year 2015.
- Das, "Virtual Classroom of Effective Learning in Information Technology Industry", *International conference on Information Technology IEEE*, page no. 221 to 226 in year 2015.
- Farsi and Munro, "Effects of Teaching Primary School Children the Islamic Prayer in a Virtual Environment", *Science and Information conference*, page no.765-769 in year 2015.
- Yang, Kriegman and Ahuja, "Survey on Detecting Faces in Images", *IEEE Transactions on Pattern Analysis and Machine Intelligence*. 24 [1] page no. 34 – 58 in year 2002.
- Yow and Cipolla, "Feature-based Human Face Detection", *Image and Vision Computing*, 15(9), page no. 713-735 in year 1997.
- Dai and Nakano, "Face-texture Model Based on SGLD and its Application in Face Detection in a Color Scene", *Pattern Recognition*. 29(6), page no. 1007-1017 in year 1996.
- Yang and Waibel, "A Real-time human Face Tracker", *Proceedings of Third workshop on applications of computer vision*, page no. 142 to 147 in year 2015.
- Durmusoglu and Kahraman, "Facial Expression Recognition Using Geometric Feautre", *IEEE conference*. DOI -099, IWSSIP, 7502700, page no. 23 to 26 in year 2016.
- Rowley, Baluja and Kanade, "Neural Networks based human Faces Detection", *IEEE Transactions on pattern analysis and machine learning Intelligence*. 20[1], page no. 23 to 38 in year 2015.
- Gosavi and Khot, "Facial Expression Recognition Using PCA", *International Journal of soft computing and engg.* 3[4] page no.258 to 262 in year 2013.
- Kiran and Kushal, "Facial expression classification using SVM Based on bidirectional local binary pattern histogram features descriptor", *17th IEEE International Conference on Software Engineering, Artificial Intelligence, Network and Parallel and Distributed Computing*, page no. 115 to 120 in year 2016.
- Vosian and Dragan, "Facial expression recognition system based on human face statistical model and SVM", *IEEE 11 International symposium on applied computational intelligence and informatics*, page no. 63 to 68 in year 2016.
- Choudhury and Chakraborty, "Framework for the recognition of human emotions using soft computing models", *International Journal of Computer Applications*. 40[17], page no. 50 to 55 in year 2012.
- Sablik and Velten, "Automatic privacy protection based on haar cascades and spectral domain water-mark", *GMBH*, ISBN: 978/3/8007/3543/3, page no. 199 to 204 in year 2013.

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