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Emotion Detection using Convolutional Neural Networks

Mrs. S. Sudha[1], Mr. C. G. Pragadeesh[2], Mr. R. G. Raguram[3], Mr. I. Santhoshkumar[4]
Assistant Professor, Department of Information Technology[1]
Students, Department of Information Technology[2,3,4]
Anjalai Ammal Mahalingam Engineering College, Kovilvenni, Thiruvarur

Abstract: *Real-time emotion recognition has been an active field of research over the past several decades. A Light Weight Emotional Recognition (LWER) system has been proposed in this project by using facial expression. Compared with other conventional method, the LWER system has low test time along with higher accuracy. Facial expressions convey non-verbal information between humans in face-to-face interactions. Automatic facial expression recognition, which plays a vital role in human-machine interfaces, has attracted increasing attention from researchers since the early nineties. Classical machine learning approaches often require a complex feature extraction process and produce poor results. In this paper, we apply recent advances in deep learning to propose effective deep Convolutional Neural Networks (CNNs) that can accurately interpret semantic information available in faces in an automated manner without hand-designing of features descriptors. We also apply different loss functions and training tricks in order to learn CNNs with a strong classification power. The experimental results show that our proposed networks outperform state-of-the-art methods on the well-known FERC-2013 dataset provided on the Kaggle facial expression recognition competition. In comparison to the winning model of this competition, the number of parameters in our proposed networks intensively decreases, that accelerates the overall performance speed and makes the proposed networks well suitable for real-time systems.*

Keywords: Emotion Recognition, Convolutional Neural Networks, Deep Learning, FERC-2013, etc.

I. INTRODUCTION

One of the important ways humans display emotions is through facial expressions. Facial expression recognition is one of the most powerful, natural and immediate means for human beings to communicate their emotions and intensions. In this proposed method, we presented a Light Weight Emotional Recognition system has been proposed in order to improve the accuracy and decrease the running time of the system.

There has always been a need to identify individual biometrics; however, the means of identification have changed drastically as populations have grown and as individuals have become more geographically mobile. Biometric technologies have emerged as tools to help identification in a global and mobile society. The term biometrics in the information technology field refers to the distinctive use of identifiers or anatomical and behavioural characteristics for authentication or recognition purposes. An easy way to comply with the Journal paper formatting requirements is to use this document as a template and simply type your text into it.

II. DESIGN ISSUES

Generally, there are many methods to recognize the type of emotion being expressed, but the output ultimately depends on the accuracy of the algorithm and there is another case needed to be considered, if the algorithm predicts the probabilities of different emotions equally it is difficult to decide the emotion. We need to improve the accuracy in order to correctly classify the emotion. This can be done using conventional Neural Network (CNN).

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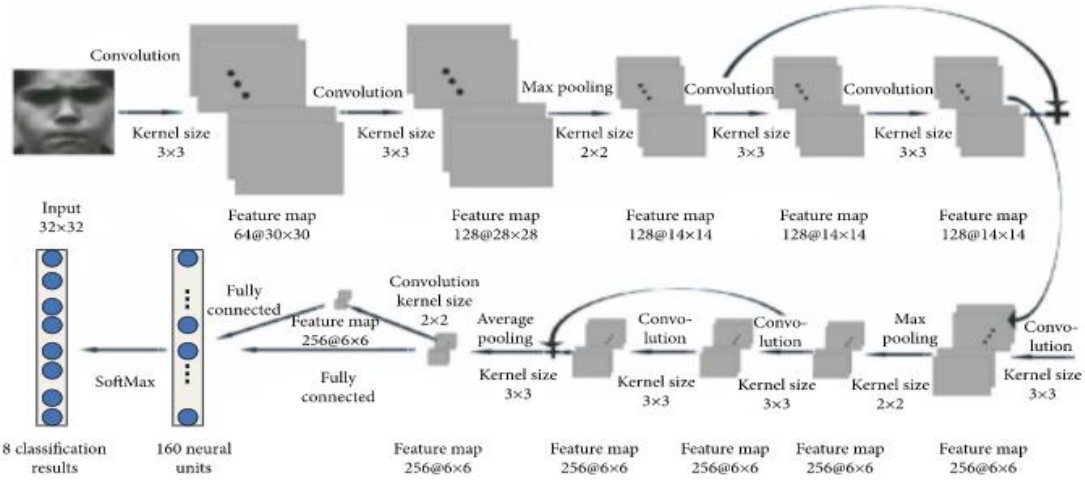
III. ALGORITHEM USED

1) Convolutional Neural Network

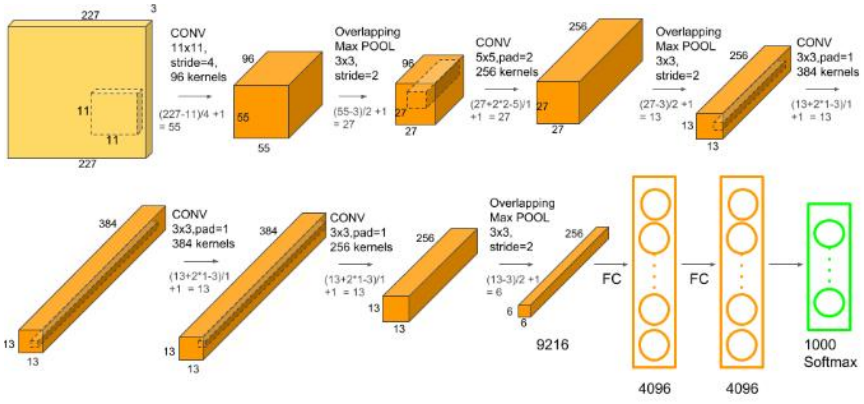
We will use the widely popular one: Convolutional Neural Networks, to work on the Face expression recognition problem. Instead of using predefined convolutional neural network models like VGG-16, ResNet, ImageNet, etc., we will use the Tensor Flow framework to build each layer of our model from scratch. Let us first start with the downloading dataset needed to build that model.



2) AlexNet:

In 2012 (ILSVRC), AlexNet was created and designed by Krizhevsky for the ImageNet Large Scale Visual Recognition Competion. To make the classification of 1.2 million images into 1000 classes, AlexNet or a deep convolutionary neural network (CNN) was utilized in the ImageNet challenge [30]. AlexNet generates best results substantially than the previous models like LeNet. The differentiations between AlexNet and previous versions are showed by numeric layers and parameters. Five CONV layers are contained in AlexNet, some of which are accompanied by max-pooling layers, three linked layers, and a final 1000-way softmax.

AlexNet has the total trainable parameters number is around 60 million. In contrary to this, LeNet is contained two coevolutionary layers, followed by three fully connect layers and two pooling layers. Approximately, the total trainable parameters of LeNet are 60,000. The nonlinear (ReLU) function uses in AlexNet whereas LeNet is used the sigmoid logistic function. To reduce the overfitting in the fully linked layers, a “Dropout” form of regularization is used by AlexNet and it is the last distinction. While designing LeNet, this principle is not used. Before describing the topology of AlexNet, some more terms used in the model are require to explain. In the following subsections, the features of AlexNet are listed in detail.



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IV. CONCLUSION

We have presented a complete and fully automated approach for facial expression identification by simultaneously utilizing the face surface and face subsurface features. We presented a new algorithm for the face identification and recognition, which can more reliably extract the face features and achieve much higher accuracy than previously proposed facial identification approaches. The proposed approach presents a very low degree of complexity, which makes it suitable for real-time applications. Depending upon the selected features and the measured region properties of the human face, the different expression of the human was further classified using CNN (convolution layers). The proposed method is superior compared with other state-of-the-art approaches and that the analysis of the general image quality of the face images reveals highly valuable information that may be very efficiently used to discriminate them from fake traits.

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