A STUDY AND ANALYSIS ON EMOTION RECOGNITION

Shesh Mani Tiwari*, Hari Om Sharan
Dept. of Computer Science and Engineering, FET, Rama University, Kanpur, India

Abstract - Emotion being a subjective thing, leveraging knowledge and science behind labeled data and extracting the components that constitute it, has been a challenging problem in the industry for many years. With the evolution of deep learning in computer vision, emotion recognition has become a widely-tackled research problem. Facial emotion recognition (FER) is an important topic in the fields of computer vision and artificial intelligence owing to its significant academic and commercial potential. Although FER can be conducted using multiple sensors, this review focuses on studies that exclusively use facial images, because visual expressions are one of the main information channels in interpersonal communication. This paper provides a brief review of researches in the field of FER conducted over the past decades.
Keywords – CNN, FER, Deep Learning, Classification, Features

I. INTRODUCTION

Artificial intelligence systems to recognize human emotion have attracted much research interest, and potential applications of such systems abound, spanning domains such as customer-attentive marketing, health monitoring, and emotionally intelligent robotic interfaces. In light of the important role that facial expression plays in communicating emotion in humans, there has been substantial research interest in computer vision systems to recognize human emotion. Facial expression recognition is the process of identifying human emotion based on facial expressions. While humans are naturally capable of understanding the emotions, it stayed as a challenging task for machines. Facial expression recognition process contains features extraction and classification as shown in Fig. 1.

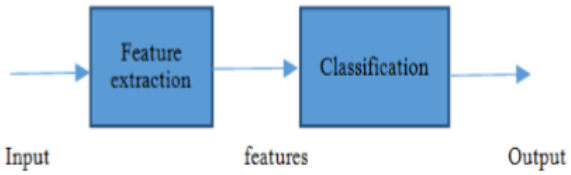

Fig. 1. Facial Expression Recognition System

Facial Expression Recognition system is a classification task. Classifier takes a set of features that are retrieved from the input image as input. These features describe the facial expression. CNN is a combination of deep learning technology and artificial neural networks. A massive development in deep learning and applying CNN for a classification problem has attained a great success [1,2].

II. LITERATURE SURVEY

There are some previous approaches to facial expression recognition.

[3] This paper presents emotion recognition model using the system identification principle. A comprehensive data driven model using an extended self-organizing map (SOM) had been developed whose input is a 26 dimensional facial geometric feature vector comprising eye, lip and eyebrow feature points.

[4] This paper depends on biometric confirmation. This paper gives a thought regarding a framework which perceive the individual's demeanor thus that the restricted work can be done in safe condition as this framework reports the state of individual to security.

[5] This paper Bartlett explores and compares techniques for automatically recognizing facial actions in sequences of images. These techniques include analysis of facial motion through estimation of optical flow; holistic spatial analysis, such as independent component analysis, local feature analysis, and linear discriminant analysis; and methods based on the outputs of local filters, such as Gabor wavelet representations and local principal components.

[6] This paper gives the learning of eigen faces. The scientific formulae and administrators utilized in the central segment investigation calculation are depict in this paper. Eigen esteems and mean qualities are the administrator utilized by PCA calculation to coordinate the most important eigen confront. Scientific portrayal is give in this paper.

[7] Lien describes a system that recognizes various action units based on dense flow, feature point tracking and edge extraction. The system includes three modules to extract feature information: dense-flow extraction using a wavelet motion model, facial feature tracking, and edge and line extraction.

[8] In this paper different methods for feature extraction are discussed with their performance parameter. These methods are based on the (HLAC) higher order local autocorrelation and (LBP) local binary pattern.

[9] In this paper, they decompose image into small sets of features images or eigen face. First, they create training dataset to compare result. Once inputted face image is pre-processed and compare with training dataset which are already computed. Highest matching can be achieved by multiple face images, but it needs high computation time.

[10] There are works that used convolutional neural networks for emotion recognition. Lopes et al. (2015) created a 5-layer CNN which was trained on Cohn – Kanade (CK+) database for classifying six different classes of emotions.

[11] Arushi and Vivek (2016) used a VGG16 pretrained network for this task. Hamester et al. (2015) proposed a 2-channel CNN where the upper channel used convolutional filters, while the lower used Gabor-like filters in the first layer.

[12] Mehrabian proposed a work it describes how to communicate using facial emotions.

III. APPLICATIONS

With the rapid development of technologies, it is required to build an intelligent system that can understand human emotion. Facial emotion recognition is an active area of research with several fields of applications. Some of the significant applications are:

A. Alert system for driving.
B. Social Robot emotion recognition system.
C. Medical Practices.
D. Feedback system for e-learning.
E. The interactive TV applications enable the customer to actively give feedback on TV Program.
F. Mental state identification.
G. Automatic counseling system.
H. Face expression synthesis.
I. Music as per mood.
J. In research related to psychology.
K. In understanding human behavior.
L. In interview
M.Customer preference

IV. CONCLUSION

This paper presented a brief review of FER approaches. As a particular type of deep learning, a CNN visualizes the input images to help understand the model learned through various FER datasets, and demonstrates the capability of networks trained on emotion detection, across both the datasets and various FER related tasks. Each method has its own strengths and limitations. This study helps to understand different kinds of models for facial expression recognition and to develop new CNN architectures for better performance and accuracy.

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