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Emotion Recognition using Facial Expression

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Abstract - *Facial Expressions are the most immediate mode of communication and interaction between individuals for sharing info between themselves. Although Facial Emotion Recognition can be conducted using multiple sensors but this review focuses on studies that exclusively use facial images, because visual expressions are one of the main information channels in interpersonal communication. Automatic emotion detection using facial expressions recognition is now a main area of interest within various fields. These do not disclose the feelings of anyone or don't disclose someone's mental views at a particular period of time. This paper basically includes the introduction of the human emotion recognition using the facial expressions of a particular human being at a particular instance of time.*

Key Words: Human Emotions, Facial Expressions, Inception v3 model, Tenserflow, CK+ dataset.

1. INTRODUCTION

Human Facial Expressions plays a vital role in day-to-day life communication between different individuals**.** By recognizing the facial expression of a particular individual, it becomes easier for determining the basic human emotions like anger, fear, disgust, sadness, happiness and surprise. These expressions can vary in every individual. Facial expressions are produced by the movement of different parts of our faces at different conditions. The preliminary observation of the mentality is primarily based on the most common forms of facial recognition to distinguish and recognize face talks. In general, SVM, LBP and Gabor are used to distinguish and recognize transparent face based on Haar, Adaboost and Neural Networks. For example, Kobayashi et al. has made the isolation and recognition of the first state-based neural network. Caifeng Shan et al. uses a SVM dictionary based on LBP's activities to get a visual recognition.

In recent years, as a new recognition method that combines artificial neural network and deep learning theory, the convolutional neural network has made great strides in the field of image classification. This method uses the local reception field, the weight of the exchange and exchange technology, and significantly reduces training parameters compared to the neural network. It also has some degree of translational invariance, rotation and distortion of the image. It has been widely used in speech recognition, facial recognition. Tensorflow is the second artificial intelligence research and development system developed by Google to support CNN (3N), the neural network (RNN) and another model of neural network. Depth This system is widely used in Google products and services. It has been used in more than 100 automated learning projects, with more than a dozen fields of speech recognition, artificial vision and robotics.

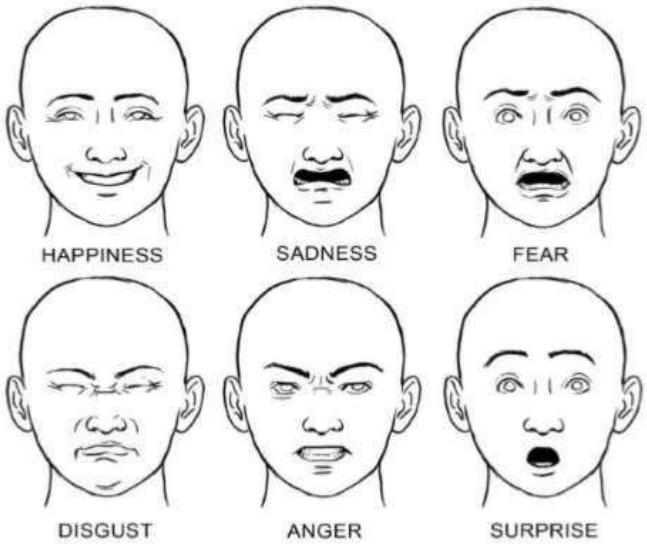

Fig -1: Six basic Facial Expressions

1.1. CATEGORIZING FACIAL EXPRESSIONS & IT'S FEATURES:

Facial expression presents a key mechanism for describing human emotion. From the beginning to the end of the day, humanity changes many emotions, it may be due to your mental or physical circumstances. Although human beings are full of various emotions, modern psychology defines six basic facial expressions: happiness, sadness, surprise, fear, disgust and anger as universal emotions [2]. The movements of facial muscles help identify human emotions. The basic facial features are the eyebrows, the mouth, the nose and the eyes. We show that it is possible to differentiate faces with a prototypical expression from the neutral expression. Moreover, we can achieve this with data that has been massively reduced in size: in the best case the original images are reduced to just 5 components. We also investigate the effect size on face images, a concept which has not been reported previously on faces. This enables us to identify those areas of the face that are involved in the production of a facial expression. Fear, disgust ,anger, surprise, happiness and sadness all are the different types of

facial emotions which a human being expresses through its facial expressions which can be made through the movement of faces .These movement of faces i.e. making facial expressions brings different emotions at the face of the human being .

Universal Emotion Identification		
Emotion	**Definition**	**Motion of facial part**
Anger	Anger is one of the most dangerous emotions. This emotion may be harmful so, humans are trying to avoid this emotion. Secondary emotions of anger are irritation, annoyance, frustration, hate and dislike.	Eyebrows pulled down, Open eye, teeth shut and lips tightened, upper and lower lids pulled up.
Fear	Fear is the emotion of danger. It may be because of danger of physical or psychological harm. Secondary emotions of fear are Horror, nervousness, panic, worry and dread.	Outer eyebrow down, inner eyebrow up, mouth open, jaw dropped
Happiness	Happiness is most desired expression by human. Secondary emotions are cheerfulness, pride, relief, hope, pleasure, and thrill.	Open Eyes, mouth edge up, open mouth, lip corner pulled up, cheeks raised, and wrinkles around eyes.
Sadness	Sadness is opposite emotion of Happiness. Secondary emotions are suffering, hurt, despair, pitty and hopelessness.	Outer eyebrow down, inner corner of eyebrows raised, mouth edge down, closed eye, lip corner pulled down.
Surprise	This emotion comes when unexpected things happens. Secondary emotions of surprise are amazement, astonishment.	Eyebrows up, open eye, mouth open, jaw dropped
Disgust	Disgust is a feeling of dislike. Human may feel disgust from any taste, smell, sound or tough.	Lip corner depressor, nose wrinkle ,lower lip depressor, Eyebrows pulled down

2. Related work:

In 1971, Paul from a psychological point of view Six basic emotions (happiness, sadness, anger, disgust, astonishment, fear) through cultures. In 1978, Ekman et al. [22] A facial action was developed Encoding system (FACS) to describe facial expressions. Today, it is a statement of facial expression Work is based on previous work, this document They have also selected six basic emotions and neutral emotions facial expression classification. Lu Guanming et al. [2] proposed a convolution neural network for recognition of facial expressions, and failure strategy and expansion strategy for the data set adopted to solve the problem of insufficient training data and the problem of overfitting. C. Shan et al. applications LBP and SVM algorithm to classify facial expressions with an accuracy of 95.10%. Andre Teixeira Lopes and others [7] used a deep convolutional neural network to classify facial expression, accuracy reached 97.81%. In traditional layout and learning in order to ensure the accuracy and reliability of the classification trained, must meet two basic assumptions: first the training samples and test samples are taken independent distribution; the second is that it is necessary training data. In many cases, however, these two the conditions are hard to find. The most likely scenario is that the training data is outdated. This usually requires label a large number of training data to needs of our training, but it is very expensive to label new data, which requires a lot of manpower and material resources.

The purpose of the transfer of education is apply the knowledge of an environment to a new environment. Compared to the traditional learning machine, transfer learning relax requirements of the two basic assumptions, it cannot require a large amount of training data, or only a small amount of data can be labeled. Transfer of learning makes. It does not have to be like traditional machine learning. The training samples and test samples should be independently and identically distributed. In the same compared to the traditional network with initialization, the learning speed of the transfer learning is much faster.

Proposed System:

This experiment is based on the Inception V3 model[8]. An example of platform tensorflow [1], hardware core, Intel i7 at 2.9 GHz, 8 GB DDR3 at 1600 MHz. CK + dataset used for experimental expression data sets (Cohn-Kanade [15], CK + dataset). We can choose the 1004 images of the facial image, which contains 7 basic shapes, happiness (158), Tris (155) out of (103), horror (146) surprise (161), fear (137) and neutral (144).

re-process the image. First, the inception v3 model [8] is the image in jpg or jpeg format for the formation and format of the image of the dataset for the PNG format, so that the image format is converted to PNG format in JPG format converted. Secondly, since the image of the dataset is the image of the facial expression taken by the digital camera and some of the color images and some images in gray, the image must be converted into the image in grayscale. In order to eliminate the interference of the floor and hair and to improve the accuracy of the classification of the images, we must cut off the area of the face of the image and use the clipping image for its formation, verification and testing. The Inception v3 network model [8] is a very complex network. If you train the model directly and the data from the CK + record [12] is relatively small, it takes a long time and the training data is insufficient. Therefore, we use transfer-learning technology to recycle the Inception v3 model. The last layer of the Inception v3 model [8] is a softmax classifier because the Image Net dataset contains 1000 classes, so the classifier has 1000 root nodes in the original network. Here we need to remove the last layer of the network, set the number of output nodes to 7 (the number of facial expressions), and then reuse the network model. The last layer of the model is formed by the later propagation algorithm, and the Cross-Entropy Cost function is used to

adjust the weight parameter by computing the error between the output of the softmax layer and the vector of the given example category day.

RESULT:

The data used in the experiment were composed of five adult human volunteers (three men and two women) and were used to construct the system, recording each person twice while watching a 210-second video. The video contained six different scenarios (relaxation, humor, sadness, fear and discussion) and experienced the most feelings from FeelTrace; we noticed that every volunteer had a different reaction to every part of the video. The video was collected from YouTube and also contained audio, which had a greater effect on the participants. The face video of each participant was collected from the FPGA Xilinx Spartan-6 LX45 and a camera sensor connected to it, and then an HDMI output from the FPGA was later connected to the computer; the Opencv Acquisition Toolbox that is used to receive and store the real-time video capabilities of the FPGA board for use in the machine. The videos were in RGB colors and for each color component of a pixel in a frame. Each participant was tied from the shoulder with his face to the camera while sitting in the chair. It is made to be natural and real; therefore, the videos were recorded in the office with a natural background and in some cases some people can be seen walking in the frame of the camera. The 10 recorded videos contain no audio, because it contains no paper; this also reduced the volume of data and therefore the data could be processed faster. It was interesting that the volunteers had a different reaction to each part of the video . So in general the data collection contained 63,000 labeled samples.

CONCLUSION:

This article deals with programs to see face-to-face and various research challenges. Basically, these programs include face recognition, resource extraction, and classification. Different approaches can be used to determine the level of better recognition. Highly respected standards are effective. These methods provide a practical solution to the visual impairment problem and can work well in a restricted area. Emotional sensitivity to the state of the state is a complex problem and creates difficulties due to the physical and psychological characteristics associated with individual characteristics. Therefore, the research in this field will continue to study for many years, as it is important to solve many problems to create a user interface and better recognition of the complex emotional conditions required.

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