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Emotion' Recognition Using Facial Expression

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Abstract: *Emotions play a very important role in our day to day life. Emotions are the natural physiological response of the human body which can be recognized by the facial expression. In the proposed system research has been done in the field of Human Computer Interaction(HCI). The entire project is divided into three major steps i.e. Face detection, facial feature extraction and classification.*

I. Introduction

A key step in the humanization of robotics is the ability to classify the emotion of the human operator. In this paper we present the design of an articially intelligent sys-tem capable of emotion recognition trough facial expressions. Three promising neural net-work architectures are customized, trained, and subjected to various classication tasks, after which the best performing network is further optimized. The applicability of the nal model is portrayed in a live video ap-plication that can instantaneously return the emotion of the user.

Facial expression recognition is an important part of human emotion recognition, which is widely used in human-computer interaction, pattern recognition, image understanding, machine vision and other fields. There are more than 10 thousand kinds of expressions, anddifferent people have different ways to express their emotions. and neural network and recognize facial expressions according to the features of Haar, Adaboost..

II. Related works

A key step in the humanization of robotics is the ability to classify the emotion of the human operator. In this paper we present the design of an articially intelligent sys-tem capable of emotion recognition trough facial expressions. Three promising neural net-work architectures are customized, trained, and subjected to various classi cation tasks, after which the best performing network is further optimized. The applicability of the nal model is portrayed in a live video ap-plication that can instantaneously return the emotion of the user.

In 1971, Paul Ekman the famous psychologist in American proposed that the facial expressions of people from different cultures are much in common, the expression of the six basic emotions of happiness, anger,sadness, disgust, surprise and fear are very similar in many cultures. Early facial expression recognition is mainly use the common methods in face recognition to classify and recognize facial expressions. Usually, SVM, LBP and Gabor are used to classify,from the psychological point of view proposed that there are six basicemotions (happiness, sadness, anger, disgust, surprise and fear) across cultures. In 1978, Ekman et al. developed the facial action coding system (FACS) to describe facial expressions. Nowadays, most of the facial expression recognition work is done.on the basis of the above work, this paper also chose the six basic emotions andneutral emotions as the standard of facial expression classification. Lu Guanming et al. proposed a convolutional neural network for facial expression recognition, and thedropout strategy and the dataset expansion strategy are adopted to solve the problem of insufficient training data and the problem of overfitting. C. Shan et al. uses LBP and SVM algorithm to classify facial expressions with accuracy. Andre Teixeira Lopes etal. used a depth convolution neural network to classify facial expression, the accuracy reached 97.81 .However, in terms of the convolutional neural network algorithm, low level network model achieves low accuracy, the deep network models often has some problems, such as lack of data, easy to over fitting, long training time and so on. In the traditional classification and learning, in order to ensure the accuracy and reliability of the classification model trained, need to meet two basic assumptions: the first is the training samples and test samples meet with independent distribution; the second is that it need enough training data.

III. Methodology

This experiment is based on the Inception-v3 [8] model of TensorFlow [1] platform, the hardware platform is MacBook Pro: processor 2.9GHz Intel i7, memory 8GB 1600MHz DDR3. The use of the experimental dataset is CK+ facial expression dataset (The Extended CohnKanade dataset [15], CK+). We select 1004 images of facial expression image, which contains 7 basic facial expressions: happiness (158), sad (155), anger (103), disgust (146), surprised (161), fear (137) and neutral (144) In this section, the following part is as follows: first, we make a simple introduction on the dataset; then, we introduce the process of the experiment in detail; finally, we verify the effectiveness of the method through the comparison experiment.

All networks are trained for 60 epochs with the data mentioned in section 3.1. Figure 3 and table 1 show various details of the training process and the nal model. For network A, the nal accuracy on the validation data is around 63%. Already after 10 epochs, the accuracy raised above 60%, indicating quick learning capabilities. Furthermore it is note-worthy that adjusting the lter dimension did not have a big in uence on the accuracy.

In this paper, based on the Inception-v3 model of Tensor Flow platform, we use the transfer learning technology to train a new facial expression classification model in CK+ dataset. The classification accuracy of the model is 97, which is higher than that of MLP, LBP and low-level network model. Compared with some deep network models, this paper takes less time. The future work is to study and develop a facial expression recognition model based on dynamic sequences.

IV. Conclusions And Future

In this paper, based on the Inception-v3 model of Tensor Flow platform, we use the transfer learning technology to train a new facial expression classification model in CK+ dataset. The classification accuracy of the model is 97, which is higher than that of MLP, LBP and low-level network model. Compared with some deep network models, this paper takes less time. The future work is to study and develop a facial expression recognition model based on dynamic sequences

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