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Face Recognition based Rating System

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ABSTRACT: Recently, the recognition of automated and unmanned restaurants has increased. Due to the absence of staff, there's no direct perception of the customers' impressions so as to seek out what their experiences with the restaurant concept are like. For this purpose, this paper presents a scoring system based supported countenance recognition with pre-trained convolutional neural network (CNN) models. For interactive human and computer interface (HCI) it's important that the pc understand facial expressions of human. With HCI the gap between computers and human will reduce. The computers can interact in additional appropriate way with humans by judging their expressions. There are various techniques for countenance expression recognition which focuses on getting good results of human expressions then the food is meant to be rated. Currently, three expression (satisfied, neutral and disappointed) are provided by the rating system.

KEYWORDS: Face recognition, CNN Networks,

I. INTRODUCTION

Biometrics is that the science of automatically recognizing people supported their physiological or behavioral characteristics or both. In recent years, it's received increasing attention to satisfy the growing needs for security in decisive applications such as forensics, commerce and government. The latter includes image processing (e.g., face, iris, etc.) and their fore the signal processing (e.g., Speech). The basic pre-requisite for any biometric system like face, fingerprint, iris, ear, hand geometry, palm print, voice, retina, keystroke, gait, signature etc., must be combination of one or more human characteristics as identified by the Researchers.



BASIC EXPRESSION



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2. FACIALEXPRESSION RECOGNITION

The FER (Facial Expression Recognition) is the identification of facial movement, mental activity and deformation of facial characteristics from still images, images sequence or videos, and categorizing them into abstract classes relied only on the visual information. This is often possible in general because in humanfacial gestures are similar. The in human internal feelings are often thrown into the face spontaneously thereby changing appearances and therefore the fiducially dynamics, and devising the face "*index of mind*".

Basic Expressions with neutral face



Basic Expressions with neutral face

3.EKMAN'S BASIC EMOTIONS

Besides the neutral expression, there are six different expressions that are generally addressed in FER. So as to allocate distinct expressions to certain

Emotion, we like to understand what quite of emotions are often acknowledged with every expression.

Emotion, n Ekman and Friesen in 1971 proposed six basic emotions, each of which features a different subject with a singular expression.

Within the literatures, these categorizations also are considered as "basic emotions". Even though many other wellknown categories are used by psychologists, scientists, and the affective, but fear, anger, happiness, sadness, surprise and disgust are the basic expressions suggested by EKMAN and Friesen.



Expressions from CK database (top to bottom, left to right): anger, disgust, fear, happiness, sadness, and surprise 3



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3.1 HAPPINESS

The happiness is the simplest expression recognized in any facial image regardless of culture, sex or age. It is an affective state described by cheerful emotions. It is easy to find the happy faces even in a crowded background and it is simplest of other emotions just by noticing "smile" on the face. A good example is smiles of a celebrity or politician in front of the camera. Thus, a right recognition of "genuine" happy emotions might be useful in few areas of applications.

3.2 FEAR

Fear is a troublesome emotion created by an imminent threat or danger that alters the brain activity. Usually, it is followed by the behavior such as hiding, running and screaming. Having a phobia of a phenomenon is an example for irrational fear. Fear expressions vary greatly depending on the degree of worry / anxiety, different cultures and gender, expressions of fear vary greatly.

3.3 DISGUST

Expressions of disgust are feelings of disgust or intense aversion caused by undesirable events (behavior) or annoying actions. Especially during pregnancy, women are more discomfort. Studies have shown that while expressing disgust, there are changes in cardiovascular and respiratory since disgust is feeling with physical responses to dirty or unpleasant situations.

3.4 SURPRISE

When something unexpected, sudden or incredible happens, surprise expressions usually occur. It is often succeeded by other feelings such as fear or happiness relied on the occasion which creates the unexpected response. For example, happiness would be the next emotion, if your friends surprised on your birthday. When someone appears suddenly in front of you, you may be afraid/fear after surprised.

3.5 SADNESS

Sadness is frequently the exact inverse of happiness and is caused by pain, sorrow, misfortune, inconvenience and defenselessness. In few cases, tears and weeping follow the sad expression. The constant and extreme sadness is called depression. The recognition of expressions of sadness is sometimes difficult because of its change in age, culture and gender.

3.6 ANGER

The anger is most troubled feelings that individuals experience today on account of the day-to day tensions in present day society. Indications of angry emotions can be found in facial expressions, non-verbal communication, hostility, or physiological responses. Anger can likewise be something worth being thankful if it gives you an approach to express negative sentiments or to discover an answer for the issues. 4

IV. BASIC STRUCTURE FOR FACIAL EXPRESSION RECOGNITION

It comprises of three basic steps - Face Acquisition, Facial Data Extraction and Representation and Facial Expression Recognition. The recognition of the face from the given image or video sequence is the first step in the analysis of facial expression. Locating the face in an image is called face detection or facial localization. Locating the face and following it across the different frames of a video sequences is called face tracking.



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Basic structure of facial expression analysis systems

4.1 FACE ACQUISITION

The purpose of acquiring a face is to identify a face with a background crowded with a complex scene. For automated systems of expression analysis, perfect face detection is very important. Few methods use the precise position of faces, while others use the approximate position of faces. Essa and Pentland used the modular Eigenspace approach for accurate face detection. To detect faces from static images and image sequences, the coefficient of the Principal Component Analysis (PCA) has been used.

4.2 FACE NORMALIZATION

Facial normalization is the process of modifying changes in the appearance of the face caused by rotation in the plane, by rotation outside the plane and by variations in lighting. This refinement process is necessary to provide consistency in the faces, and helps to create reliable facial features. The rotations in the plane happen because of the revolution of the face parallel to the plane of camera. As a result, the facial image is completely captured, but it is not vertically aligned.

4.3 FACIAL FEATURE REPRESENTATION

In general, in the area of image processing or computer vison, feature representation is the process of producing valuable information from sequence of images or images or videos, so that the efficient utilization of information might be sufficiently powerful to classify the images into exact abstract classes related to the context. A digital image is 2-dimensional array (3D for color image).

V. PROPOSED FRAMEWORK FOR FER

Humans identify and understand the faces and facial expressions in a view with lesser or no attempt. The automated recognition of face expression and analysis made facial expressions into Human-Computer interaction (HCI) as a novel approach, to develop the intercommunication more closely and effective. 5

After the localization, the features are extracted using two local binary patterns. Finally, for the classification also CNN is used.



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Proposed framework for FER

Only LBP has been used earlier for facial expressions. But on Multi-scaling and Multi-dimensional, ELBP and DCLBP have not been studied earlier. The ELBP is used for face recognition and ear recognition [] and DCLBP is used for texture classification [].

Feature extraction is the crucial step. It is carried out in a heuristic and natural way. Upon this, local facial features are required and to be stored for classification of facial expressions. In order to get the local description, Ms-ELBP and MD-DCLBP are computed and compared with other techniques like Gabor filter etc., LBP is independent of illumination variations. In the proposed work, the features of the face are extracted using Ms-ELBP and MD-DCLBP.

VI. SIGNIFICANCE OF EXPRESSION DATABASES

In general, recognition algorithms are compared to databases of specific images or videos that contain images and their corresponding basic truths. Databases provide a unified platform for testing algorithms. Usually, databases collect images in controlled environments and integrate diversity into their content according to different themes, lighting, age, gender, ethnicity, textures. Any algorithm that has a strong database performance can be verified to evaluate it in more critical situations and improve it later.

The database of facial expressions is a collection of images or video clips with facial expressions of a range of emotions. In the posed database, participants are required to express different basic emotional expressions, and expressions are natural in spontaneous expression databases. Spontaneous expressions are different from posed expressions in terms of configuration, intensity and duration. In addition to this, the synthesis of several AU can hardly be achieved without going through the associated emotional state. 6



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Snapshots from the databases CK and JAFEE



Cohn-Kanade AU-Coded Face Expression Database (Cohn-Kanada) is the most generally used exhaustive database for automatic facial expression analysis research. The Cohn-Kanade Facial Expression Database is composed of 100 university students aged 18 to 30 years old. 65% were female, 15% were African-American, and 3% were Asian or Latino.

The subjects were instructed by the experimenter to perform a series of 23 facial displays including a single action unit and a combination of action units.Six of them are descriptions of prototypical emotions of anger, disgust, fear, joy, sorrow and surprise.

Japanese Female Facial Expression (JAFFE) Database composed of 213 images of seven facial expressions (6 basic facial expressions + 1 neutral) posed by 10 Japanese female subjects. Each image has been rated on 6 emotion adjectives by 60 Japanese subjects. It's the primary downloadable database for countenance analysis.

VII. EXPERIMENTAL RESULT

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VIII. RESULT

CK database is used for the evaluation of proposed work based facial feature efficiency from 96 subjects, 408 image sequences are selected, each of which was labeled as one of six basic emotions. To form the neutral expression set, the first frame (neutral expression) of all 408 sequences was selected to make the 7-class expression dataset consisting of 1,632 expression images.

The researchers suggested different validation techniques to generalize the classifier. The most used validation methods are k-fold validation, Repeated Random Sub Sampling (RRSS) and LOO (Leave One Out) strategy. In thesis, k-fold validation is used. In k-fold, the data set is divided into k approximately equal folds, of which the k-1 folds are used for training and the remainder 1 is used for the testing. Here, 10-fold cross validation principle is used with seven classes, with neutral expression. The results are averaged over 10 executions. Each time dataset is divided into 10 random partitions, out of which 9 are used for training and 1 for testing. In the thesis, k-fold validation is used.

The performance of the proposed techniques Ms-ELBP, MD-DCLBP, Fusion Algorithm with CNN is evaluated on JAFFE. The confusion matrix exhibits the proportion in percentage, any expression shown in a row falsely identified as another expression in the column

IX. CONCLUSION AND FUTURE SCOPE

This paper began with the goal of exploring the plant of facial expression recognition, its challenges, presenting a replacement robust facial feature vector and devising its performance in facial expression recognition. This conclusion and highlights the varied contributions made by the research presented in this paper. It also provides asummary of the direction of future research opportunities so on further improve the functionality and effectiveness of the proposed algorithm.

The research is a never-ending process. But it gives a lead for several research works. Few of the significant enhancements. Recognition of facial action units along with its combinations instead of emotion-specified expressions. Propose appropriate mapping for reducing the length of MD-LBP. Modification of others variants of LBP to generate multidimensional features. Develop more powerful systems for the acquisition of face, extraction and representation of facial data and recognition of facial expression to tackle head rotation (out-of-plane and in-plane), illumination variations, lower intensity of expressions and occlusions. 9



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