Uniform Local Binary Patterns Approach for Human Facial Expression Recognition

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***Abstract*— facial expression analysis is rapidly becoming an area of intense interest in computer science and human computer interaction design communities. Psychological studies have suggested that facial motion is fundamental to the recognition of facial expression.**

Expression is the most important mode of non-verbal communication between people. Recently, the facial expression recognition technology attracts more and more attention with people's growing interesting in expression information. In this paper, we propose LBP histograms based automatic facial expression recognition system to recognize the human facial expression like happy, fear, sad, angry, disgust and surprise. Initially facial image is segmented into three region from which the uniform local binary patterns (LBP) texture features distributions are extracted and represented as a histogram description. A Support Vector Machine is used to classify different kinds of facial expressions. We have carried our experiments upon Yale face database and JAFFE face database. The Yale Face Database contains 165 grayscale images in GIF format of 15 individuals.

JAFFE Database, available at *http://www.kasrl.org/jaffe.html* consisting 213 images posed by 10 Japanese female models. The proposed model reports 92.53% of classification accuracy.

Index Terms- Japanese Female Facial Expression (JAFFE) database; facial, expression; recognition; Matlab; Local Binary Pattern, feature extraction, SVM, YALE face database.

I-INTRODUCTION:

Facial expression analysis plays a significant role for human computer interaction. Automatic analysis of human facial expression is still a challenging problem with many applications. Face identification and recognition has lead to the development of different algorithms for various applications such as automated access control, surveillance, image retrieval…etc [5]. Facial expression analysis has wide range of application in areas such as Human Computer Interaction (HCI), psychological area, image understanding, face animation etc. Humans interact with each other both verbally and non-verbally [6].

Most approaches to automatic facial expression analysis attempt to recognize a principal set of prototypic emotional facial expression. i-e- fear, sadness, disgust, anger, surprise and happiness, from the survey, it was revealed that most of the facial expression systems were based on the Facial Action Coding System (FACS), [3], [10].

It is a system designed for human observers to describe changes in the facial expression in term of visually observable activations of facial muscles. Facial Expression Recognition should not be confused with human emotion recognition as is often done in computer vision. Facial expression recognition deals with classification of facial motion and facial feature deformation in the abstract classes that are purely based on visual information. But emotions are result of many different factors such as emotional voice, pose, gestures, facial expressions etc.

Nowadays, Facial Expression Recognition is getting more and more attention from the research community. Facial expression plays an important role in smooth communication among individuals. The extraction and recognition of facial expression has been the topic of various researches subject to enable smooth interaction between computer and their users. In this way, computers in the future will be able to offer advice in response to the mood of the users [13]. Recently, a number of new technologies for Facial Expression Recognition have been developed. Our goal is to create a system, which can be trained from training images for the facial expressions and used to recognize the facial expression in the test images.

The remainder of the paper is organized as follows: next section describes wavelet transformation and the filters. Section III describes Methodology. Faces classifier using SVM is given in section IV. Results is describes in section V. Finally, a global conclusion is given in section VI.

II- WAVELET TRANSFORM

The wavelet transform is similar to the Fourier transform (or much more to the windowed Fourier transform) with a completely different basis functions. The main difference is that Fourier transform decomposes the signal into sinus and cosines, i.e. the functions localized in Fourier space; while the wavelet transform uses functions that are localized in both the real and Fourier space. Generally, the wavelet transform can be expressed by the following equation: