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NEI Facial Expressions for Identification

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Abstract

This paper presents North East Indian (NEI) facial expression analysis using visual face images. A short review on relative works has been illustrated. Visual face images have been collected from tribes and non-tribes of North East Indian people. Six basic facial expressions i.e. anger, happy, sad, surprise, fear and disgust have been captured in NEI face database. The facial feature changes occurred during different expressions have been analyzed. This analysis shows that captured facial expressions meet the standard facial expressions. These face images can be taken for face identification purpose. Automatic facial expression identification system may be generated using the NEI facial expression database.

*Keywords:*Facial expression; NEI face database; Visual face image; Facial feature changes

1. Introduction

An expression can be described as a collective set of facial feature movements. Individual elements of each expression can take place in varying intensities like tighter eyelids and growing cheeks represent a joyful expression. A face is more emotion expressive medium than verbalization of one's feeling. Facial expression depicts different cues about pain, sentiment, intention, awareness, individuality etc [1]. For intelligent and

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natural human computer interaction (HCI), it is essential to understand facial expression automatically [2]. In the modern era of image analysis and pattern recognition, automatic facial expression identification turns into a popular research area. Several researchers explored different approaches to recognize facial expressions automatically.

N. Sebe et.al [3] explored the approach of using facial expression in video for machine perception of emotions. Contributions had been made in twofold: first, the creation of the authentic facial expression database had been done in which natural facial expressions were taken as test subjects. Second, emotions were detected using various machine learning algorithms.

Tian et al. [7] discussed the Automatic Face Analysis (AFA) system, which was used to analyze both permanent and transient features of nearly frontal-view face image sequence. The AFA system can recognize smooth changes in facial expression. Multi-state facial component models were proposed for tracking and modelling a variety of facial features like eyes, lips, brows, cheeks.

M. Bartlett et al. [8] presented a user independent, fully automatic, real time facial action recognition system. In this system, after detecting the frontal face images from the video stream, each frame was coded with respect to 20 action units. This method applied support vector machines and AdaBoost to the texture-based image representations. The classifiers provided the predicted result of action unit intensity.

S. Park et.al [9] explored a novel technique to recognize facial expressions using deformation. The subtle facial expressions were deformed into corresponding extreme facial expressions. The deformed facial expression images were projected into the AAM and appearance features were extracted. Finally the classification of appearance features was done through multi-class Support Vector Machines (SVMs).

This paper mainly concentrates on accuracy of captured facial expressions of NEI people. The more accurately expressions are captured; the more accurately facial expressions will be identified. Basic facial expressions with corresponding feature changes are illustrated in the next section.

2. Overview of Facial Expression

Different authors have classified facial expression into six basic expressions, and some are of seven expressions. In this paper, six basic facial expressions i.e. happy, anger, sad, surprise, fear and disgust have been illustrated. One facial expression differs from the other because of the changing facial features such as in cheeks, eyebrow, nose, lips, mouth etc. Fig.1 shows the basic facial expressions. These basic expressions are described below [10].

- Anger describes individual psychological understanding, having been insulted, victimized or denied and a revenge tendency.
- Happy describes the pleasure, a positive temperament, and friendliness.
- Sad expression associates the loss, grief, embarrassment, soreness, helplessness.
- Surprised expressions convey messages about something being unanticipated, unexpected, novel, or astonishing.
- Fear expression shows the possibility of personal demolition from interpersonal violence or impersonal hazards.
- Disgust expression associates the emotions of imprecise, infectious, revolting etc.

Facial features change according to the emotion. Facial feature movements, which are associated with facial expressions, are as follows:

- In happy expression, muscle around the eye tightened, CrowsFeet wrinkle around eyes, cheeks raised, lip corners raised diagonally.
- In anger expression, eyebrows pulled down, upper lids pulled up, lower lids pulled in, margin of lips rolled in, and lips may be tightened.