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UNDERSTANDING OF FACIAL EXPRESSIONS BY THE HIERARCHICAL RECOGNITION OF GENUINE EMOTIONS

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Abstract. *For realizing the natural man-machine interaction, understanding of facial expressions and gestures is not negligible. In this paper, we proposed a hierarchical recognition approach, for the understanding of human emotions. According to this method, the facial AFs (action features) were firstly extracted and recognized by using histograms of optical flow. Then, based on the facial AFs, facial expressions were classified into two classes, one of which attributes to the positive emotions, and the other does the negative ones. Accordingly, the facial expressions belonged to the positive class, or the ones belonged to the negative class, were classified into more particular emotions. Finally, the scheme how to coordinate in recognizing facial action features and facial expressions for man-machine interaction was proposed.*
Keywords: Facial action features, Hierarchical recognition, Authentic emotions

1. **Introduction.** On-line communication, interaction and communities give rise to exciting new application areas for computers. For realizing the natural man-machine interaction, understanding of facial expressions and gestures is not negligible. Although nonverbal cues and clues to the underlying structure of communication were studied by some researchers [7], what they mainly used as cues are head nods and shakes, eye-brow position and eye gaze. It is a little rough for understanding of human emotions to utilize only these nonverbal cues and clues.

On the other hand, many of current researches focus on the study of recognizing the happiness, sadness, surprise, fear, anger and disgust, which are considered to be universally associated with distinct facial expressions. In these researches, the methods of expression classifications proposed ([1], [2], [3], [4], [6], [13]) almost employ a representation of facial action units, which is based on the descriptions of the epic of facial expressions suggested by Ekman [10]. In [10], so called 44 AUs (Action Units) which can describe all the facial expressions was proposed. But, by observing the experiment results of our analyzing the facial action features [5], except 44 AUs defined by Ekmen, there were other facial action features extracted, such face sideways or forehead motion, which reveal the human emotions more distinctly.

Furthermore, practically, except the six principle expressions above, it is necessary to recognize the other expressions in some cases, such as the system of monitoring patients