A New Appearance-Based Facial Expression Recognition System with Expression Transition Matrices

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Abstract

Generally, the facial expression recognition systems may be roughly categorized into feature-based methods, image-based methods and model-based methods. However, two significant drawbacks exist in above methods. First, most of feature-based methods can not extract the facial features (shape, color, and position) robustly because of wrinkle, hair and glasses occlusion and illumination variation. Second, the computation of extracting facial features is complex and costly. Third, most of current researches recognized the facial expressions at high resolution images. However, in the real applications of facial expression recognition the facial images are often captured with low resolution. In this study, we propose a novel image-based facial expression recognition method called "expression transition" to identify six kinds of facial expressions (anger, fear, happiness, neutral, sadness, and surprise) at low-resolution images. The boosted tree classifiers and template matching are used to locate and crop the effective facial region that may characterize facial expressions. Then, the expression transformed images via a set of expression transition matrices are matched with the real facial images to identify the facial expressions. The proposed system can recognize the facial expressions with the speed of 0.24 seconds per frame and accuracy above 86%.

Keyword：facial expression recognition, expression transition, boosted tree classifiers