Statistical learning based facial animation

基于统计学习的表情动画

Citation: Shibiao Xu, Guanghui Ma, Weiliang Meng, Xiaopeng Zhang, 2013. Statistical learning based facial animation. *Journal of Zhejiang University-Science C (Computers & Electronics)*, 14(7): 542-550. [doi: 10.1631/jzus.CIDE1307]

- Considering the numerous motion units in the expression coding system, we present *a novel simplified motion unit* based on the basic facial expression, and construct the corresponding basic action for a head model.
- As image features are difficult to obtain using the performance driven method, we develop *an automatic image feature recognition method* based on statistical learning, and *an expression image semi-automatic labeling method* with rotation invariant face detection, which can improve the accuracy and efficiency of expression feature identification and training.
- After facial animation redirection, *each basic action weight needs to be computed and mapped automatically*. We apply the blend shape method to construct and train the corresponding expression database according to each basic action, and adopt the least squares method to compute the corresponding control parameters for facial animation.
- Moreover, there is *a pre-integration of diffuse light distribution and specular light distribution* based on the physical method, to improve the plausibility and efficiency of facial rendering.

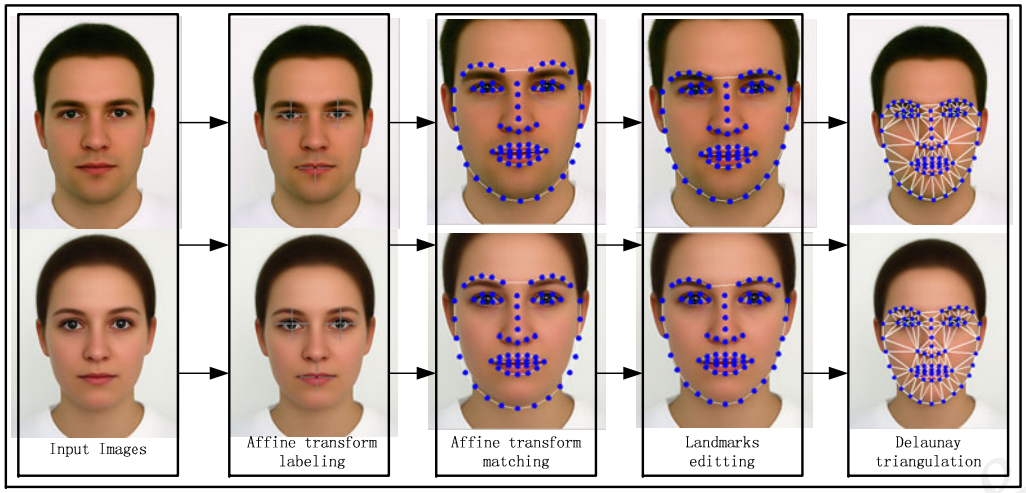


Fig. 3 Overview of semi-automatic labeling

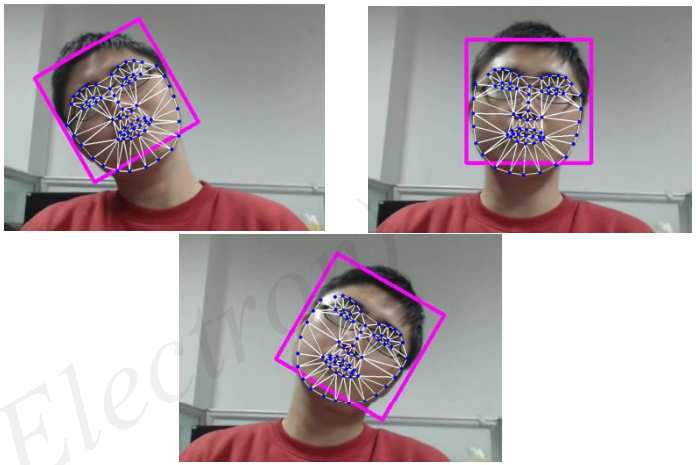
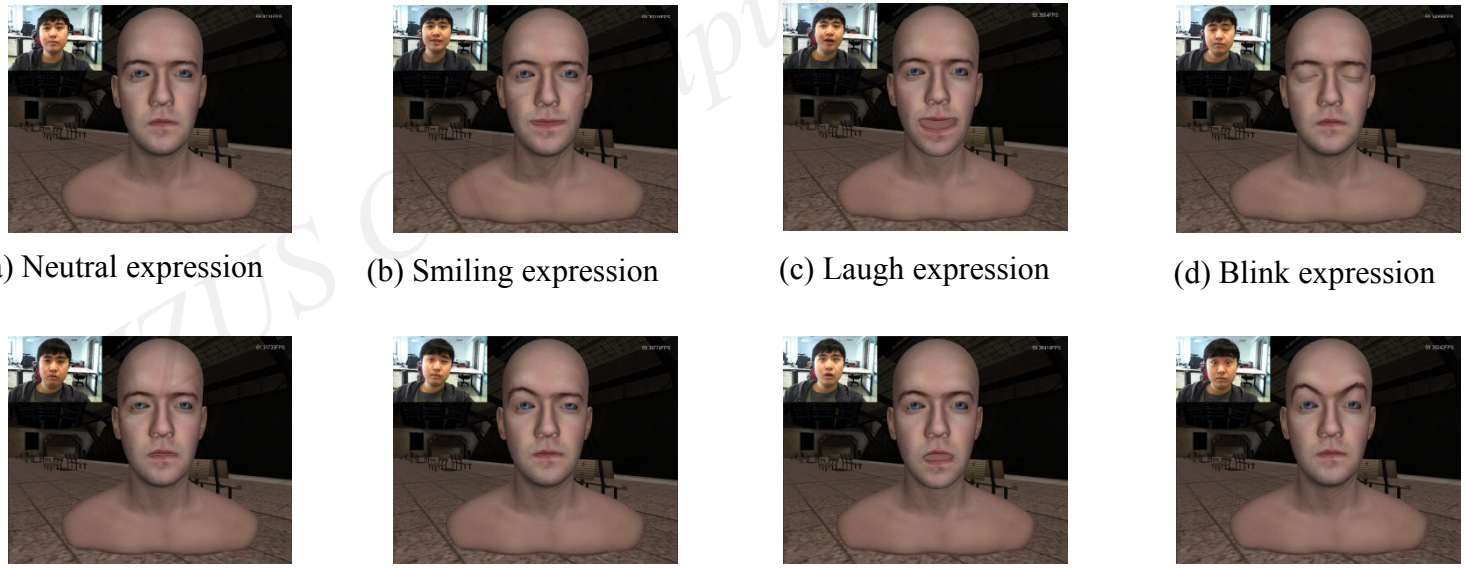


Fig. 4 Our rotation invariant face detection



(a) Neutral expression (b) Smiling expression (c) Laugh expression (d) Blink expression

(e) Sadness expression (f) Contempt expression (g) Surprise expression (h) Fear expression

Fig. 9 Facial animations simulation and rendering