

FaceTracker : A Human Face Tracking and Facial Organ Localizing System

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1. Introduction

This paper presents a tracking system based on the technique of gravity-center template [1] to track faces and localize facial organs such as pupil, eyes, nose and mouth.

2. System Structure

The system consists of two stages (Fig.1). Input with an original video, the system will output an object video with face and facial organ areas' locations.

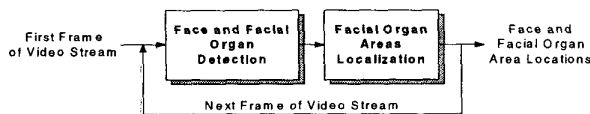


Fig.1. System structure

The first module(Fig.2 and Fig.3) produce initial location information about faces and facial organs such as eyebrows, eyes, nose and mouth. The second module is composed of 4 parts(Fig. 5), which output the final exact location information. The six steps in Fig.4 and 2 steps in Fig.6 illustrate the procedure for faces and their organs' detection.

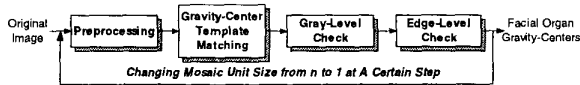


Fig.2. Face and facial organ detection

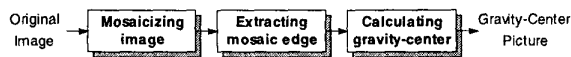


Fig.3. Preprocessing



Fig.4. Face and Facial organ detection

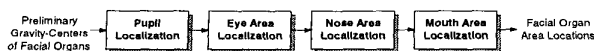


Fig.5. Facial organ area localization

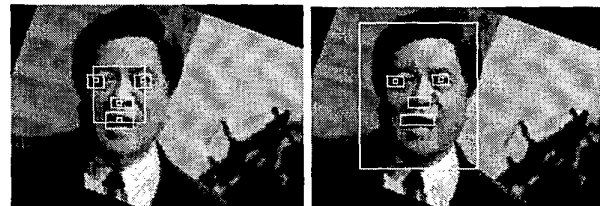


Fig.6. Initial areas and finally extracted ones

3. System Implementation

A system is set up as shown in Fig. 7, which can track single or multiple upright faces and localize facial organs in unconstrained backgrounds. A real time video is input from a USB digital camera. The tracking speed is 4.2 frames per second on a PentiumIII-700MHz PC. The average rates of tracking and localization are 97.8% and 87.5% respectively on a test set of 600 sequential images.



Fig. 7. System Interface

4. Conclusion and future work

The system introduced here is more practical compared with some detecting schemes such as deformable template technique [2]. Further work will include the improvement of facial texture check and utilization of movement or skin color information.

References

- [1] J. Miao, B. C. Yin, K. Q. Wang, et al, A hierarchical multiscale and multiangle system for human face detection in a complex background using gravity-center template, *Pattern Recognition*, 32(7), 1999, pp. 1237-1248
- [2] A. L. Yuille, Deformable templates for face detection, *J. Cogn. neurosci.* 3, 1991, pp. 59-70