Real-time Tracking System based on Matching Templates Generated from Image Texture

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In this demonstration, we propose a computer-vision based real-time registration method for augmented reality based on template matching. Computer-vision tracking methods for augmented reality applications typically use special fiducial markers such as squares or circles. Our new method uses a black square fiducial to obtain the initial tracking condition, but does not use it in subsequent iterative tracking phases.

Several natural feature points are extracted from the tracked object by off-line image analysis. While tracking the object, some of feature points are dynamically selected and matching templates for those feature points are generated. Then feature points in an image are detected by template matching with generated templates. While 4 feature points are detected, this 'selection' and 'matching' processes are iterated. After that, pose and position of the tracked object are calculated.

There are some advantages in this method. First one is that this method works in real-time with a PC. Since most of time-consuming process is done by off-line, on-line processing is light enough to achieve 30 frames per second by a PC. Second one is that this method is robust for partial occlusions of tracked objects. If a feature point is occluded somehow, this method avoids using the feature point and tries to use another visible feature point. Also this method has wide tracking range in the distance between the camera and tracked objects. Off-line image analysis is done for multi scale images and feature points are extracted in every scale before tracking phase. Then this method can select suitable feature points for tracking even if the camera is located close to or far from the tracked object.

We will show this real-time tracking demonstration by using a laptop PC with Pentium 4 2.0GHz cpu.

Fig.1 An example of racked texture and extracted features

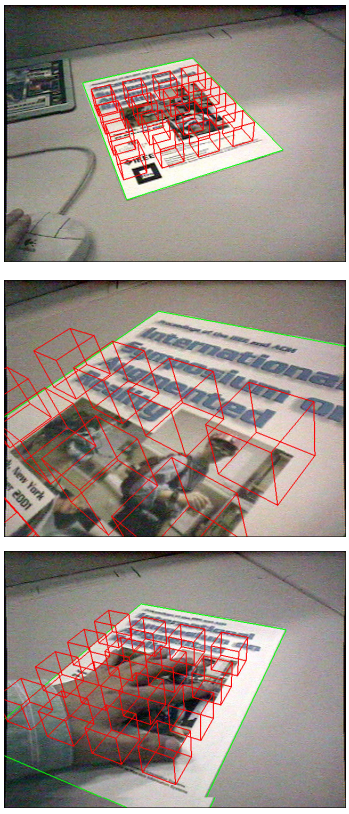

Fig.2. Tracking examples