

AN IMPROVED FULL SEARCH ALGORITHM WITH ADAPTIVE TEMPLATE BLOCK FOR FAST AND ACCURATE OBJECT TRACKING

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ABSTRACT. *This paper proposes a novel scheme for fast and accurate object tracking by using improved full search algorithm with adaptive template block. The proposed improved full search algorithm uses a modified search region which is obtained using a coarse-to-fine scheme. The proposed algorithm can greatly reduce computational cost for obtaining the optimal result of motion estimation. Because the scale of the bounding box of a moving object changes when the object moves from nearby to far away or from far away to nearby, typical block-matching algorithms with a fixed template block cannot obtain accurate and reliable object tracking. Therefore, improved full search algorithm with adaptive template block is proposed to obtain accurate and reliable tracking of an object whose scale changes. Experimental results demonstrate that the proposed improved full search algorithm with adaptive template block outperforms other block-matching algorithms in object tracking.*

Keywords: Block-matching, Object tracking, Adaptive template block

1. Introduction. Visual surveillance has received increasing attention in the last decade. Visual surveillance has a wide range of potential applications [1-5], such as event detection, behavior description, object counting, and security. The general framework of visual surveillance is shown in Figure 1 [6]. Therefore, object tracking plays an important role in identification and behavior description. Furthermore, object tracking is one of the most challenging tasks in computer vision. This technique can be applied to many applications, such as intelligent traffic information system, telemedicine, home networking, wide FOV video [19,24], and military surveillance [20,21].

The object tracking can be categorized into region-based tracking, active contour-based tracking, feature-based tracking, and model-based tracking [6]. In region-based tracking, object tracking is obtained according to variations of the image regions corresponding to the moving object. The background image is maintained dynamically, and the motion region is usually detected by subtracting the background from the current image. However, region-based tracking is not reliable for occluded objects.

In active contour-based tracking, object tracking uses objects' outlines as bounding contours and updates these contours dynamically in successive frames. Active contour-based tracking can describe objects more effectively and efficiently than region-based tracking. However, it is difficult to start tracking automatically because active contour-based tracking is highly sensitive to the initialization of tracking.

In feature-based tracking, object tracking uses an object's elements (such as color, area, segment, and vertex) as features, and then matches these features between successive frames. Feature-based tracking allows real-time processing and multi-object tracking.