

A COMPLEX MOTION RECOGNITION TECHNIQUE EMPLOYING DIRECTIONAL MOTION TEMPLATES

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ABSTRACT. *Recognizing complex human motion is a difficult task. In this paper, we have developed a robust method to recognize complex human motion. The basic motion history image and motion energy image method has been updated considering multi-dimensional history and energy images to calculate the feature vectors for recognizing various complex human motions. The basic motion history image method performs unsatisfactorily due to “overwrite problem” or self-occlusion when a motion sequence has more than one direction. This motion self-occlusion due to the overwriting of former motion information by that of the later motion results in serious recognition failure. The proposed method can solve this problem by defining directional motion templates. For recognition, a 64-dimensional feature vector is created for each activity by the employment of Hu moments. Then, leave-one-out cross-validation method is employed for testing for the recognition. We have recognized the ‘rajio-taiso’ (Japanese Radio Exercises) motions, which are complex in nature by employing the method. The recognition rate has been satisfactory in spite of the complex nature of the input data. We have achieved 92% average recognition rate, whereas the average recognition rate was only 53% for the basic motion history method.*

Keywords: Human motion recognition, Motion history image, Directional motion history image, Motion template

1. **Introduction.** One of the top-listed research arenas in the computer vision field is human motion analysis in image sequences [1-6]. The number of approaches to recognize motion, particularly human movement, has recently grown at a tremendous rate. We can divide them into generic human model recovery (3D reconstruction and recognition approaches), view-based or appearance-based models, and direct motion-based recognition. In our research, we concentrate on the appearance-based model (or view-based representation), where an action is described by a sequence of two-dimensional instances/poses of the object. Appearance-based motion recognition can recognize the gesture without any incorporation of sensors on the human body or its vicinity. Human behavior analysis is an important field for many video understanding applications such as intelligent video surveillance, in robotics, aware house, augmented reality, virtual reality, content-based image storage and retrieval, intelligent user interfaces, video conferencing, and many more.

We can typify human motion analysis into three broad areas, namely – human tracking, human body structure analysis and human motion and activity recognition [1]. We concentrate on human motion and activity recognition. Two different types of techniques can be considered to recognize human posture: intrusive and non-intrusive techniques [7]. Intrusive techniques usually track body markers to recognize the posture of a person,