

Person Re-identification Using 3D Data Analysis Method and Kinect Sensor

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Abstract—Automated personal identification systems, such as personal facial recognition systems and automated motor vehicle registration number checking, are examples of public security protection systems. The area of personal identification for security purposes is of growing interest for security assessment in public places, and airports, as examples, now becoming an imperative matter for research in the Internet netscape. We propose a method of immediate recognition of a subject person, based on Incremental Dynamic Time Warping (IDTW) which identifies personal gait patterns recorded via a 3D depth sensing camera such as in Microsoft's Kinect® version 2, by analyzing a dataset of gait gestures derived from a sample of 16 people. The experimental results show that the IDTW algorithm increases the efficiency of recognizing at 81%.

Index Terms—Personal Identification; Gesture Recognition; IDTW; Kinect Camera; Computer Visions.

I. INTRODUCTION

Multimedia analysis technology for indexing or explaining multimedia files provides significant advantages for information retrieval from huge databases. This technology can be applied for personal identification based on a video database. The science of personal physical behavior pattern searching and indexing is based on the biological features of a subject person that are able to be filtered from multimedia files (image or video) recording imagery of that person. Specific physical aspects of the person are analyzed and are measured and analyzed by a computer based on standard, generic data of biological features for recognition and identification of the person.

Gesture recognition is an important part of communication between humans and computers. Interactive human body movement and gesture tracking is the basis of many applications including gaming, human-computer interaction, telepresence, health-care and security [1]. Generally, the recognition result is acquired after the movement or gesture has been detected and completed.

In this paper, we propose an analysis method for recognition of gait gestures and its application to person identification.

In the person identification process, the skeletal joints of the person can be analyzed to solve the limited problem of face recognition by using the biological features of the gait gestures. There has also been research into the analysis of the human personal cycle of gait gestures [2,3]. Gait gesture analysis requires more than twenty components to identify a person, and uses the kinematics of the person; movement and rhythm of walking, for example. Compared with analyzing the human face, using gait gesture recognition is the more

effective method for person identification. Person re-identification has to analyze joint of skeleton

However, the gait gesture recognition methods need video images to track the motion correctly and a segmentation algorithm to separate the human body image area from the overall media image. The human body data area is the only part of the image used to analyze gait gestures [4] and therefore must be isolated from the overall image. This is difficult due to the movement of the image in

the video. Segmenting a moving gesture from the video requires a high degree of computation and can easily be mistaken.

Given the problems of analyzing images and videos, researchers have found that using a 3-dimensional data sensor to record human gait gesture is the preferred option. In 2010, Microsoft Company produced a 3D depth sensing camera called the 'Kinect sensor' which uses X-Box 360 videogame. This player can act as a remote control for gaming by using the gesture of the players. The camera has a sensor and an application programming interface (API) for searching and representing the body as a skeletal image. It identifies the body joints of a player who is standing in front of the sensor. The Kinect camera has the great advantage of being inexpensive but easy to use and gives high accuracy of detection of the motion, in 3D [5].

This paper presents a method for person identification using gait gestures. The computational method uses the anthropometric biological features in the 3D data, captured by the Kinect 3D camera, and analyzes that data.

The method of gait pattern recognition that we propose is based on the Incremental Dynamic Time Warping (IDTW) algorithm. This an extension of the classic Dynamic Time Warping (DTW) algorithm by providing an accurate comparison between the incoming, incomplete data and the complete sample data already available in the image database.

The preliminary results of our work indicate that the proposed system is capable of successful person identification when incomplete data is available.

II. RESEARCH METHODOLOGY

This section describes the process of recording the human gait patterns to enable the creation of the skeletal models of the sample people, to compute the feature vectors, and to measure similarity, as shown in Figure 1.

