3D Human Motion Analysis for Reconstruction and Recognition

Chutisant Kerdvibulvech[1] and Koichiro Yamauchi[2]

[1]Rangsit University, 52/347 Muang-Ake, Paholyothin Rd, Lak-Hok,
Patum Thani 12000, Thailand
chutisant.k@rsu.ac.th
[2] Keio University, 3-14-1 Hiyoshi, Kohoku-ku 223-8522, Japan
yamauchi@hvrl.ics.keio.ac.jp

Abstract. In recent years, biometrics modalities with depth information are an interesting resource. As they can apply to many applications, range scanners have obviously become popular increasing the measurement accuracy and speed. In this paper, we propose a method for 3D human motion analysis for reconstruction and recognition. We use 3D gait signatures computed from 3D data that are obtained from a triangulation-based projector-camera system. The method consists of several steps: First, 3D human body data are acquired by using a projector-camera system. The body data are composed of representative poses that occur during the gait cycle of a walking human. Second, 3D human body model is fitted to the body data using a bottom-up approach to estimate its pose. Third, the entire gait sequence is recovered by interpolation of joint positions in the fitted body models. Representative results have been shown to ensure the robustness of the proposed method.

Keywords: 3D Human Body Data, Human Motion Analysis, Reconstruction, 3D Recognition, Human Body Model, 3D Model Fitting.

1 Introduction

Gait recognition aims for personal identification based on walking style. The use of recognition based on human gait has many advantages in various aspects as a contactless, exposed, and characteristic biometrics. If the habit of walking is changed consciously, the motion seems unnatural. In addition, gait involves not only surface shape, called static feature, but also continuous motion, called dynamic feature. Over the last few decades, recognition approaches using 3D biometrics have been proposed. This is because these reconstruction and recognition methods from 3D human motion analysis can apply to many recent applications in real life.

For example, Igual el al. [1] built a system that recognizes gait-based gender. They used depth cameras to capture and then extract the features in real-time. It was noted that this approach is robust to luminance changes since it discards the RGB information. Hu el al. [2] developed a probabilistic system with a measurement model to track

F.J. Perales and J. Santos-Victor (Eds.): AMDO 2014, LNCS 8563, pp. 118–127, 2014.