International Journal of Innovative Computing, Information and Control
Volume **5**, Number **5**, May **2009**
ICIC International ©2009 ISSN 1349-4198
pp. 1351–1358

A SEMANTIC JOINT-BASED NURBS HUMAN BODY MODEL FOR MOTION CAPTURE DATA

Xiaopeng Wei and Boxiang Xiao
School of Mechanical Engineering
Dalian University of Technology
Dalian 116024, P. R. China

Qiang Zhang* and Changjun Zhou
Liaoning Key Lab of Intelligent Information Processing
Dalian University
Dalian 116622, P. R. China
*Corresponding author: zhangq30@hotmail.com

Received November 2007; revised April 2008

Abstract. *A semantic joint-based NURBS human body model for motion capture data is presented in this paper. The human model is constructed by a set of NURBS surfaces, and the deformation and animation can be driven by motion capture data using a semantic model composed of 22 semantic joints. Each semantic joint includes 6 parameters. The deformation of each part of human model is implemented by use of coordinate interpolation based on the key coordinates which are seated on semantic joints and generated by the semantic model. Finally, the experimental results are illustrated, the main contributions and limitations are discussed.*
Keywords: Semantic joint, Human body model, Motion capture data

1. **Introduction.** In the last few years realistic human animation based on motion capture data has been becoming a hot issue. Motion capture data has been widely used in virtual human motion control and synthesis. Many researchers focus on the reuse of motion capture data. Xu et al. [1] developed a semantic human model for deformation of time-varying-mesh. In their work, they presented an articulated ten-segment semantic human model with piecewise-rigid motions and estimated the motions between the two frames. Finally, a realistic deformation of a mesh human model was achieved. To match the virtual human model and motion data automatically, Hu et al. [2] put forward a novel algorithm called LMSA(lazy match based on semantic analysis)which generated skeleton for existing human model and matched it to the motion data. By their approach, different motion data can be applied to the existing human model directly without predefining skeleton for human model. Mortara et al. [3] put forward a framework for the automatic extraction and annotation of anthropometric features from human body models. In their way, the structural description of the human body was turned into a semantic description by using a set of rules and measures related to the features combining with reasoning their configuration. Moreover, a framework for realistic rendering of a multi-layered human body model was presented by Mehmet and Ugur [4]. Deng et al. [5]described a robust real time estimation method of time varying human multijoint arm viscoelasticity during movement. A genetic algorithm guided control point extraction method that enabled automatic face image morphing was proposed by Karungaru and colleagues [6].

There are many works on human modeling, joint parameter estimation and extraction of semantic features from image. Tong et al. [7] presented a novel class of human model