西安电子科技大学80周年校庆学术活动年——海内外学者报告会

Academic Lecture Series by Scholars Home and Abroad for Xidian University's 80th Anniversary Celebrations

学 术 报 告

题目：Joint Gait and Pose Manifold for Video-based Human Motion Estimation

报告人：Guoliang Fan, Oklahoma State University

时间：2011 年 9 月 26 日下午 15：00----16：30

地点：电子工程学院报告厅　主楼 II 区 241

Abstract： In this talk, I present a new manifold learning method for human motion modeling, i.e., joint gait-pose manifold (JGPM) that unifies two motion variables, i.e., pose (a specific posture in a walking cycle) and gait (an individual walking style), into the same manifold representation. JGPM is able to capture the motion variability both across different poses and among multiple gaits simultaneously. Specifically, we propose three versions of JGPM with different constraints imposed. The first one is the torus-based JGPM that involves direct RBF mapping and serves as the baseline model. The second one is the torus-constrained JGPM that is learned through the topologically constrained Gaussian process dynamical model (GPDM) and retains the ideal torus structure. The third one is the torus-like JGPM that balances an ideal manifold structure and the intrinsic data structure and learned by a new two-step Gaussian process (GP) algorithm. We also develop a new model validation method to examine the overall performance of recent human motion models including three newly proposed JGPMs. Experimental results demonstrate that JGPM-like outperforms existing GP-based methods as well as other two JGPMs in terms of the capability of motion interpolation, extrapolation, denoising and recognition. Also, torus-like JGPM is applied to video-based motion estimation in a particle filtering framework. Our algorithm is trained from the CMU Mocap data and tested on the Brown HumanEva dataset, and experimental results show the effectiveness and efficacy of the proposed JGPM for motion estimation.

Bio

Guoliang Fan received the B.S. degree in Automation Engineering from Xi'an University of Technology, Xi'an, China, in 1993, the M.S. degree in Computer Engineering from Xidian University, Xi'an, China, in 1996, and the Ph.D. degree in Electrical Engineering from the University of Delaware, Newark, DE, in 2001. From 1996 to 1998, he was a graduate assistant in the Department of Electronic Engineering at the Chinese University of Hong Kong. Since 2001, Dr. Fan has been an assistant and associate professor in the School of Electrical and Computer Engineering at Oklahoma State University (OSU), Stillwater, OK, and the Director of Visual Computing and Image Processing Laboratory (VCIPL). His research interests include image processing, machine learning computer vision, biomedical imaging and remote sensing applications. Dr. Fan is a recipient of the 2004 National Science Foundation (NSF) CAREER award. He received the Halliburton Excellent Young Teacher Award in 2004, the Halliburton Outstanding Young Faculty Award in 2006 from the College of Engineering at OSU, and the Outstanding Professor Award from IEEE-OSU in 2008 and 2011. He is an associate editor of the IEEE Trans. Information Technology in Biomedicine, EURASIP Journal on Image and Video Processing and ISRN Machine Vision. Dr. Fan is a senior member of IEEE.

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