



JOINT DOD AND DHS WORKSHOP ON IMAGE ANALYSIS

Department of Advanced Technologies, Alcorn State University
1000 ASU Drive, Lorman, MS 39096

Time: 9:00am ~ 12:10pm on Jan. 21, 2011 (Friday)
Place: Auditorium Room in Extension Building (ASU Main Campus)
Audience: Alcorn Faculty & Students, Invited Speakers & Guests
Contact: Dr. Yufeng Zheng (yzheng@alcorn.edu) or Ms. White (601-877-6482)

Agenda

9:00am Welcome Reception
9:30am Opening Remark
Dr. Barry Bequette (Dean, School of AREAS, Alcorn State University)
9:40am Adaptive Level-set based 3D Colon Modeling with Application to the Registration of
Supine and Prone CT Scans
Dr. Dongqing Chen (University of Louisville)
10:10am Six Blind Men's Approach to Interactive Visualizations for Science and Engineering
Dr. Jian Chen (University of Southern Mississippi)
10:40am Experimental Study of Face Recognition Algorithms
Dr. Zhaoxian Zhou (University of Southern Mississippi)
11:10am 3D Bayesian Optical Image Reconstruction
Dr. Chaoyang Zhang (University of Southern Mississippi)
11:40am Multispectral Image Applications in Night Vision Enhancement and Face Recognition
Dr. Yufeng Zheng (Alcorn State University)
12:10pm Closing Remark
Dr. Kwabena Agyepong (Chair, Advanced Technologies, Alcorn State University)

(Note: The Abstracts and Short-bios of each speaker are given in the following pages.)

9:40am Adaptive Level-set based 3D Colon Modeling with Application to the Registration of Supine and Prone CT Scans

Dr. Dongqing Chen (University of Louisville)

Abstract

In Computed Tomographic Colonography (CTC), a patient is scanned twice on his or her supine and prone positions. This presentation first introduces a variational model for the surface evolution based on region statistics is used to extract colon from the background and to build the 3-D Colon model. The closed contours are propagated toward the desired 3D region boundaries through the iterative evolution of the adaptive level sets function. Then, the 3-D colon centerline is computed and extracted. All the centerline points are used to formulate the point-based 3-D shape registration, which is used to align supine and prone models for the same subject to minimize global differences represented in rotations and translations. To verify the effectiveness of this method, we tested the algorithm on several CTC datasets. The distances between the corresponding points on the centerlines of the prone and supine scans before and after registration have been used to do the quantitative analysis. The results show that this algorithm can align the prone and supine scans very well, and reduce the minimum distance significantly.

Short Bio

Dongqing Chen is a research associate with the Department of Electrical & Computer Engineering (ECE), University of Louisville, Louisville, Kentucky. He received his Ph.D. from the same department in December, 2008. He received the B.S. and M.S. degrees in optical engineering from Tianjin University, Tianjin, China, in 1994 and 2000, respectively, and the M.S. degree in electrical engineering from the Illinois Institute of Technology (IIT), Chicago, in 2003. He published about 30 technical articles including book/book chapters, journal papers and conference publications. His research includes medical imaging, computer aided diagnosis (CAD) systems, medical image visualization, PDE-based image analysis, computer vision and machine learning.

10:10am Six Blind Men's Approach to Interactive Visualizations for Science and Engineering

Dr. Jian Chen (University of Southern Mississippi)

Abstract

Visual knowledge discovery is the process of discovering interesting patterns and trends in data. My research aims at exploiting and makes use of human perceptual and cognitive abilities to help detect the structure of data. In this talk, I will present my first attempt to evaluate encoding techniques for vector and tensor field visualizations. I will also present a problem-solving environment called VisBubbles that enables fluid workflow to facilitate scientists' discovery.

Short Bio

Dr. Jian Chen is an assistant professor in the school of computing at the University of Southern Mississippi. Her research investigates new computing techniques for sciences in the areas of visualization and interaction. Before joining USM, she was a research associate at the Brown University with David Laidlaw and Sharon Swartz. She received her Ph.D. in Computer Science from Virginia Tech. She is a member of IEEE and ACM.

10:40am Experimental Study of Face Recognition Algorithms

Dr. Zhaoxian Zhou (University of Southern Mississippi)

Abstract

Face recognition has received substantial attention in recent years due to applications in fields such as biometrics community and computer vision research. A lot of face recognition algorithms have been developed during the past decades. These algorithms can be can be classified into appearance-based and modal-based schemes. Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA) or Fisher Discriminant Analysis (FDA) are two typical linear appearance-algorithms, and Elastic Bunch Graph Matching (EBGM) is a two-dimensional modal-based approach. This talk reviews the three classical methods and typical standard test databases of face images. After the review is presented, the algorithms are implemented with Matlab. Scenarios and performance benchmarking are compared for each of the algorithms. The effectiveness and bottlenecks of each computation are discussed and possible improvements in different applications are given.

Short Bio

Zhaoxian Zhou received the PhD degree in Electrical Engineering from the University of New Mexico in 2005. From 1991 to 1997, he was an Electrical Engineer in China Research Institute of Radiowave Propagation. In the fall of 2005, he joined the School of Computing, the University of Southern Mississippi as an assistant professor. His research interests include image processing and digital signal processing, time domain computational electromagnetics, high performance computing and numerical analysis. He has published more than twenty academic journal papers and conference presentations. His teaching interests include antennas and radiowave propagation, microwave engineering, applied electromagnetics, analog and digital communications, numerical analysis, and power systems. His teaching interests include communications, electromagnetics, antennas and propagation, electric power, and signal processing. He is the recipient of 2003 IEEE APS RMTG award, 2003 SUMMA Graduate Fellowship in Advanced Electromagnetics, and 2007 Outstanding New Teacher Award from ASEE-SE. He serves as a reviewer for academic journals and conferences. He is a member of ASEE, a senior member of IEEE, and a member of HKN Honor Society of Electrical and Computer Engineering.

11:10am 3D Bayesian Optical Image Reconstruction

Dr. Chaoyang Zhang (University of Southern Mississippi)

Abstract

Optical imaging has drawn more and more attention over the past decade for its potential as an alternative or complementary diagnostic tool to x-ray or ultrasonic tomography. This talk focuses on the Bayesian optical image reconstruction algorithm and its application to biomedical fluorescence absorption tomography. For large problems the memory requirements for storage and manipulation of required matrices can become prohibitive. A data decomposition technique has been proposed to develop efficient image reconstruction schemes. The trend and research issues in this field will also be discussed.

Short Bio

Dr. Joe Zhang is the Director and Associate Professor in the School of Computing. His research interests include 3D image reconstruction, high performance computing, data mining and computational biology. His research is supported by NSF, NIH and DOD and have had more than 40 peer-reviewed publications. He is the Program Committee chair of the 2009 IJCBS and Steering Committee co-chair of the ACM-BCB conferences.

11:40am Multispectral Image Applications in Night Vision Enhancement and Face Recognition
Dr. Yufeng Zheng (Alcorn State University)

Abstract

Multispectral images usually present complimentary information such as visual-band imagery and infrared imagery, which enables and enhances advanced applications in remote sensing, night vision, face recognition, etc. This talk will present the basic processing and analyses of multispectral images and demonstrate their applications in night-vision colorization and face recognition. (1) In night vision application of multispectral imagery, the fused image can increase the reliability of interpretation while the colorized imagery can improve observer performance and reaction times. The image fusion procedure is based on the advanced discrete wavelet (*a*DWT) transform. While the daylight coloring technique renders the multispectral night-vision imagery with natural colors, which human users are use to observing in everyday life. Specifically, the night vision colorization is achieved segment-by-segment by mapping the color statistics of the multispectral imagery to that of the daylight images, and thus the colorized images resemble daylight pictures. It is anticipated that the proposed method in night vision imagery will help improve target recognition and visual analysis at night time. (2) Face recognition can be achieved by using visible (RGB) images, infrared (thermal) images or their fusions. In this presentation, a reliable thermal face recognition system will be briefly introduced, which can enhance the biometrics security applications at nighttime. With a properly acquired thermal image (as a probe image) in monitoring zone, the following processes will be employed: normalization, face detection, face alignment, face masking, Gabor wavelet transform, face pattern words (FPWs) creation, face identification by similarity measure (Hamming distance). If eyeglasses are present on a subject's face, an eyeglasses mask will be automatically extracted from the querying face image, and then masked with all comparing FPWs (no more transforms) stored in database (gallery images). A high recognition rate has been achieved with our face datasets regardless operating time and glasses-wearing condition.

Short Bio

Yufeng Zheng received his Ph.D. degree in Digital Image Processing from the Tianjin University (Tianjin, China) in 1997. He is presently with the Alcorn State University (Mississippi, USA) as an assistant professor. Dr. Zheng serves as a program director of the Computer Networking and Information Technology Program, and a director of the Pattern Recognition and Image Analysis Lab. He is the principle investigator (PI) of two federal grants and the Co-PI of several grants. So far Dr. Zheng holds two patents in glaucoma classification and face recognition, and has published three book chapters and 37 scientific papers. His research interests focus on image analysis, pattern recognition, visual process modeling, biometrics, and computer-aided diagnosis. Dr. Zheng is a member of SPIE, a member of IEEE & Computer Society, and also a public speaker and technical reviewer.