

CGiV09

6th International Conference
Computer Graphics, Imaging & Visualisation

The Book of Abstract



Tianjin University
■ Tianjin ■ China ■





IV09 & cgiv09 - DIGITAL ART GALLERY Online Exhibition
July 2009 - June 2010

VIRTUAL GALLERY VENUE
www.graphicslink.co.uk/DART.htm

Exhibiting Artists:
2D Art

Luis **Arambilet**
Anna **Chupa**
Dena **Elisabeth Eber**
Copper **Giloth**
Robert **Fathauer**

Gabrielle **Peters**
Teja **Krasek**
Lane **Last**
John **Labadie**
Jing **Zhou**

Margie **Labadie**
Michael **Takeo Magruder**
Jeremy **Rotstain**
LiQin **Tan**
Peter **Sanders**

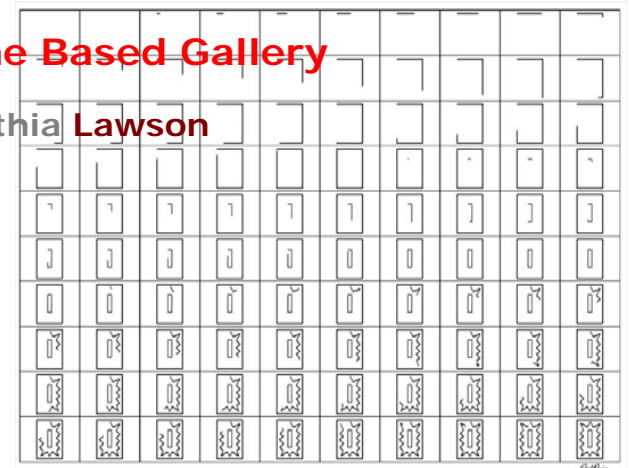
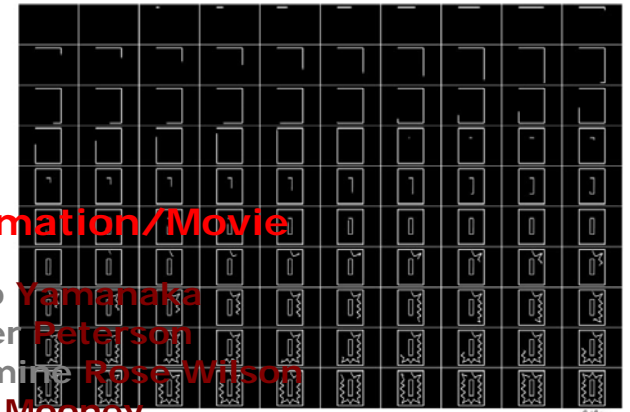
Joohyune **Pyune**
Cynthia **Beth Rubin**
Mark **Stock**
Ray **StArnoud**
Jasmine **Rose Wilson**
Sheila **Pinkel**
Ian **Gwilt**

Animation/Movie

Akio **Yamanaka**
Peter **Peterson**
Jasmine **Rose Wilson**
Ben **Mooney**

Time Based Gallery

Cynthia **Lawson**



Daniel Durning
Stevens Institute, USA

A full-day Event: Tuesday 11th August 2009, Time: 10:30 -14:30

Computer Graphics, Imaging and Visualisation DOCTORAL RESEARCH WORKSHOP

Organised by
School of Computer Science, Tianjin University, Tianjin, China
 &
Visualisation & Graphics Research Unit of LSBU, UK

Computer Graphics, Imaging and Visualization –CGIV- Forum is an annual forum that is held for 6 year running. This year CGIV forum in collaboration with the Visualisation & Graphics Research Unit of LSBU, UK and the School of Computer Science, Tianjin University, Tianjin, China are pleased to announce Doctoral Research Workshop within the scope of the 6th International conference on Computer Graphics, Imaging and Visualization (CGIV09). This workshop provides an opportunity for PhD students to present their work, receive feedback and to meet other researchers working in CGIV area. The focus of this workshop will be on the pros and cons of various Computer Graphics, Imaging and Visualization ideas and solutions and its potential impact on both the research community and the industry in general.

All doctoral students involved in Computer Graphics, Imaging and Visualization research area are welcome to attend. The event is organised in four sessions with up to four PhD students per session. Presenters, which are PhD students at various stages of their PhD, will give an outline of their PhD research in order to benefit from feedback about their work and methodology from a combined industry & research panel.

Tuesday 11 August 2009

10:00	< Meeting Room Foyer, B407, 25 Teaching building, School of Computer Science, Tianjin University, Tianjin, China > Registration
10:30 - 13:00	< Meeting Room, B407, 25 Teaching building, School of Computer Science, Tianjin University, Tianjin, China > Doctoral Research Workshop: Computer Graphics, Imaging and Visualisation Chair: Professors Ebad Banissi & Xiaochun Cao Detecting photographic composites using geometric constraints Wei Zhang, Tianjiin University Interactive Visualization for Maritime Anomaly Detection Maria Riveiro, University of Skovde, Sweden
13:00	< Meeting Room, B407, 25 Teaching building, School of Computer Science, Tianjin University, Tianjin, China > Lunch Break

14:00	< Meeting Room, B407, 25 Teaching building, School of Computer Science, Tianjin University, Tianjin, China >
	Games in Sustainable Agriculture: A study in Paddy farming practices
	Othman Zakirah, University Malaya
	MIFT: A mirror reflection invariant feature descriptor
	Xiaojie Guo, Tianjin University
	1-1 feedback round table discussion
	Final commentary

Wednesday 12 August 2009

08:00	< Conference Hall, Tianjin University >
	<i>Registration</i>
09:30	< Lecture theatre 8, Conference Hall, Tianjin University, Tianjin, China >
	Opening & Welcome
	Welcome & official opening from Tianjin government and Tianjin University
	Welcome Speech from cgiv09 Conference Chairman, Prof. Enhua Wu, Institute of Software, Chinese Academy of Sciences, China, Associate Dean, Faculty of Science and Technology, University of Macau
	Welcome Speech from cgiv09 Conference Co-Chairman, Prof. Ebad Banissi, VGRU, LSBU, UK
10:20	< Lecture theatre foyer, Conference Hall >
	<i>Morning Coffee Break / Photograph Session</i>
10:50	< Lecture theatre 8, Conference Hall, Tianjin University, Tianjin, China >
	Session CGIV09_1.1: Computer Graphic, Visualisation and Imaging Application
	Chair: Jiawan Zhang, Tianjin University, China
	<Keynote Lecture> Investigation on Weathering Effect of Natural Scenes
	Prof. Enhua Wu, Associate Dean, Faculty of Science and Technology, University of Macau
	<Keynote Lecture> Computational Manga
	WONG, Tien-Tsin, Professor, Dept of Computer Science & Engineering, The Chinese University of Hong Kong
	<Keynote Lecture> Video Surveillance
	YingLi Tian, Associate Professor Department of Electrical Engineering, City University of New York, USA)
13:00	< Lecture theatre foyer, Conference Hall >
	<i>Lunch Break</i>

<p>14:00 - 15:20</p>	<p>< Lecture theatre 5, Conference Hall, Tianjin University > Session CGIV09_1.2: Visualisation_I Chair: Prof. Mao Lin Huang, University of Technology, Sydney (UTS), Australia</p> <p>Visualizing Air Traffic Flow Management Alert Information using Squarified Treemaps <u>Jiening, Wang</u>; Qizhen, Hou; Yongxin, Liu; Chunfeng, Zhang</p> <p>A Review of Scene Visualization Based on Language Descriptions <u>Zeng, Xin</u>; Tan, Manling</p> <p>Interactive Visualization of Normal Behavioral Models and Expert Rules for Maritime Anomaly Detection <u>Riveiro, Maria</u>; Falkman, Göran</p> <p>Large Scale Network Analysis with Interactive Visualisation <u>Nguyen, Quang Vinh</u>; <u>Huang, Mao Lin</u></p> <p>The Application of Computer Graphic Technology on Monitoring Roller Compaction Quality of Rock-fill Dam <u>Zhang, Ping</u></p>	<p>< Lecture theatre 7, Conference Hall, Tianjin University > Session CGIV09_1.3: Imaging_I Chair: Prof. M. Sarfraz, Kuwait University, Kuwait</p> <p>Cluster Coding Algorithm for Stochastic Textures Identification <u>Khoo, Hee Kooi</u>; Ong, Hong Choon; Wong, Ya Ping</p> <p>Image Segmentation using Adaptive Tree-structured Wavelet Transform <u>Pun, Chi-Man</u>; Zhu, Hong Ming</p> <p>Extended Basis Pursuit Model and Its Application in Image De-noising <u>WANG, Xiong-liang</u>; ZHU, Ju-Bo; WANG, Chun-ling; LIANG, Dian-Nong</p> <p>A K-means based Generic Segmentation System <u>Irani, Arash Azim Zadeh</u>; Belaton, Bahari</p> <p>A Statistical Image Retrieval Method using Color Invariant <u>Jin, Cheng</u></p>
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<p>14:00 - 15:20</p>	<p>< Lecture theatre 6, Conference Hall, Tianjin University > Session CGIV09_1.4: Rendering Chair: Prof. Jiening Wang; Civil Aviation University of China, China Illuminant Condition Matching in Augmented Reality: A Multi-Vision, Interest Point Based Approach; <u>Bingham, Mark</u>; Taylor, D.; Gledhill, D.; Xu, Z. A Fast Method for Real-time Computation of Approximated Global Illumination; <u>Ly, Weiwei</u>; Lu, Jian; Liu, Xuehui; Wu, Enhua A Method of Sketch-Based 3D Modeling for Virtual Garments; Sun, Zhengxing; <u>Zhang, Yaoye</u>; Liu, Kai; Zhang, Yan</p>	<p>< Lecture theatre 8, Conference Hall, Tianjin University > Session CGIV09_1.5: Image/Video Analysis for Face Recognition_I Chair: Prof. Yingli Tian, City University of New York, USA Real-time Accurate Facial Feature Corner Localization by Rule-Based Selection; <u>Tong, Jiaqi</u>; Ma, Lizhuang; Xu, Zhiliang Skeletonization of Grayscale Volumes for Shape Description; <u>Ye, Liang</u>; Liu, Jun; Shan, Guihua; Chi, XueBin Human Age Estimation by Metric Learning for Regression Problems; <u>Long, Yangjing</u> Super-Resolution using Regularized Orthogonal Matching Pursuit based on Compressed Sensing Theory in the Wavelet Domain; <u>Fan, Na</u> A Real-time Detecting and Tracking Method for Moving Objects Based on Color Video; Li, Jianyu; <u>Li, Feng</u>; Zhang, Min</p>
<p>15:20</p>	<p>< Lecture theatre foyer, Conference Hall > <i>Coffee Break</i></p>	

<p>15:50 - 17:00</p>	<p>< Lecture theatre 5, Conference Hall, Tianjin University > Session CGIV09_1.6: CAGDAG_I Chair: M. Sarfraz, Kuwait University, Kuwait</p> <p>Improving Non-Uniform Rational B-splines' Knot Removal <u>Ibrahim, Abdul Rahman</u>; Shamsuddin, Siti Mariyam</p> <p>Ball Robot and the Graphics Generation and its Image Calculation based on CAD Geometric Model <u>Bingchen, QI</u>; Yoshikuni, OKAWA; Yanqiu, DONG; Jilin, LUAN; Wei, QI</p> <p>A Novel Corner Detector Approach using Sliding Ellipses <u>Sarfraz, Muhammad</u></p> <p>Smoothing arc splines by cubic curves <u>Habib, Zulfiqar</u>; <u>Sakai, Manabu</u></p>	<p>< Lecture theatre 7, Conference Hall, Tianjin University > Session CGIV09_1.7: Multimedia Chair: Prof. Ron Balsys; Central Queensland University Australia</p> <p>Real-time Simulation of Large Area Nearshore Wave for Marine Simulator <u>Li, Yongjin</u>; Jin, Yicheng; Yin, Yong; Shen, Helong</p> <p>Digital Video Watermarking in the Discrete Wavelet Transform Domain <u>Al-Taweel, Sadik Ali</u>; <u>Sumari, Putra</u></p> <p>Style-sheets Extraction from Existing Digital Contents by Image Processing for Web-based BML Contents Management System <u>Morimoto, Hidekazu</u>; Meing, Fanfan; Takano, Shigeru; Okada, Yoshihiro</p> <p>Assessing User Acceptance towards Virtual Museum: The Case in Kedah State Museum, Malaysia Zakirah, Othman; Norazimah, Awang; Abdul Razak, Yaakub</p>
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15:50 - 17:00	<p>< Lecture theatre 6, Conference Hall,Tianjin University > Session CGIV09_1.8: Computer Graphics_I Chair: Prof. Zhengxin Sun, Nanjing University, China</p> <p>GPU Supported Patch-based Tessellation for Dual Subdivision <u>Fan, Fengtao</u>; <u>Cheng, Fuhua</u></p> <p>BRDF Valid Sampling Based On Gradient Magnitude Synthetic Analysis <u>Zeng, Zhou</u>; <u>Ma, Lizhuang</u>; <u>Zheng, Zuoyong</u></p> <p>Skeletal Texture Synthesis Pan, Gang; <u>Zhang, Jiawan</u>; Zhou, Xiaozhou; Sun, Jizhou</p>	<p>< Lecture theatre 8, Conference Hall,Tianjin University > Session CGIV09_1.9: Bio-Medical Visualisation Chair: Prof. Yan Liu, Tianjin University, China</p> <p>Skull Registration Using Rigid Super-Curves <u>Liao, Iman Yi</u>; Zheng, Pan; Belaton, Bahari</p> <p>Accelerating Algebraic Reconstruction Using CUDA-Enabled GPU <u>Lu, Yuqiang</u>; Wang, Weiming; Chen, Shifu; Xie, Yongming; Qin, Jing; Pang, Wai-Man; Heng, Pheng-Ann</p> <p>Estimating Cybersickness of Simulated Motion Using the Simulator Sickness Questionnaire (SSQ): A Controlled Study <u>Bruck, Susan</u>; Watters, Paul Andrew</p> <p>The Impacts of Animated-Virtual Actors' Visual Complexity and Simulator Sickness in Virtual Reality Applications Kartiko, Iwan; Kavakli, Manolya; Cheng, Ken</p>
18:30	<p><Dining Hall, Qiyuan Hotel> cgiv09_ Social Event: Conference Dinner</p>	

Thursday 13 August 2009

08:30	< Conference Hall, Tianjin University >	
	<i>Registration</i>	
9:00	< Lecture theatre 5, Conference Hall, Tianjin University >	< Lecture theatre 7, Conference Hall, Tianjin University >
	<p>Session CGIV09_2.1: Computer Graphics_II Chair: Dr Natasha Dejdumrong, KMUTT, Thailand</p> <p>Particle Based Skinning <u>Tokoi, Kohe</u>; Komiya, Shingo</p> <p>Particle Importance based Fluid Simulation <u>Chang, Yuanzhang</u>; Bao, Kai; Liu, Youquan; Zhu, Jian; Wu, Enhua</p> <p>Facial Expression Representation Using A Quadratic Deformation Model <u>Obaid, Mohammad</u>; Mukundan, Ramakrishnan; Billinghamurst, Mark; Sagar, Mark</p> <p>Implementation of Ant Colony Algorithm base on GPU <u>Jiening, Wang</u>; Jiankang, Dong; Chunfeng, Zhang</p> <p>Photon Mapping Parallel Based On Shared Memory System <u>he, huaiqing</u>; Wang, Tianbao; Xu, Qing; Xing, Yaoyu</p>	<p>Session CGIV09_2.2: Digital Art, Animation & Multimedia_I Chair: Prof. Ebad Banissi, LSBU, UK</p> <p>Expansion of communication in Media art through the Intelligent Interaction <u>Lee, Seung-hyun</u>; Kim, Tae-Yong</p> <p>A Framework on the Applications of Interactive Art Hare, Teeragit Nasaree; <u>Dejdumrong, Natasha</u></p> <p>Artwork-based 3D Ink Style Modeling and Rendering <u>Sun, Meijun</u>; Tian, Tian; Sun, Jizhou</p> <p>A Motion Retargeting Method for Topologically Different Characters <u>Lu, Wenyu</u>; Liu, Yan; Sun, Jizhou; Sun, Libo</p> <p>On the Art gallery Problem Based on the 4-coloring Scheme <u>Wang, Kelun</u>; Ren, Hongxiang</p> <p>A Study on the Visual Styles of Wayang Kulit Kelantan and Its Capturing Methods <u>Khor, Kheng Kia</u></p>

09:00	<p>< Lecture theatre 6, Conference Hall, Tianjin University > Session CGIV09_2.3: IRTAST_I Chair: Dr Zulfiqar Habib, , National University of Computer & Emerging Sciences, Pakistan</p> <p>Face Recognition using a Time-of-Flight Camera <u>Meers, Simon</u>; Ward, Koren</p> <p>A Fuzzy Logic Based Approach to De-Weather Fog-Degraded Images <u>Desai, Nachiket</u>; Chatterjee, Aritra; Mishra, Shaunak; Chudasama, Dhaval; Choudhary, Sunav; Barai, Sudhirkumar</p> <p>A Dynamic Clustering Algorithm of Small Data Set <u>peng, Tao</u>; Jiang, Minghua; Hu, Ming</p> <p>Thai Font Type Recognition using Linear Interpolation Analysis <u>Jamjuntr, Pitchaya</u>; <u>Dejdumrong, Natasha</u></p>	<p>< Lecture theatre 8, Conference Hall, Tianjin University > Session CGIV09_2.4: CAGDAG_II Chair: Prof. M. Sarfraz, Kuwait University, Kuwait</p> <p>Wang-Ball Triangular Patches and Its Properties <u>Sukjaitham, Supareuk</u>; Dejdumrong, Natasha</p> <p>A New Model of Triangular DP Surfaces and Its Applications Krungkarnchana, Podcharid; Dejdumrong, Natasha</p> <p>Surface Mesh Segmentation using Local Geometry <u>Chun, Chansophea</u>; Guha, Sumanta</p> <p>Particle Swarm Optimization for NURBS curve fitting Setyo Adi, Delint Ira; <u>Shamsuddin, Siti Mariyam</u></p> <p>Fast Recursive Algorithm for a New Model of Triangular Surfaces <u>Unjai, Wittaya</u>; Dejdumrong, Natasha</p> <p>A Fast hole-filling strategy of 3D Scanned Human Body <u>Sun, Xiao-dong</u>; Zhang, Hong-bin</p>
11:00	<p>< Lecture theatre foyer, Conference Hall > <i>Coffee Break</i></p>	

11:30	<p>< Lecture theatre 5, Conference Hall, Tianjin University > Session CGIV09_2.5: Image/Video Analysis for Face Recognition_II Chair: Prof. Lizhuang Ma; Shanghai Jiao Tong University, China</p> <p>Video Volume Segmentation for Event Detection <u>Wang, Jing</u>; Xu, Zhijie</p> <p>Nonlinear Image Interpolation Using Adaptive Conic Blending Spline <u>Zhao, Huanxi</u>; <u>Sun, Chuan</u></p> <p>Soccer Ball Tracking using Dynamic Kalman Filter with Velocity Control <u>Kim, Jong-yun</u>; Kim, Tae-Yong</p>	<p>< Lecture theatre 7, Conference Hall, Tianjin University > Session CGIV09_2.6: Data & Information Visualisation Chair: Prof. Qing Xu, Tjian University, China</p> <p>A Visualization of Tag Relations among User Interests in the Social Tagging System <u>Bae, Joohee</u>; Lee, Kyungwon</p> <p>Synthesis Vis: A Web Site Supporting Collaborative Information Visualization <u>XiongFei, LUO</u>; HongAn, WANG; Wei, LIU; DongXing, TENG; Tian, YANG; ZaiFei, LIAO; Feng, TIAN</p> <p>A Zoomable Shopping Browser Using a Graphic-Treemap <u>Huang, Mao Lin</u>; Nguyen, Quang Vinh; Vo, Viet Cuong; Wang, Junhu</p> <p>Visualization Techniques on the Examination Timetabling Pre-processing Data <u>Thomas, J. Joshua</u>; Tajudin Khader, Ahamad; Belaton, Bahari</p>
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11:30	<p>< Lecture theatre 6, Conference Hall, Tianjin University > Session CGIV09 _2.7: Spatial/Geographic Data Visualization_I Chair: Prof. Eric Li; City University of Hong Kong, China</p> <p>Land use/cover classification by using Digital Camera Imagery <u>Lim, Hwee-San</u>; Mat jafri, Mohd Zubir; Abdullah, Khiruddin</p> <p>A Locatable ZeroWatermarking Scheme and Visualization for 3D Mesh Models Zhang, Jiawan; <u>Pan, Gang</u>; Jiang, Chen; Zhou, Xiaozhou</p> <p>Indonesia forest fires exacerbate Carbone monoxide pollution over Peninsular Malaysia during July to September 2005 <u>Rajab, Jasim</u>; Mat jafri, Mohd Zubir; Lim, Hwee-San; Abdullah, Khiruddin</p> <p>Real-time rendering system of large-scale terrain in flight simulation: design and implementation <u>He, Huaiqing</u>; Xing, Yaoyu; Wang, Tianbao</p>	<p>< Lecture theatre 8, Conference Hall, Tianjin University > Session CGIV09 _2.8: Augmented, Mixed, and Virtual Reality Chair: Ebad Banissi, VGRU, London South Bank University, UK</p> <p>An Implementation Review of Occlusion-Based Interaction in Augmented Reality Environment; Shahidan, Mohamad Shahrul; Ibrahim, Nazrita; Mohamed Zabil, Mohd Hazli; Yusof, Azlan</p> <p>Volume Cost Based Mesh Simplification; <u>Chuan, Chansophea</u>; Guha, Sumanta</p> <p>Rendering of 3D Cloud for Marine Search and Rescue Simulator in Real-time; <u>Shen, Helong</u>; Yin, Yong; Li, Yongjin</p> <p>On-line Visualization as a sequence Grid application for Parametric Studies; <u>Pajorova, Eva</u></p> <p>A Framework for Evaluating Human Action Detection via Multidimensional Approach; Lili N.A.</p>
13:00	< Lecture theatre foyer, Conference Hall > <i>Lunch Break</i>	
14:00-18:00	<Gate of Conference Hall > cgiv09_Social Networking Event: City's land mark tour	

Friday 14 August 2009

08:30	< Conference Hall, Tianjin University >	
09:00-11:00	<p data-bbox="271 363 1193 395" style="text-align: center;">< Lecture theatre 7, Conference Hall, Tianjin University ></p> <p data-bbox="271 395 1193 467">Session CGIV09_3.1: IRTAST_II Chair: Prof. Xiujin Wang; Tianjin University, China</p> <p data-bbox="271 515 1193 627">Enhanced Algorithm for Extracting the Root of Arabic Words <u>Ghwanmeh, Sameh Hussein</u>; Al-Shalabi, Riyad F.; Kanaan, Ghassan G.; Rabab'ah, Saif</p> <p data-bbox="271 643 1193 786">k/K-Nearest Neighborhood Criterion for Improving Locally Linear Embedding <u>Eftekhari, Armin</u>; Abrishami Moghaddam, Hamid; Babaie-Zadeh, Massoud</p> <p data-bbox="271 802 1193 914">Using the selected candidate vectors to determine kernel parameters <u>Li, Xiaoyan</u>; Zhang, Hongbin</p> <p data-bbox="271 930 1193 1042">Two Dimensional Compressive Classifier for Sparse Images; Eftekhari <u>Armin</u>; Abrishami Moghaddam, Hamid; Babaie-Zadeh, Massoud</p> <p data-bbox="271 1058 1193 1161">Online Handwriting Thai Character Recognition Karnchanapusakij, Credit; Suwannakat, Phattharasuda; Rakprasertsuk, Waroonorn; <u>Dejdumrong, Natasha</u></p>	<p data-bbox="1193 363 2056 395" style="text-align: center;">< Lecture theatre 8, Conference Hall, Tianjin University ></p> <p data-bbox="1193 395 2056 467">Session CGIV09_3.2: CAGDAG_III Chair: Prof. Yoshihiro Okada, Kyushu University, Japan</p> <p data-bbox="1193 515 2056 627">Monomial Forms for Curves in CAGD with Their Applications <u>Aphirukmatakun, Chanon</u>; Dejdumrong, Natasha</p> <p data-bbox="1193 643 2056 722">A graphical approach to approximate offset computation Li, C. L.; ZHOU, Gang; CHAN, C. W.</p> <p data-bbox="1193 738 2056 834">A New Model of Univariate and Bivariate Bases for Curves, Rectangular surfaces and Triangular surfaces; <u>Jangchai, Jaratpong</u>; Dejdumrong, Natasha</p> <p data-bbox="1193 850 2056 946">Blending functions generating a cubic curve that closely approximates a polygon from four control points; <u>Chang, Lawrence Hooi Tuang</u></p> <p data-bbox="1193 962 2056 1074">General Shape Grammar Interpreter for Intelligent Designs Generations Trescak, Tomas; Rodriguez, Inmaculada; Esteva, Marc</p> <p data-bbox="1193 1090 2056 1161">Fuzzy Geometric Modeling Ali, Jamaludin Md.; Wahab, Abd. Fatah; Majid, Ahmad Abd.</p>

09:00-10:00	<p>< Lecture theatre 5, Conference Hall, Tianjin University > Session CGIV09_3.3: Spatial/Geographic Data Visualization _II Chair: Jiawan Zhang, Tianjin University, China</p> <p>3D Modelling Of A Famosa Fortress, Malaysia Based on Comparison of Textual and Visual Data <u>Izani, Mohd</u>; Bridgesa, A.; Razak, A</p> <p>Integrated Tourist Navigation System Wang, Haomian; Cui, Weiwei; Zhou, Hong; <u>Ou, Huamin</u></p> <p>Total Suspended Solids (TSS) Mapping Using ALOS Imagery over Penang Island, Malaysia Lim, Hwee-San; Mat jafri, Mohd Zubir; Abdullah, Khiruddin</p>	<p>< Lecture theatre 6, Conference Hall, Tianjin University > Session CGIV09_3.4: Animation Chair: Xiaochun Cao, Tianjin University, China</p> <p>The hierarchical perception model for crowd simulation; Sun, Libo; Liu, Yan; Sun, Jizhou; Lu, Wenyu</p> <p>A Preliminary Study Of Human Motion Based On Actor Physiques Using Motion Capture Sze Joon, Jong</p> <p>Providing novel and useful data for game development using usability expert evaluation and testing Choi, Yong Jun</p>
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10:00-12:00	<p>< Lecture theatre 5, Conference Hall, Tianjin University > Session CGIV09_3.5: Spatial/Geographic Data Visualization_III Chair: Prof. Ghassan Kanaan, Arab Academy, Jordan</p> <p>Retrieval of Aerosol Optical Thickness (AOT) and its Relationship to Air Pollution Particulate Matter (PM10) <u>Othman, Nadzri</u>; Mat Jafri, Mohd Zubir; Hwee San, Lim; Abdullah, Khiruddin</p> <p>Study on Land Surface Temperature Based on Landsat Image over Penang Island, Malaysia <u>KOK CHOOI, TAN</u>; HWEE SAN, LIM; MOHD ZUBIR, MAT JAFRI; KHIRUDDIN, ABDULLAH</p> <p>Merging Infrared and Microwave SST data at South China Sea Ng, Hou Guan; <u>Othman, Nadzri</u>; Jafri, Mohamad Zubir; Abdullah, Khiruddin</p> <p>Transformation of Spatial Data Format for Interoperability between GIS Applications <u>Budiarto, Rahmat</u>; Isawasan, Pradeep</p> <p><POSTER> Digital Imaging in Singapore: The Integration of digital imagery with traditional art media and techniques for site specific architectural, urban and landscape settings of Singapore <u>Conradi Chavez, Ina</u></p>	<p>< Lecture theatre 6 , Conference Hall, Tianjin University > Session CGIV09_3.6: POSTER Chair: Prof. Meijun Sun, Tianjin University, China</p> <p>An Efficient Off-line Signature Identification Method Based On Fourier Descriptor and Chain Codes <u>samak, ahmed</u>; amr, ismail; ramadan, mohammed; eldanf, talaat</p> <p>Three Dimensional Lip Animation Engine for Thai Pronunciation <u>Sanguansatjapong, Achara</u>; Ponprajak, Thidaporn; Dejduorong, Natasha</p> <p>Approximating From Scattered Data Using Moving Least Square method <u>Li, Ting ting</u>; Lee, Byung Gook</p> <p>Painting Using Experimental Animation <u>Conradi Chavez, Ina</u></p> <p>Haptic Glove for Augmented Reality <u>Ping, Lee Shang</u></p> <p>Exploring the Potential of Mobile In-Game Advertising Among The Undergraduate Students in Malaysia Che Din, Sharkawi; Faiz, Shahrul</p> <p>The real time simulation on route planning and route monitoring in navigation simulator <u>Xinyu, Zhang</u>; Hongxiang, Ren; Yong, Yin</p>
11:00	<p>< Lecture theatre foyer, Conference Hall > <i>Coffee Break</i></p>	

12:00

< Lecture theatre 8, Conference Hall, Tianjin University >

Session CGIV09_3.7: CGIV

Chair: Prof. Jizhou Sun; Tianjin University, China

Applying Fractal and Chaos Theory to Animation in the Chinese Literati TraditionBalsys, Ronald J.; [Huang, Qing](#)**Conference Closing from cgiv09 committee:****Chairman:**

Prof. Enhua Wu
Institute of Software, Chinese Academy of Sciences, China
Associate Dean, Faculty of Science and Technology, University of Macau

Co-Chairman:

Prof. M. Sarfraz
Department of Information Science, Kuwait University

Prof. Ebad Banissi
VGRU, LSBU, UK

Organizing Chairman:

Prof. Jizhou Sun
Dean, School of Computer Science and Technology, Tianjin University, China
Dean, School of Computer Software, Tianjin University, China

Organizing co-Chairman:

Prof. Maolin Huang
Faculty of Information Technology, University of Technology, Sydney, Australia

Prof. Xiaochun Cao
School of Computer Science and Technology, Tianjin University, China

Program Committee Chair:

Prof. Jiawan Zhang
Vice Dean, School of Computer Software, Tianjin University, China
Director, Institute of Computer Graphics and Image Processing

13:00	< Lecture theatre foyer, Conference Hall > <i>Lunch Break</i>
14:00	< Meeting Room, B407, 25 Building, School of Computer Science and Technology, Tianjin University > cgiv2010-Committee Members Meeting
	Close

ABSTRACTS

**Computer Graphics, Imaging and Visualisation
Doctoral Research Workshop**

Chair: Professors Ebad Banissi, Xiaochun Cao

**Detecting photographic composites using geometric
constraints**

Wei Zhang, Tianjiin University

Image compositing technology has become popular for tampering with digital photographs. We describe how such composites can be detected by enforcing the geometric and photometric constraints from shadows. In particular, we explore (i) the imaged shadow relations that are modeled by the planar homology, and (ii) the color characteristics of the shadows measured by the shadow matte. Our approach efficiently extracts these constraints from a single image and makes use of them for the digital forgery detection. Experimental results on visually plausible images demonstrate the performance of the proposed method.

**Interactive Visualization for Maritime Anomaly
Detection**

Maria Riveiro, University of Skovde, Sweden

This thesis investigates how combinations of visualization, interaction and data mining methods can support the detection of anomalous behavior in maritime traffic. We investigate the use of visual analytics-based techniques to support the user in situations where expert knowledge is needed and automatic approaches do not work well. In our

studies, we use simulated and real-world maritime traffic data.

**Games in Sustainable Agriculture: A study in Paddy
farming practices**

Othman Zakirah (University Malaya)

Playing computer games is a popular recreational activity for young people. This development of games industry is simply because the youth today really interested more of the computer games rather than manual or traditional games. Based on pilot study at Kubang Pasu, Kedah on October 2006, many young Malaysia (students around 7 - 16 years old) used cyber café to play computer games, such as war, investigation, sport and football games. They spent time to play computer games at afternoon, evening and holiday school. The results also show most of the games being played by the Malaysia gamer is developed by the western counterpart. As reviewed, until the present, there is a limited amount of research being done in virtual sustainable agriculture games, focus in paddy farming. Not surprisingly, there are no research about that' in Malaysia.

So, this research investigates the potential of using virtual reality application to promote sustainable agriculture in order to disseminate information paddy farming sector. Based on the main objective, the research will concentrate to build a prototype of Virtual Paddy games and to propose a model for a participatory policy and management development through the applications.

This research employed a qualitative research design using observation and case study approach. The respondents are farmer, researcher and agriculture officer. The location of case study is paddy farming area at Sabak Bernam,

Selangor, Kahang Organic Rice, Johor and Muda Agricultural Development Authority (MADA) at Northern Malaysia.

MIFT: A mirror reflection invariant feature descriptor,
Xiaojie Guo (Tianjin University)

In this work, we present a mirror reflection invariant descriptor which is inspired from SIFT. While preserving tolerance to scale, rotation and even affine transformation, the proposed descriptor, called MIFT, is also invariant to mirror reflection. We analyze the structure of MIFT and show how MIFT excels SIFT in the context of mirror reflection while performs as well as it when there is no mirror reflection. The performance evaluation is demonstrated on natural images such as reflection on the water, non-rigid symmetric objects viewed from different sides, and reflection in the mirror. Based on MIFT, applications to image search and symmetry axis detection for planar symmetric objects are also shown.

**Session CGIV09_1.1: Computer Graphic,
Visualisation and Imaging Application**

Chair: Jizhou Sun, Tianjin University, China

<Keynote Lecture>

Investigation on Weathering Effect of Natural Scenes

Prof. Enhua Wu, Associate Dean, Faculty of Science and Technology, University of Macau

<Keynote Lecture>

Video Surveillance

YingLi Tian, Associate Professor Department of Electrical Engineering, City University of New York, USA)

<Keynote Lecture>

Computational Manga

WONG, Tien-Tsin, Professor, Dept of Computer Science & Engineering, The Chinese University of Hong Kong

Manga (Japanese-style comic) industry is blooming in the last few decades worldwide, especially in Asian countries. Traditionally, manga arts are accomplished manually. Although certain degree of computerization has been undergone in recent years, the major change is basically the media, i.e. from pen-and-ink to digital media. Its tedious and labor-intensive workflow is still more or less the same. Computers are still not intelligently exploited. In this talk, we present our recent works on computational manga, in which we aim at facilitating various production steps with the advanced computer technologies.

Traditionally, mangas are produced mostly in black-and-white (B/W) and possibly with a few pages in color (e.g. cover). The B/W and color mangas are actually two separate production processes and hence their drawing styles may sometimes be inconsistent. Is it possible to unify their production processes in order to save the production cost and unify the styles? In this talk, I will present a computer-assisted method to colorize an originally B/W manga into a color version by simply scribbling on the B/W version. It not just simplifies the production of color mangas, but also combines the production processes of B/W and color mangas, and hence retains the original style (those strokes, hatching, and screening) of B/W mangas in

its color counterparts. The proposed method colorizes image based on both pattern-continuity and intensity-continuity, instead of intensity-continuity alone (as in optimization-based colorization). Hence it overcomes the abrupt intensity changes in B/W mangas.

Manga artists usually draw the backgrounds based on real photographs. Such background preparation is tedious and time-consuming. Some artists already make use of simple computer techniques, such as halftoning, to convert a given color photograph into B/W manga. However, the resultant mangas are so inconsistent in style and monotonous in pattern due to the single halftone screen. In fact, most manga artists use multiple screens to express the texture, tone, and other appearance. Is it possible to turn a color photograph into manga without sacrificing the style and content richness? To satisfy such need, we develop a color-to-screen technique that can generate manga retaining both the style and content richness.

Storing mangas/cartoons in digital formats, such as MPEG (for animation) and JPEG (for still images), is usually problematic due to the fact that high-contrast outlines in manga or cartoons lead to serious ringing artifacts. To solve the problem, an analogy-based method is proposed to dering such artifacts. Unlike filtering approaches, it is not a post process, but a synthesis process. We will show examples to demonstrate how it can reduce the ringing artifacts that is hard to be removed by other methods like bilateral filtering, POCS, or signal adaptive filtering. Finally, I will also briefly introduce our other recent results in this area of computational manga.

Speaker Biography:

Tien-Tsin Wong graduated from the Chinese University of Hong Kong in 1992 with a B.Sc. degree in Computer Science. He obtained his M.Phil. and Ph.D. degrees in

Computer Science from the same university in 1994 and 1998 respectively. In 1999, he joined the Computer Science & Engineering Department of the Chinese University of Hong Kong. He is currently a Professor. He is also a Visiting Professor and Doctoral Advisor at Tianjin University. Recently, he received the **IEEE Transactions on Multimedia Prize Paper Award 2005** and the **Young Researcher Award 2004**.

He has actively involved (as Program Co-chair, Program Committee and Organizing Committee) in several international conferences, including SIGGRAPH Asia 2009, Eurographics (2007-2009), Pacific Graphics (2000-2005, 2007-2009), Computer Graphics International (2004, 2006), Medical Imaging and Augmented Reality (2001), International Conference on Image and Graphics (2002), CAD/Graphics (2003, 2005, 2006), Chinagraph (2000, 2002, 2004, 2006, 2008) and ACM VRCIA (2006). Besides, he is also active in transferring graphics technologies to games industry, including writing articles in books for game developers (Graphics Gems V, Graphics Programming Methods, and Shader X3 to ShaderX7).

His main research interests include computer graphics, computational manga, precomputed lighting, image-based rendering, GPU programming, medical visualization, multimedia compression, and computer vision. In 1997, he proposed one of the earliest representations for image-based relighting, apparent BRDF of pixel (ABRDF). Since then, many research on precomputed lighting have been done worldwide. He also proposed a geometry-dependent framework for modeling surface imperfections, such as dust accumulation, in 1995 (reported in Computer Graphics World magazine). Since 2005, he and his team have been devoting to the field of computational manga, and published several pioneer works in prestigious venue such as SIGGRAPH.

Session CGIV09_1.2: Visualisation_I

Chair: Prof. Mao Lin Huang, University of Technology, Sydney (UTS), Australia

Visualizing Air Traffic Flow Management Alert Information using Squarified Treemaps

Jiening, Wang; Qizhen, Hou; Yongxin, Liu; Chunfeng, Zhang

The alert information play very important role in Air Traffic Flow Management (ATFM), and is often presented using simple graphics such as histogram or table. These familiar visualizations are effective for providing overview to some extent, but the details related to hierarchy are often neglected. In this paper we present a generalized treemap algorithm that aims to enhance alert information visualization for ATFM operations. We propose extensions to treemap algorithm such that treemaps can be created and updated in accordance with Air Traffic Control (ATC) manners and airspace construction in China.

A Review of Scene Visualization Based on Language Descriptions

Zeng, Xin; Tan, Manling

When dealing with computational models for integrating natural language and graphic representation, it is useful to examine theories of human visual perception and spatial language to discover what kind of processes and representation lie in between. This paper begins with a discussion of systems which have been implemented. It outlines related natural language processing technology and

theories that involve in language based scene visualization. We then discuss the way can be used to integration of visual information for scene generation.

Interactive Visualization of Normal Behavioral Models and Expert Rules for Maritime Anomaly Detection

Riveiro, Maria; Falkman, Göran

Maritime surveillance systems analyze vast amounts of heterogeneous sensor data from a large number of objects. In order to support the operator while monitoring such systems, the identification of anomalous vessels or situations that might need further investigation may reduce the operator's cognitive load. While it is worth acknowledging that many existing mining applications support identification of anomalous behavior, autonomous anomaly detection systems are rarely used in the real world, since the detection of anomalous behavior is normally not a well-defined problem and therefore, human expert knowledge is needed. This calls for the development of interaction components that can support the user in the detection process.

In order to support the comprehension of the knowledge embedded in the system, we propose an interactive way of visualizing expert rules and normal behavioral models built from the data. The overall goal is to facilitate the validation and update of these models and signatures, supporting the insertion of human expert knowledge, while improving confidence and trust in the system.

Large Scale Network Analysis with Interactive Visualisation

Nguyen, Quang Vinh; Huang, Mao Lin

This paper proposes a new interactive visualisation for analysing large hierarchical structures and networks. The technique combines of different graph layout methods with a layout refinement process, an interactive navigation mechanism and clustering algorithms. The integration of these components makes it flexible in dealing with a variety of graph and hierarchical structures. Interactive exploration is enabled with chain-context view. We aim to provide user with an effective mechanism for understanding of the nature of various networks. This could lead to the discovering and revealing of the hidden structures and relationships among elements as well as relationships associated with the elements.

The Application of Computer Graphic Technology on Monitoring Roller Compaction Quality of Rock-fill Dam

Zhang, Ping

This article technically analyzes the application of computer graphics on “automatic monitor and feedback control system for roller compaction quality of rock-fill dam” on the comprehension of the monitor process. The application and software implementation of computer graphic technology enable the monitor system for roller compaction quality of rock-fill dam to realize drawing of tracks and strips of rollers, calculation and display of control parameters of roller compaction, which achieves the goal of visual monitor on roller compaction quality.

Session CGIV09_1.3: Imaging_I

Chair: Prof. M. Sarfraz, Kuwait University, Kuwait

Cluster Coding Algorithm for Stochastic Textures Identification

Khoo, Hee Kooi; Ong, Hong Choon; Wong, Ya Ping

A stochastic texture is a texture whereby the arrangement of the pattern is random in nature. The identification for each of these textures is uncertain and usually involves complex methods to search for the locations of the correlation between these textures. We propose the cluster coding algorithm which could easily classify the stochastic textures in a semantic way based on statistical features. This algorithm is successfully applied in both synthetic and real-life textures for segmentation. In this study, the cluster coding showed a significant improvement over other techniques in terms of classification accuracy and computation time.

Image Segmentation using Adaptive Tree-structured Wavelet Transform

Pun, Chi-Man; Zhu, Hong Ming

In this paper we propose a novel approach for image segmentation using adaptive tree-structured wavelet transform for texture analysis. We first split the input image into $N \times N$ blocks, calculate the distances between neighbor blocks by the energy signatures of the wavelet coefficients of the adaptive tree-structured wavelet transform of each block. Then we merge blocks with smallest distances to form larger regions. The process will repeat until we got desired number of regions. Experimental results show that our proposed method outperforms the existing image segmentation method.

Extended Basis Pursuit Model and Its Application in Image De-noising

WANG, Xiong-liang; ZHU, Ju-Bo; WANG, Chun-ling; LIANG, Dian-Nong

Images are often corrupted by impulse noise from a noisy sensor or channel transmission errors. Two common types of impulse noise are the Salt-and-pepper noise and the random valued noise. The goal of impulse noise removal is to suppress the noise while preserving the edges and the details. An important type of impulse noise is salt-and-pepper noise, which is usually found in imaging with quick transients such as faulty switching, decoding errors, or transmitting images over noisy digital channels. When images are corrupted by salt-and-pepper noise, only part of pixels is changed, and the noisy pixels like white and black dots sprinkled on the images.

The Non-linear techniques have been found to provide more satisfactory results in comparison to linear methods. The often used two nonlinear methods are the median filter and the outlier method. In median filtering the central pixel inside a window is replaced by the median value of all pixels in the window. However, median filtering not only removes impulse noise but also introduces distortion, in particular, for highly corrupted images. Many other methods based on the SM filter are proposed, but these methods all replace noise by the SM filter or its variants without considering the local features such as the possible present of edges. The peak-and-valley filter is one kind outlier method. It is a non-linear non-iterative filter for impulse noise reduction based on order statistics and a minimal use of the background information. It consists of applying two conditional rules. The noisy pixels are identified and replaced in a single step. The replacement gray value is

taken from the neighbors' gray levels. The peak-and-valley filter's main disadvantage is that the estimated value is unrealistic. One detail Preserving Filter is actually a variation of the peak-and-valley filter based on a re-cursive minimum-maximum method.

Basis Pursuit is a novel method for signal sparse representation. It seeks the sparse representation of signal from complete or over-complete dictionaries. That is to select the fewest dictionary elements from the redundant basis set to represent the signal in order that the intrinsic nature of the signal can be captured. Basis Pursuit plays an important role in signal processing and bears good foreground in image processing. Traditional Basis Pursuit model is adapted to signal de-noising under additive Gaussian noise. Actually, noise characteristic varies with the different application environment. Based on the different fitness error term, one new kind Extended Basis Pursuit De-Noising (EBPDN) model is brought forward. The performance of EBPDN is compared with three other filters, the median, the peak-and-valley and detail preserving. Image de-noising experimental results demonstrate that EBPDN model can provide good de-noising results and outperform other filters in terms of Salt-and-pepper noise suppression and detail preservation.

A K-means based Generic Segmentation System

Irani, Arash Azim Zadeh; Belaton, Bahari

This paper presents a creative general purpose segmentation system, potentially capable of object extraction from RGB images. The segmentation takes place by initially performing K-means clustering and then recombination. K-means algorithm uses RGB color values, diagonal busyness factor (sum of color differences among

central and diagonal pixels) and epsilon spatiality factor (sum of Euclidian distances of pixels belonging to a particular cluster from their cluster center) as its clustering parameters in order to produce optionally compact or loose clusters representative of inherent color and texture. In addition, three different distribution methods are introduced to initialize central points and therefore improve the clustering accuracy. The methods are evenly spaced values, random values and evenly spaced samples respectively. In evenly spaced values, clusters (central points) are evenly distributed along the range of RGB colors available with in the image so that each cluster may partially represent a sub range of the total range of colors available with in the image. In random values, the distribution of clusters (central points) is not even. To define a central point an RGB color is randomly selected from the range of RGB colors available with in the image. In evenly spaced samples the distribution of clusters (central points) is based on X and Y (width and height) coordinates rather than color. To obtain an even distribution, total number of image pixels are calculated and then divided by the number of clusters (central points). Recombination is performed by scanning the neighborhood of each pixel in eight connected directions and determining the class (cluster) to which majority of neighbors belong. The class of central pixel (the pixel whose neighborhood is scanned) is then changed to the class (cluster) that majority of neighbors belong.

A Statistical Image Retrieval Method using Color Invariant

Jin, Cheng

Content based image retrieval is an essential task in many image processing applications, among which, color based methods have been receiving constant attentions in past

years, because color information is a discriminative descriptor for image retrieval, especially in case of large database. A limitation of previous color based methods is their unsuitability for retrieving similar scenes under varying lighting conditions as color is sensitive to illuminations. Besides image descriptors of some existing methods are with large dimensionality and thus computational expensive. As betterment, an adaptive method is proposed in this paper, which integrates the color invariant with some spatial information of images. Different from previous work, the number of states during the quantization of the color space is not manually determined. Instead, it depends on the context of the image itself, using an adaptive clustering technique: Firstly, feature map consisting of color invariants is established for images. Secondly, the Markov chain model is employed to capture the image both color and spatial information. Thirdly, an image descriptor is computed for each image, not under the frame of the entire fixed color space. To practice our method, similar images are retrieved with a similarity measure based on a two-stage weighted distance. Experiments show that, this method has improved simplicity and compactness without the lost of efficiency and robustness.

Session CGIV09_1.4: Rendering

Chair: Prof. Jiening Wang; Civil Aviation University of China, China

Illuminant Condition Matching in Augmented Reality: A Multi-Vision, Interest Point Based Approach

Bingham, Mark; Taylor, D.; Gledhill, D.; Xu, Z.

For the output of an augmented reality application to appear realistic a number of issues need to be taken into consideration. The illumination correspondence between the real and virtual components should be taken into account as well as the scene level of detail and the accuracy of alignment between the two worlds. This paper focuses on matching world illumination and photometric registration methods. It introduces a new technique that aims to utilize shadow/object interest point correspondences in order to locate and virtually reproduce real-life illuminants. The technique is favorable as it makes use of natural calibration objects in the form of natural scene geometry and associated shadows. Using an interest point based approach computational complexity is kept relatively low. Further work to be undertaken is discussed.

A Fast Method for Real-time Computation of Approximated Global Illumination

Lv, Weiwei; Lu, Jian; Liu, Xuehui; Wu, Enhua

We present a fast method for real-time computation of approximated global illumination for fully dynamic scenes under area light sources. To accelerate the computation, we use simplified models to calculate the indirect illumination, while render the direct illumination with original complex models. After direct illumination is computed with convolution soft shadow maps algorithm, color, position and normal textures are generated, from which a Halton quasi-random sampling method is used to produce the pixel lights

for the second bounce. Our testing models show that thousands of passes can be rendered with the simplified scenes in one second for the indirect illumination, and it can dramatically improve the frame rate for relatively complex scenes. Final image is generated by blending direct image and all indirect images.

A Method of Sketch-Based 3D Modeling for Virtual Garments

Sun, Zhengxing; Zhang, Yaoye; Liu, Kai; Zhang, Yan

This paper presents a method to reconstruct a 3D garment model from a sketched garment contour. Firstly, a set of inputting strokes is processed to form a closed sketched contour according to their spatial relationships and independent of their orders. Secondly, a reference model of the virtual character is established in terms of a modification of distance field computation that only considers the distance along z-axis. Thirdly, the mapping relationship between the contour and the character model is determined by assigning each grid a z-axis offset measured from the contour to the outline of character and positioning it in 3D space based on reference model. Finally, a constrained Delaunay triangulation is used to reconstruct a 3D garment surface. The experiment results prove that the proposed method can generate a garment surface constrained by sketch and adapted the underlying form of character model, and the process can perform in real time.

Session CGIV09_1.5: Image/Video Analysis for Face Recognition I

Chair: Prof. Yingli Tian, City University of New York, USA

Real-time Accurate Facial Feature Corner Localization by Rule-Based Selection

Tong, Jiaqi; Ma, Lizhuang; Xu, Zhiliang

We propose a coarse-to-fine approach for localizing eye and lip corners, which is accurate and robust, and can be executed in real-time. Given an image, we first detect the face and the rough initial positions of eyes and lip in the coarsest level. In the middle level, SUSAN corner detection is applied to obtain candidate corners, from which we select a best one as the facial feature corner. Finally, in the finest level, the corner is further refined by Normalized Cross-Correlation (NCC) template matching. We have tested our algorithm on the database containing 5000 faces with various poses, expressions, occlusions and light conditions. The experimental results show that our method can successfully localize the facial feature corners with more than 20FPS, which is very appealing.

Skeletonization of Grayscale Volumes for Shape Description

Ye, Liang; Liu, Jun; Shan, Guihua; Chi, XueBin

Skeletons as important shape features of an object are useful for shape description. Unfortunately, methods obtaining skeletons of a grayscale volume are lacking due to no clear boundary between object and background. In this paper, we present a new segmentation-free

skeletonization method on grayscale volumes based on Marching Cubes, topological thinning and a novel pruning routine. Our method is capable of generating a family of skeletal curves and surfaces that lie centered at rod-like and plate-like parts in the grayscale volume for shape description. It is demonstrated on biomedical data-sets.

Human Age Estimation by Metric Learning for Regression Problems

Long, Yangjing

The estimation of human age from face images has many real-world applications. However, how to discover the intrinsic aging trend is still a challenging problem. We proposed a general distance metric learning scheme for regression problems, which utilizes not only data themselves, but also their corresponding labels to strengthen the credibility of distances. This metric could be learned by solving an optimization problem. Via the learned metric, it is easy to find the intrinsic variation trend of data by a relative small amount of samples without any prior knowledge of the structure or distribution of data. Furthermore, the test data could be projected to this metric by a simple linear transformation and it is easy to be combined with manifold learning algorithms to improve the performance. Experiments are conducted on the public FG-NET database by Gaussian process regression in the learned metric to validate our framework, which shows that its performance is improved over traditional regression methods.

Super-Resolution using Regularized Orthogonal Matching Pursuit based on Compressed Sensing Theory in the Wavelet Domain

Fan, Na

A wavelet based compressed sensing Super Resolution algorithm is developed, in which the energy function optimization is approximated numerically via the Regularized Orthogonal Matching Pursuit. The proposed algorithm works well with a smaller quantity of training image patches and outputs images with satisfactory subjective quality. It is tested on classical images commonly adopted by Super Resolution researchers with both generic and specialized training sets for comparison with other popular commercial software and state-of-the-art methods. Experiments demonstrate that, the proposed algorithm is competitive among contemporary Super Resolution methods.

A Real-time Detecting and Tracking Method for Moving Objects Based on Color Video

Li, Jianyu; Li, Feng; Zhang, Min

In this paper, a new background modeling method using Gaussian mixture model based on Bayer color filter array is proposed. It improves the efficiency of obtaining the prospect moving objects in the color video. Besides, it is proposed a method that can track the multi-moving objects using the combination of Camshift and Kalman filter based on the prospect image. Take actual moving objects detection and tracking as examples, this algorithm has advantages of quick speed and good accuracy. Meanwhile,

it can realize multi-moving objects tracking and overcome occlusion problem in the process of tracking.

Session CGIV09_1.6: CAGDAG_I

Chair: M. Sarfraz, Kuwait University, Kuwait

Improving Non-Uniform Rational B-splines' Knot Removal

Ibrahim, Abdul Rahman; Shamsuddin, Siti Mariyam

Data reduction and shape accuracy are two things that come in mind when it comes to computer graphics research. One such algorithm used is Non-Uniform Rational B-splines (NURBS). The method used to reduce data in NURBS is via knot removal, which relies on an error tolerance value. This paper proposes integrating Particle Swarm Optimization (PSO) to determine the error tolerance value. The approach has made determining the error tolerance value an automatic process. There is a small amount of success in implementing this method thus far. It is not a perfect solution as of yet, but it has potential to unite artificial intelligence algorithms and computer graphics in efforts to promote more avenues of research in this field.

Ball Robot and the Graphics Generation and its Image Calculation based on CAD Geometric Model

Bingchen, QI; Yoshikuni, OKAWA; Yanqiu, DONG; Jilin, LUAN; Wei, QI

In this paper, the basic image calculation of the soccer robot of "more athletes and less balls" and the billiard robot of "more balls and less athletes" were discussed separately. And put forward our algorithm for the fast image calculation

of the ball obstructed by other balls for the problem that must be resolved while the billiard robot installed an onboard camera hitting billiards, as this paper uses the graphic generation and image calculation method based on CAD geometric model, this make the calculating process only rely on the area P of the exposed part of obstructed balls as well as the gravity coordinates of this area, and the volume of these three quantities can be obtained fast through simple pixels, so the algorithm proposed in this paper has a strong practicality.

Keywords: Ball Robot, CAD Geometric model, graphics generation, image calculation.

A Novel Corner Detector Approach using Sliding Ellipses

Sarfraz, Muhammad

This paper introduces a new corner detection approach for planar digital curves. The proposed algorithm finds the corners by sliding set of three ellipses along the curve and counting number of contour points lying in each ellipse. This structure incorporates both local and global view of given shape which is a key to find all corners successfully. Proposed technique has been found very consistent with human vision system. This is a novel, accurate and an efficient method. A comparative study with three popular existing corner detectors is also presented. The proposed technique is also useful to detect corners from noisy shapes as well as natural object boundaries.

Smoothing arc splines by cubic curves

Habib, Zulfiqar; Sakai, Manabu

Arc splines are planar, tangent continuous, piecewise curves made of circular arcs and straight line segments. These are important in manufacturing industries because of their use in the cutting paths for numerically controlled cutting machinery, highway route and robot paths. This paper considers how to smooth three kinds of G1 biarc models: the C-, S-, and J-shaped, by replacing their parts by a single G2 cubic B\`ezier function composed of minimum possible spiral pieces. Use of a single curve rather than two functions has the benefit because designers and implementers have fewer entities to be concerned.

Session CGIV09_1.7: Multimedia

Chair: Prof. Ron Balsys; Central Queensland University Australia

Real-time Simulation of Large Area Nearshore Wave for Marine Simulator

Li, Yongjin; Jin, Yicheng; Yin, Yong; Shen, Helong

This paper introduces a new method for simulating nearshore wave. Firstly, parabolic mild-slope equations are set up according to the simulation area and input waves. After solving the equations, the integral wave parameters such as the root mean square wave height, the peak wave period and the mean wave direction can be got. Instantaneous surface elevations can also be obtained from the model. Then, the integral wave parameters and an

instantaneous surface elevation are composed into a float texture. Finally, a view-dependent sea surface is rendering use this texture as wave parameters. Experimental results show that this method can be applied to simulate large areas of nearshore waves in real-time with realistic effect. It is suitable for the application of real-time simulation, particularly for marine simulator.

Digital Video Watermarking in the Discrete Wavelet Transform Domain

Al-Taweel, Sadik Ali; Sumari, Putra

Nowadays, the digital copyrights are the common concern in the Multimedia Digital production industry and these copyrights apply various watermarking techniques. In this paper we present a method for a robust watermarking insertion in a video frame. The proposed method works on the uncompressed video based on the spread spectrum communication. The researchers applied the technique in the discrete wavelet transform domain (DWT). The results showed that the watermark has high perceptual invisibility and robust against JPEG compression, geometric distortions such as Downscaling, Cropping, and Rotation, as well as noising. The watermark was successfully extracted from the video after various attacks.

Style-sheets Extraction from Existing Digital Contents by Image Processing for Web-based BML Contents Management System

Morimoto, Hidekazu; Meing, Fanfan; Takano, Shigeru; Okada, Yoshihiro

This paper proposes a web-based BML contents management system. BML is a short form of Broadcast

Markup Language which is the script language for data broadcasting contents included in digital TV broadcasting services of Japan. The scripting style of BML is very similar to that of HTML and it also supports style-sheets and JavaScript. However, in BML, there are many restrictions about the display area size, font sizes, color types and so on because the BML-browser of TV is not flexible as compared with the Web-browser. Although there are a couple of dedicated software packages for BML contents creation, they are very expensive and difficult to use. So, BML contents creation is not easy for the end-user. To make it easier to create BML contents, the authors have been developing a web-based BML contents management system. This paper explains fundamental functionalities provided by the proposed BML contents management system.

Already many digital contents were created and stored and we can easily obtain their images by capturing the screen snapshot. So, this paper also proposes style-sheets extraction method for BML contents from such already existing digital contents by image processing techniques.

Assessing User Acceptance towards Virtual Museum: The Case in Kedah State Museum, Malaysia

Zakirah, Othman; Norazimah, Awang; Abdul Razak, Yaakub

Abstract – This paper describes the testing analysis that has been done towards a prototype of virtual museum named ViSeum. The prototype was based on the real Kedah State Museum (KSM) at Northern Malaysia. This ViSeum was developed using non immersive virtual reality technique, whereas it focused to reduce cost development and maintenance, easy access and more interactive. The objective of this study is to present the result of the

analysis based using Technology Acceptance Model on the survey. Perceived usefulness, perceive ease of use, perceived enjoyment and behavioural intention are the independent variables in testing intention to use by visitor.

Session CGIV09_1.8: Computer Graphics_I

Chair: Prof. Zhengxin Sun, Nanjing University, China

GPU Supported Patch-based Tessellation for Dual Subdivision

Fan, Fengtao; Cheng, Fuhua

A novel patch-based tessellation method for a dual subdivision scheme, the Doo-Sabin subdivision, is presented. Patch-based refinement for face-split subdivision schemes such as Catmull-Clark subdivision or Loop subdivision has been widely studied. But there is no patch-based tessellation algorithm for dual subdivision scheme [Shiue et al. 2005] yet. The method presented in this paper is the first attempt to fill up that gap. The new method uses an 1D array to hold vertices; it creates a patch corresponding to a vertex in the original mesh and does not have any numerical round off gaps on patch boundaries. These characteristics are different from those of patch-based refinements for face-split subdivision schemes. Experimental results show that our algorithm achieves real time tessellation performance for moderate meshes.

BRDF Valid Sampling Based On Gradient Magnitude Synthetic Analysis

Zeng, Zhou; Ma, Lizhuang; Zheng, Zuoyong

In general, there are some minor flaws on the surface of homogeneous material, such as stains, nicks, will produce

unfavorable effects on isotropic BRDF measurement, especially for highlight material. In this paper, we present a numerical technique, which can efficiently solve this problem by gradient magnitude synthetic analysis. We measure BRDF by fixing camera and rotating light source. We found that nicks or stains will exhibit different properties from their surrounding material in some special light orientations. A novel algorithm is developed to detect tiny nicks or stains based on this principle. We merge gradient magnitude info of possible edge points by common edge detection algorithms at all light source orientations and classify edge points as several ranks, and then check invalidity of edge points and rationally distribute them by comprehensively analyzing the rank of each point.

Skeletal Texture Synthesis

Pan, Gang; Zhang, Jiawan; Zhou, Xiaozhou; Sun, Jizhou

In this paper, we present an improved synthesis algorithm for both 2D and solid textures. Based on the wavelet-based multiresolution pyramids and the improved optimization of texture synthesis, a coarse texture was synthesized as a skeleton. By adding detail information to the coarse texture, the higher resolution results can be generated. This skeletal growth-like procedure makes the result more controllable. In addition, to make full use of the spatial relationships among texture pixels, wavelet coefficients rather than traditional RGB channels are used to search the nearest neighbour pixels. Experimental study shows that the method plays well for both 2D and solid texture synthesis.

Session CGI V09_1.9: Bio-Medical Visualisation

Chair: Prof. Yan Liu, Tianjin University, China

Skull Registration Using Rigid Super-Curves

Liao, Iman Yi; Zheng, Pan; Belaton, Bahari

This research presents an algorithm, Rigid Super Curves (RSC), to solve the problem of registering two skulls under a rigid transformation using crest lines. The method that recovers the rigid transformation between two sets of fully matched curves is proposed. RSC exploits the non-ambiguity of B-Spline representation of super-curves whilst overcoming the inability of super-curves to restore rigid transformations. A further contribution of this study is a two-stage algorithm based on RSC which registers two sets of partially matched curves under a rigid transformation. The algorithm improves the robustness over feature based methods by considering the structure rather than individual points of the curve. Experimental results on CT scanned skull data show that proposed algorithm is more robust and accurate at recovering the rigid transformation between two sets of crest line data compared with Iterated Closest Point and Super Curves methods.

Accelerating Algebraic Reconstruction Using CUDA-Enabled GPU

Lu, Yuqiang; Wang, Weiming; Chen, Shifu; Xie, Yongming; Qin, Jing; Pang, Wai-Man; Heng, Pheng-Ann

In this paper, we apply the Compute Unified Device Architecture (CUDA) to the 3D cone-beam CT reconstruction using simultaneous algebraic reconstruction technique (SART). With the hardware acceleration, the computationally complex SART can run at speed

comparable to the commonly used filtered back-projection, and provide even better quality volume with less samples. The main contributions include two novel techniques to accelerate the reconstruction. We introduce a ray-driven projection along with hardware trilinear interpolation, as well as a voxel-driven back-projection that can avoid redundant computation by combining CUDA shared memory. Significant performance boost is reported from experiments using our techniques. A real-time reconstruction is achieved within 3 seconds for a 128*128*128 volume from 80 128*128 projections, without compromising image quality. Our proposed method realizes the instantaneous presentation of CT volume to the physician once acquired the projection images.

Estimating Cybersickness of Simulated Motion Using the Simulator Sickness Questionnaire (SSQ): A Controlled Study

Bruck, Susan; Watters, Paul Andrew

The aim of this experiment was to determine which cybersickness symptoms are associated with simulated motion, by comparing responses to the Simulated Sickness Questionnaire (SSQ) between a control and experimental condition. Using non-parametric statistical tests, we found that general discomfort, fatigue, headache, eyestrain, difficulty in focusing eyes, increased sweating, nausea, difficulty in concentrating, stomach awareness and blurred vision were significantly higher in a high simulated motion task compared with a low simulated task. The implications for preventing cybersickness in virtual environments are discussed.

The Impacts of Animated-Virtual Actors' Visual Complexity and Simulator Sickness in Virtual Reality Applications

Kartiko, Iwan; Kavakli, Manolya; Cheng, Ken

This article discusses the effects of Animated Virtual Actors' (AVAs) visual complexity on Simulator Sickness (SS) in Virtual Reality (VR) applications. SS is one of the major disadvantages of VR simulations. Previous research has shown that visual complexity correlates with SS. Yet complex AVAs are increasingly used along with real-time graphics. Minimizing SS for a VR application is thus beneficial. A series of VR simulations were created to teach second-year psychology students about the navigational capabilities of desert ants with different levels of AVA's visual complexity: flat, cartoon, or life-like. We predicted that more complex AVAs would induce more SS. The results contradicted the predictions, with no significant differences in SS between groups as a function of the AVA's visual complexity. Moreover, our methods succeeded in low overall levels of SS in all the simulations. Possible explanations and our future research directions are discussed.

Session CGIV09_2.1: Computer Graphics_II

Chair: Dr Natasha Dejdumrong, KMUTT, Thailand

Particle Based Skinning

Tokoi, Kohe; Komiya, Shingo

When deforming a shape by skinning in character animation, we may encounter unexpected results such as surface collapse and shape shrinkage. In this article, we propose an improved skinning method that preserves volume through deformation and prevents such shape contraction by using particles that have interaction forces affecting each other. In this method, the interaction forces working among the particles enable them to keep a constant distance from each other, and the volume is mostly preserved because the number of particles is unchanged during deformation. The particles are associated with fixed points on a skeleton, and their position and motion are controlled as if they adhere to the skeleton. Vertex positions on a surface of the shape are then fixed according to an arrangement of particles to generate the deformed object shape. We compare the deformation result of the proposed method with the result of the skinning using conventional vertex blending and show the validity of the proposed method.

Particle Importance based Fluid Simulation

Chang, Yuanzhang; Bao, Kai; Liu, Youquan; Zhu, Jian; Wu, Enhua

We present a novel method using particle importance to accelerate the traditional Smoothed Particle Hydrodynamics based fluid simulation. Reynolds number and vorticity are exploited as the new criteria to evaluate the importance for

each particle. If a particle is unimportant, its current acceleration and velocity are used to update values in the next time step with the complex state updating step removed, in this way the computation time is saved. We also propose an improved surface tension model. The experiments demonstrate that this new method is not only easy to implement, but also greatly improves the simulation speed without visual quality sacrifice.

Facial Expression Representation Using A Quadratic Deformation Model

Obaid, Mohammad; Mukundan, Ramakrishnan; Billingham, Mark; Sagar, Mark

In this paper we propose a novel approach for representing facial expressions based on a quadratic deformation model applied to muscle regions. The non-linear nature of muscle deformations can be captured for each expression, by subdividing the face into 16 facial regions and using the most general rubber-sheet transformation of second degree.

The deformation parameters are derived using a least-square minimization technique, and used to construct a Facial Deformation Table (FDT) to mathematically represent each expression. The generalized nature of the transformations allows us to easily map expressions from one model to another, and employ the FDTs in facial expression applications such as facial recognition and animations. The paper presents experimental results using the smile expression.

Implementation of Ant Colony Algorithm base on GPU

Jiening, Wang; Jiankang, Dong; Chunfeng, Zhang

Ant colony algorithm is an efficient intelligent algorithm to solve NP hard problem. This paper presents a parallel computing solution based on General Purpose GPU (GPGPU) to solve Traveling Salesman Problem (TSP) with Max-Min Ant System (MMAS). The experimental result shows it is more efficient than pure CPU computing.

Photon Mapping Parallel Based On Shared Memory System

He, Huaiqing; Wang, Tianbao; Xu, Qing; Xing, Yaoyu

By searching the basic tasks when photons are launched by photon mapping algorithm, this paper focuses on the implementation of photon mapping in parallel at low-end graphics workstation. It designs and implements multithreading of photon mapping under the shared memory even gets obvious acceleration ratio through a combination of OpenMP and Win32 threads library. Meanwhile, it further optimizes the parallel performance and, to some extent, improves the speed of rendering of photon mapping.

Session CGIV09_2.2: Digital Art, Animation & Multimedia_I

Chair: Prof. Ebad Banissi, London South Bank University, UK

Expansion of communication in Media art through the Intelligent Interaction

Lee, Seung-hyun; Kim, Tae-Yong

Media art can be defined as 'a computer-based creative activity' in narrow sense or 'a general art using technology' in broad sense. It is a common opinion that a unique artistry through the media in the aesthetic dimension and empirical dimension in eliciting the participation of the audience is an important issue. In this Media art 'Interaction' with the audience cannot be overemphasized. Because a work of art is presented in half of the unfinished work and a spectator completes the work as half of the originator. The participation of audience in history more than 40 years of Media art, interactive works has been expanded more and more. However, feedback pre-made by the author's intention and technology is the limit for them to communicate with the audience. Therefore, the new level of feedback needs to reach the level of interaction that the author and audience sympathize through the works deeply. And works should have a superior intelligence and do rational action based on the present situation. This is the core of this paper. For considering this aspect, we need to see it differently such that technology is only a tool, presents the skill as the nature of the art, and try to critically consider the possibility of the skill.

A Framework on the Applications of Interactive Art;

Hare, Teeragit Nasaree; Dejrumrong, Natasha

With the fusion in the world of art and science, technology has made a dent in the course of art, and there is now a time and place for those actively interested in both the academics of art and science like never before. Interactive

art is one of the current trends that can be seen from this group of creative minds. The incorporation of code into forms of visual art helps create a dialogue between the artwork and the audience. We describe the use of the Processing coding toolkit along with other methods for digital artists to create innovative interactive artworks. By furthering the application of this intriguing art form, we can surely gain benefits in a wide range of fields, such as promotional purposes or any way in creatively expressing a figure.

Artwork-based 3D Ink Style Modeling and Rendering

Sun, Meijun; Tian, Tian; Sun, Jizhou

The famous Chinese painting artworks in ancient years are valuable assets, but the reuse of their styles in digital world is a challenging task. This paper presents a novel automatic ink-style transferring method from an input artwork to build the correspondent 3D stylized scene. The input artwork is first segmented into several meaningful regions to prepare for the following work. Then contour and skeletons of each region is extracted to build the corresponding 3D model by surface inflation technique. At the same while art style attributes such as color, texture and width of stroke for each region are analyzed to maintain the artistic style coherence. In addition, surface features of the built 3D models are also extracted. The traditional multi-layer rendering model for NPR rendering is modified to generate more flexible stylized results. At last all the extracted features are used to guide the process of Ink-style rendering. The experiment results show that the input artwork and the 3D scene are coherent very well in style.

A Motion Retargeting Method for Topologically Different Characters

Lu, Wenyu; Liu, Yan; Sun, Jizhou; Sun, Libo

In this paper, we present a real-time method for motion retargeting between topologically different characters. An intermediate skeleton, first proposed by Monzani, is used for setting correspondence between nodes of the source skeleton and the target skeleton. When animal-to-human motion retargeting is performed, segment lengths of the intermediate skeleton are adjusted to address the problem such as upper limbs unable to reach the ground. To get a satisfactory motion, an improved adaptation principle based on end effector constraints is introduced for eliminating undesirable phenomena.

On the Art gallery Problem Based on the 4-coloring Scheme

Wang, Kelun; Ren, Hongxiang

It isn't the best result on the art gallery based on the 3-coloring in resolving the most of simple polygons, through a analysis of the simple polygon triangulation in the relationship between adjacent triangles, using the dual relation between triangulation and binary tree, this paper puts a forward 4-coloring on the polygon triangulation, and analyze and research the case which has been 4-coloring.,we can obtain some results that the condition of any type of colors could cover the whole polygon, and the condition that at least one type of colors could cover the whole polygon(namely the art gallery only need for monitors), we also analyzing the reason which failed to cover the whole polygon, and presenting the condition which couldn't be 4-colored.

A Study on the Visual Styles of Wayang Kulit Kelantan and Its Capturing Methods

Khor, Kheng Kia

In the attempt to preserve and safeguard the unique traditional Wayang Kulit (Shadow Play), UNESCO has designated it as a Masterpiece of Oral and Intangible Heritage of Humanity on 7th November 2003. This paper reviews the critical situation of Wayang Kulit Kelantan in Malaysia. The visual styles of Wayang Kulit Kelantan was described into four major aspect, which are the puppets, shadows, screen for shadow projection (Kelir) and its light source. It also reviews the methods and techniques used to capture the visual styles of Wayang Kulit in animations, films, artworks, comics and video documentation. This is followed by the study of the use of modern technology including Computer Graphics (CG) to capture the traditional Wayang Kulit play.

Session CGIV09_2.3: IRTAST_I

Chair: Dr Zulfiqar Habib, National University of Computer & Emerging Sciences, Pakistan

Face Recognition using a Time-of-Flight Camera

Meers, Simon; Ward, Koren

This paper presents a system for detecting, tracking and recognising human faces using a time-of-flight camera. After detecting a single central feature point, the facial landscape is tracked by intersecting the three-dimensional data with spheres centred at the detected feature. The resulting spherical intersection profiles are used to track the

position and orientation of the face, and in performing face recognition. This publication explains the advantages of this technique, and presents alignment optimisation algorithms based on symmetry, local search, and motion analysis, and some preliminary experimental results. Use of a time-of-flight camera allows real-time tracking and recognition of faces which is not affected by illumination or face orientation, utilises both depth and texture information, and is completely unobtrusive and highly efficient. We show that as the technology matures, time-of-flight based recognition systems are likely to surpass the existing alternatives in accuracy as well as speed and convenience.

A Fuzzy Logic Based Approach to De-Weather Fog-Degraded Images

Desai, Nachiket; Chatterjee, Aritra; Mishra, Shaunak;
Chudasama, Dhaval; Choudhary, Sunav; Barai,
Sudhirkumar

Poor visibility in foggy weather stems out from the fact that the particles in atmosphere scatter and absorb the light from the environment and the light reflected from the objects. Mathematically, de-weathering a fog degraded image is an ill posed problem and existing approaches have a high complexity and low versatility. In this paper, a novel fuzzy logic-based algorithm to de-weather fog-degraded images is proposed. Specifically, the air-light estimation is carried out using fuzzy logic followed by color correction for enhanced visibility. Experimental results show that the algorithm works efficiently for images with a sky region. Due to its low complexity compared to conventional physics

based solutions, it enables real-time use on a mobile platform which is crucial from a road safety viewpoint.

A Dynamic Clustering Algorithm of Small Data Set

peng, Tao; Jiang, Minghua; Hu, Ming

The traditional clustering algorithms are designed for large dataset or vary large dataset. It is not easy to cluster the small dataset because of the loss of the statistical character and probability character. In this paper, the class ration is introduced, based on the class ratio, the dynamic clustering algorithm is proposed. The dataset are divided into all possible classes, and the class ratios are computed, the min class ratio is chosen and the clustering about the min class ratio is the best clustering. With the experiments, the schema is an effective way for the clustering of small data sets.

Thai Font Type Recognition using Linear Interpolation Analysis

Jamjuntr, Pitchaya; Dejdumrong, Natasha

A new approach to Thai font type recognition that is presented in this paper is based on linear interpolation analysis of the character contour. The algorithm can perform effectively and classify font type obviously and the same font type show high similarity coefficient which is 99.33 but different font type is low that below 21 %.

Session CGIV09_2.4: CAGDAG_II

Chair: Prof. M. Sarfraz, Kuwait University, Kuwait

Wang-Ball Triangular Patches and Its Properties

Sukjaitham, Supareuk; Dejdumrong, Natasha

A new model of triangular Ball surface is proposed with its quadratic complexity. It can be constructed from the idea of Wang-Ball univariate functions and Wang algorithm. The new bivariate basis functions look analogous to the Wang-Ball polynomials. Evaluating points on a curve can be calculated from the new recursive algorithm that is proved to be quadratic $O(n^2)$. Thus, the calculation time is less than any other triangular curves. Finally several important geometric properties for these surfaces are also identified such as normality, convexity and symmetry.

A New Model of Triangular DP Surfaces and Its Applications

Krungkarnchana, Podcharid; Dejdumrong, Natasha

A recent proposed model for triangular DP surfaces provided in [3] has been found that there is an inappropriate property in its recurrence formulae. It is lack of convexity, i.e., the summation of blending functions is not equal to one. This paper presents a new triangular DP surfaces that possesses the convexity property and quadratic evaluation complexity. These two characteristics are realized to be very important attributes in surface modeling.

Surface Mesh Segmentation using Local Geometry;

Chuon, Chansophea; Guha, Sumanta

We present a novel algorithm to segment a 3D surface mesh into visually meaningful regions. Our approach is based on an analysis of the local geometry of vertices. In particular, we begin with a novel characterization of vertices as convex, concave or hyperbolic based upon their discrete local geometry. Hyperbolic and concave vertices are considered potential feature region boundaries. We propose a new region growing technique starting from these boundary vertices leading to a segmentation of the surface that is subsequently simplified by a region-merging method. Experiments indicate that our algorithm segments a broad range of 3D models at a quality comparable to existing algorithms. Its use of methods that belong naturally to discretized surfaces and ease of implementation make it an appealing alternative in various applications.

Particle Swarm Optimization for NURBS curve fitting

Setyo Adi, Delint Ira; Shamsuddin, Siti Mariyam

This paper discusses on an alternative solution for curve fitting based on particle swarm optimization (PSO). The implementation of this method is conducted by generating randomly weight and control points of the NURBS curve. The weight and generated control points are used to calculate the NURBS point. The results are compared with the example data points to find the minimum error. The implementation results have shown that the proposed method yield better solution compared to the conventional methods with minimum error generated.

Fast Recursive Algorithm for a New Model of Triangular Surfaces

Unjai, Wittaya; Dejdumrong, Natasha

A new model of bivariate bases on triangular patches is offered by applying the existing univariate bases propose by Dejdumrong. In this paper, some geometric properties and its efficient recursive formulae are provided. Its fast recursive evaluation algorithm is also obtained in terms of a quadratic time complexity. Thus, It is shown that this type of surfaces is obviously more efficient than the traditional triangular Bézier surfaces or other kinds of triangular patches, and practical for interactive geometric modeling.

A Fast hole-filling strategy of 3D Scanned Human Body

Sun, Xiao-dong; Zhang, Hong-bin

Human body scanning technology has a promising application in many fields such as anthropometric surveys, clothing design. Due to the properties of surface (e.g. parallel to camera, occlude, reflectance) cause holes or gaps on the Human Body scanned (HBS) data (e.g. corst, top of head) which challenged the HBS data in applications.

Since scanned data usually got noise points near the hole or on the edge, the result of typical boundary edge based filling-hole strategy is tend to be affected by the noise points. And the muti-times-scanned method of filling hole will encountered with high cost both of time and labor consume.

This paper presents a filling hole strategy based on point cloud for HBS data. The algorithm is free from identification

and triangulation process which is more simply and effectively with less time costs and the method is immune to affection of the noise points near boundary of the holes in contrast to the typical hole filling algorithms.

Session CGIV09_2.5: Image/Video Analysis for Face Recognition_II

Chair: Prof. Lizhuang Ma; Shanghai Jiao Tong University, China

Video Volume Segmentation for Event Detection

Wang, Jing; Xu, Zhijie

Video processing for surveillance and security applications has become a research hotspot in the last decade. This paper reports a research into volume-based segmentation techniques for video event detection. It starts with an introduction of the structure in 3D video volumes denoted by spatio-temporal features extracted from video footages. The focus of the work is on devising an effective and efficient 3D segmentation technique suitable to the volumetric nature of video events through deploying innovative 3D clustering methods. It is supported by the design and experiment on the 3D data compression techniques for accelerating the pre-processing of the original video data. An evaluation on the performance of the developed methods is presented at the end.

Nonlinear Image Interpolation Using Adaptive Conic Blending Spline

Zhao, Huanxi; Sun, Chuan

A new adaptive rational image interpolation algorithm is proposed. For an natural image, according to the difference information of the local pixel gray value in the vertical and horizontal direction, a conic blending spline with large weight parameters is employed to reconstruct sharp edges and image details within the interpolated image, and one with small weight is used to reduced the blocking artifacts. The proposed algorithm exhibits significant improvement in image quality when compared with the conventional polynomial spline type algorithms, especially with high magnification ratio, such as four times or more.

Soccer Ball Tracking using Dynamic Kalman Filter with Velocity Control

Kim, Jong-yun; Kim, Tae-Yong

Most of methods to track the ball in the soccer video are using the feature of size, shape and texture of the ball. But the ball's size is very small in the soccer video and feature of appearance is changed frame by frame. Therefore the ball tracking is very difficult when we use only feature of ball's appearance in a single frame. In the latest works, people are using the Kalman Filter algorithm for tracking the ball. Ball tracking using the Kalman filter is better than using only information of ball's appearance. But when the ball is disappearing due to occlusion by player, Kalman Filter makes a pool prediction. So this is the problem what we must overcome for tracking the ball in the soccer video. In this paper, we propose the Dynamic Kalman Filter

algorithm to overcome this occlusion problem. Dynamic Kalman Filter tracks the ball robustly in the dynamic condition seems like a situation of occlusion by player. Dynamic Kalman Filter has three kinds of mode. First is measurement mode and second is Player Occlusion mode and the last is prediction mode. Dynamic Kalman Filter tracks the ball adaptively using these kinds of mode in the dynamic condition. And then Dynamic Kalman Filter also uses the Velocity Control of state. These assist the tracking accuracy in the situation of occlusion by player. The proposed Dynamic Kalman Filter shows better results than Typical Kalman Filter and existing Adaptive Kalman Filter about 80% accuracy increase.

Session CGIV09_2.6: Data & Information Visualisation

Chair: Prof. Qing Xu, Tjian University, China

A Visualization of Tag Relations among User Interests in the Social Tagging System

Bae, Joohee; Lee, Kyungwon

Social tagging systems provide users with the ability to share information and extend their field of knowledge. The purpose of this paper is to explore the tag relations of user interest in these systems and examine the semantic relations of tag usage in terms of user interests. To do this, a classifying method was used to characterize words into seven classes. Experiments were limited to the five areas of interests: music, photography, games, books and videos. Samples were taken from 50 English-language web pages in

the social bookmarking service Delicious. The top 7 tags were extracted from each web page that was tagged as music, photography, games, books and videos. Via the results of the tag analysis of this study, relationship between tags and user interests were demonstrated. This study employed a radial visualization method, which has the advantage of giving an overview of the whole cluster of connection among tags. This visualization can represent the semantic concept of connection between tags and between interests. It can contribute to raising the cognitive power and awareness of tag usage in various categories and show the relative weight of tags.

Synthesis Vis: A Web Site Supporting Collaborative Information Visualization

XiongFei, LUO; HongAn, WANG; Wei, LIU; DongXing, TENG; Tian, YANG; ZaiFei, LIAO; Feng, TIAN

This paper describes mechanisms for collaboration in the context of information visualization, recasting visualizations as not just analytic tools, but social spaces. We describe the design and deployment of Synthesis Vis, an intranet web site where various users may contribute data, create interactive visualizations, and carry data-driven exploration. The goal of the site is to support collaboration around information visualizations at a large scale by fostering a social style of design process. Moreover, the site serves as a collaborative information visualization tool for individuals, providing a medium to share visualizations among users. To support this goal, the site includes novel mechanisms for end-user creation of visualizations and collaboration in the design process of those visualizations. The early usage of Synthesis Vis verifies the design and deployment of Synthesis Vis for collaborative information visualization.

A Zoomable Shopping Browser Using a Graphic-Treemap

Huang, Mao Lin; Nguyen, Quang Vinh; Vo, Viet Cuong;
Wang, Junhu

Effective and efficient navigation and representation of the entire structure of the product catalogue is one of the important factors for on-line market. This paper proposes an application using Treemaps visualization to enhance the functionality of online product category. We aim to develop high-quality catalog interfaces in terms of readability, understandability and comprehension by integrating graphics into Treemaps. We applied two types of Treemaps: 1) Slice-and-Dice Treemap, 2) Squarified Treemap, into the on-line catalogue to address the "small window" problem allowing buyers to overview and navigate large product categories dynamically. We also use a history bar that locates on the top of each category and sub-category to provide a 2.5-dimensional view of contextual information.

Visualization Techniques on the Examination Timetabling Pre-processing Data

Thomas, J. Joshua; Tajudin Khader, Ahamad; Belaton,
Bahari

This paper follows a method to effectively provide useful visualizations to the examination timetabling problem. The results are some interactive visualization that should provide a much more sensible way of analysis, since it requires having to pay more attention for a complete understanding of the data and also, offers more data at the same time frame and space for the schools. We present the analysis we have made to effectively provide the

visualization that built-in us, the Prefuse Visualization Toolkit to develop within graph view on the data and other information visualization techniques are being handled based on the suitability. We call this raw data as preprocessing since it is not put into any scheduler to generate timetables. Finally, interactive visualization has helped timetablers, to improve on assigning of timeslots for the exams in a particular school.

Session CGIV09 _2.7: Spatial/Geographic Data Visualization_I

Chair: Prof. Eric Li; City University of Hong Kong,
China

Land use/cover classification by using Digital Camera Imagery

Lim, Hwee-San; Mat jafri, Mohd Zubir; Abdullah, Khiruddin

This paper presents an economical analysis of using a digital camera imagery data to classify land use/cover in the Prai Industrial area, Penang, located in Peninsular Malaysia. The data were captured using a digital camera, Kodak DC 290 from a small light aircraft at 8000 feet altitude. This overcomes the problem of difficulty in obtaining cloud-free satellite images especially in the equatorial region where experience showed that just two or three cloud-free scenes per year could be obtained. The use of digital camera as a sensor to capture digital images is cheaper and economical compared to the use of other airborne sensor. The images consisted of the three visible bands-red, green and blue.

Three supervised classifications techniques (maximum likelihood, minimum distance-to-mean and parallelepiped) were performed to the digital image. The training sites were established using polygons within each scene and four land cover classes were assigned to each classifier. The relative performance of the techniques was evaluated. The accuracy of the classified images was validated using a reference data set. The results produced high degree of accuracy. Finally, geometric correction was performed to the digital image using the nearest neighborhood method with second order polynomial to produce geocoded map. The final results showed that the digital camera can be used as a tool for providing useful data for land cover classification. The classified images provided useful information for planning and development of a small area of coverage.

A Locatable Zero Watermarking Scheme and Visualization for 3D Mesh Models

Zhang, Jiawan; Pan, Gang; Jiang, Chen; Zhou, Xiaozhou

Nowadays, most 3D mesh model protections are based on embedding watermarking system. These methods have to change the original mesh data to achieve the watermarking. Considering the sensitivity and complexity of 3D mesh data, this paper proposes a disturbing free 'zero-watermarking' algorithm, which is based on octree partition. For each octant, we employ parameterization and Singular Value Decomposition (SVD) to analyse the 3D geometry signal and construct the zero-watermark with corresponding Octree-codec. The integrity of protected 3D mesh can be checked through computing the similarity of watermark between original and processed mesh. Moreover, the results are represented in a visual way, which means the tendency of deviation and changed region will be colored according to

our merits of similarity. The Experiment results verify that the algorithm is robust to various attacks including affine transformation, vertex reordering, noise addition, cropping, simplifying, and even mixed attack.

Indonesia forest fires exacerbate Carbone monoxide pollution over Peninsular Malaysia during July to September 2005

Rajab, Jasim; Mat jafri, Mohd Zubir; Lim, Hwee-San; Abdullah, Khiruddin

Wind carried the smoke further afield from forest fires in Sumatra caused worse air pollution in Malaysia reached extremely hazardous levels and forced schools and an airport to close. There were 3,258 'hot spots' recorded by NOAA satellites in the province of Riau only in August, each one representing a fire. USM Pulau Pinang station results and data from the Atmospheric Infrared Sounder (AIRS) indicate that an air mass originating from July to September over forest fires in Riau and North Sumatra arrived in Malaysia. AIRS with its two companion microwave instruments, Advanced Microwave Sounding Unit (AMSU) and Humidity Sounder for Brazil (HSB), form the integrated atmospheric sounding system. Provides information for several greenhouse gases, CO₂, CH₄, CO and O₃ as well as to improve weather prediction and study the water and energy cycle. AIRS measure CO total column by (52)channels with Uncertainty Estimate 15-20% at 500mb, Vertical Coverage 1000 - 1 mb, 7 - 9 layers, tropospheric Carbone monoxide (CO) abundance is retrieved from the 2180-2230 cm⁻¹ region of the IR spectrum. The Retrieved CO total column amount (CO_total_column_A) as well as Effective CO volume mixing ratio (CO_VMR_eff_A), Level-3 monthly (AIR*3STM) 1°*1° spatial resolution and Effective

CO Volume Mixing Ratio profile (CO_VMR_eff) (9 layers) ascending, Level-2 daily Standard are compared between the two timing of various, (day time) summer (July, August & September) 2005 & 2007, the map & data was processed and analyzed by using Photoshop & SigmaPlot 11.0 programs and analysis CO distribution over Peninsular Malaysia for both direct comparison and the comparison using the same a priori profile for the period from July to September to obtain more detailed information and identify the change as well as the effect of Indonesia forest fire 2005. Carbon monoxide concentration on August 2005 higher than August 2007 in all cases, and agree very well on the horizontal distributions of CO represented by the high correlation coefficients (0.8472 - 0.8929). The CO maps were generated using Kriging Interpolation technique.

Real-time rendering system of large-scale terrain in flight simulation: design and implementation

He, Huaiqing; Xing, Yaoyu; Wang, Tianbao

In flight simulation, scenes are rich in content with the characteristic of large-scale. In this paper, a large-scale terrain rendering procedure suitable for flight simulation is presented and a terrain data pre-scheduling criteria is established. A linked queue based quadtree partitioning algorithm is proposed, so that triangulation and elimination of cracks can be performed simultaneously during the process of quadtree partitioning. At last, an experimental system is designed and implemented to perform large-scale terrain real-time rendering. Based on this system, we studied the key technologies of real-time rendering large-scale terrain. Experimental results demonstrate that the system is suitable for real-time rendering large-scale terrain.

Session CGIV09 _2.8: Augmented, Mixed, and Virtual Reality

Chair: Ebad Banissi, LSBU, UK

An Implementation Review of Occlusion-Based Interaction in Augmented Reality Environment

Shahidan, Mohamad Shahrul; Ibrahim, Nazrita; Mohamed Zabil, Mohd Hazli; Yusof, Azlan

Augmented Reality (AR) technology shows some potential in providing new approach of interaction with computer. It shares similar potential in Virtual Reality (VR) but at lower cost. In this paper, an AR application is developed to explore the capability of the interaction approach called occlusion based interaction using low cost device. The implementation of the application is utilizing the ARToolKit library as the main library to handle the AR part while OpenGL and GLUT to handle the graphics manipulation and windows management respectively.

Volume Cost Based Mesh Simplification

Chuon, Chansophea; Guha, Sumanta

We develop a polygonal mesh simplification algorithm using a vertex-decimation approach. The novelty in our method lies in (a) a characterization of mesh vertices as hyperbolic or non-hyperbolic based upon their discrete local geometry, (b) the cost function used to select a vertex for decimation, and (c) the heuristics applied to re-triangulate the resulting

hole. The algorithm begins by classifying the input mesh vertices as hyperbolic or non-hyperbolic, and then computes a volume cost for each non-hyperbolic vertex, in analogy with spherical volume, to capture the loss of fidelity if that vertex is decimated. Vertices of least volume cost are successively deleted and the resulting hole re-triangulated. Preliminary experiments indicate a performance comparable to that of the best known mesh simplification algorithms.

Rendering of 3D Cloud for Marine Search and Rescue Simulator in Real-time

Shen, Helong; Yin, Yong; Li, Yongjin

Based on the previous work of modeling dynamic 3D cloud using Cellular Automata, this paper renders realistic 3D cloud for Marine Search and Rescue Simulator visual system in real-time. Physically based light interaction is implemented by Open Scene Graph with a common PC. Light scattering and absorbing is considered. After the 3D cloud integrated into the visual scene, experimental results show that it has realistic effect with fast rendering speed. It is suitable for the applications of real-time simulation, Marine Search and Rescue Simulator especially.

On-line Visualization as a sequence Grid application for Parametric Studies

Pajorova, Eva

The presented work is aimed at creation and test online visualization tool for Grid-based Parametric Studies as a sequence application in Grid environment. The design is tested on the applications those have the character as a Parametric studies. Examples are the Astronomical simulations. One of them is the simulation of the Oort-cloud

formation. The dynamical evolution of the test particles was followed via numerical integration, in the GRID, for the period of 2 Gyr. The main problem is Visual control in time when the Grid application is still running.

A Framework for Evaluating Human Action Detection via Multidimensional Approach

Lili N.A.

This work discusses the application of an Artificial Intelligence technique called data extraction and a process-based ontology in constructing experimental qualitative models for video retrieval and detection. We present a framework architecture that uses multimodality features as the knowledge representation scheme to model the behaviors of a number of human actions in the video scenes. The main focus of this paper placed on the design of two main components (model classifier and inference engine) for a tool abbreviated as VASD (Video Action Scene Detector) for retrieving and detecting human actions from video scenes. The discussion starts by presenting the workflow of the retrieving and detection process and the automated model classifier construction logic. We then move on to demonstrate how the constructed classifiers can be used with multimodality features for detecting human actions. Finally, behavioral explanation manifestation is discussed. The simulator is implemented in bilingual; Math Lab and C++ are at the backend supplying data and theories while Java handles all front-end GUI and action pattern updating.

Session CGIV09_3.1: IRTAST_II

Chair: Prof. Xiujin Wang; Tianjin University, China

Enhanced Algorithm for Extracting the Root of Arabic Words

Ghwanmeh, Sameh Hussein; Al-Shalabi, Riyad F.; Kanaan, Ghassan G.; Rabab'ah, Saif

Stemming is one of many tools used in information retrieval (IR) to combat the vocabulary mismatch problem, in which query words do not match document words. Stemming in the Arabic language does not fit into the usual mold, because stemming in most research in other languages so far depends only on eliminating prefixes and suffixes from the word, but Arabic words contain infixes as well. In this paper we have introduced an enhanced root-based algorithm that handles the problems of affixes, including prefixes, suffixes, and infixes depending on the morphological pattern of the word. The stemming concept has been used to eliminate all kinds of affixes, including infixes. Series of simulation experiments have been conducted to test the performance of the proposed algorithm. The results obtained showed that the algorithm extracts the correct roots with an accuracy rate up to 95%.

k/K-Nearest Neighborhood Criterion for Improving Locally Linear Embedding

Eftekhari, Armin; Abrishami Moghaddam, Hamid; Babaie-Zadeh, Massoud

Spectral manifold learning techniques have recently found extensive applications in machine vision. The common

strategy of spectral algorithms for manifold learning is exploiting the local relationships in a symmetric adjacency graph, which is typically constructed using k-nearest neighborhood (k-NN) criterion. In this paper, with our focus on local linear embedding as a powerful spectral technique, shortcomings of k-NN for construction of the adjacency graph are first illustrated, and then a new criterion, namely k/K-nearest neighborhood (k/K-NN) is introduced to overcome these drawbacks. The proposed criterion involves finding the sparsest representation of each sample in the dataset, and is realized by modifying Robust-SLO, a recently proposed algorithm for sparse approximate representation. k/K-NN criterion gives rise to a modified spectral manifold learning technique, namely Sparse-LLE, which demonstrates remarkable improvement over conventional LLE through our experiments.

Using the selected candidate vectors to determine kernel parameters

Li, Xiaoyan; Zhang, Hongbin

This paper proposes an improved scheme of using the inter-cluster distance in the feature space to choose the kernel parameters. First, the candidate vectors of the training set are selected. Then calculate the inter-cluster distance between classes to choose the proper kernel parameters. Finally the selected kernel parameters are used to train the Support Vector Machine (SVM) models. The basic principle is that the Support Vector (SV) set contains all information necessary to solve a given classification task. Experiment results show that our scheme costs much less computation time. Moreover, suitable kernel parameters can also be selected at the same time.

Two Dimensional Compressive Classifier for Sparse Images

Eftekhari, Armin; Abrishami Moghaddam, Hamid; Babaie-Zadeh, Massoud

The theory of compressive sampling involves making random linear projections of a signal. Provided signal is sparse in some basis, small number of such measurements preserves the information in the signal, with high probability. Following the success in signal reconstruction, compressive framework has recently proved useful in classification, particularly hypothesis testing. In this paper, conventional random projection scheme is first extended to the image domain and the key notion of concentration of measure is closely studied. Findings are then employed to develop a 2D compressive classifier (2D-CC) for sparse images. Finally, theoretical results are validated within a realistic experimental framework.

Online Handwriting Thai Character Recognition

Karnchanapusakij, Credit; Suwannakat, Phattharasuda; Rakprasertsuk, Waroonorn; Dejdumrong, Natasha

This research is a study of the structure and method in writing Thai characters for conversion and computer use. This paper covers the creation of an online handwriting recognition system through the use of vectorization approach. The character sampling is done with 10 control points for the vector creation of angles and rotation direction. The vectorized characters are then compared to an XML database in which contains predefined character

information. The best matched character is then further analyzed for character uniqueness such as tails and size before concluding the found character. This system supports the writing of different character styles including slanted characters. The resulting system is of 90.88% correctness in which is satisfactory and effective for Thai handwriting recognition.

Session CGIV09_3.2: CAGDAG_III

Chair: Prof. Yoshihiro Okada, Kyushu University, Japan

Monomial Forms for Curves in CAGD with Their Applications

Aphirukmatakun, Chanon; Dejdumrong, Natasha

There are several methods used for plotting curves in CAGD, e.g., by directly computing their basis functions (polynomials) or using their recursive algorithms. For the former method, evaluating a curve using their basis functions is a tedious task because their equations need to be solved by using complicated formulae computations. Whereas for the latter method, implementing a program by using recursive algorithm is simpler than the former method but it takes more computational time. Thus, an alternative method for constructing curves by using the monomial form is introduced. Employing monomial form approach, a curve can be computed by using monomial matrix operations. Because the matrix multiplications can be done in parallel programming, the performance of generating a curve for high degree can be increased. In the mean time, there exists the monomial functions for any degree Bézier curves. However, there has been no monomial functions for any other kinds of CAGD curves. This work proposes several monomial functions for Said-Ball, Wang-Ball, DP,

Dejdumrong and NB1 curves. Consequently, these monomial functions will be useful and convenient for readily computing the derivatives, degree elevations, degree reductions and conversions among these curves.

A graphical approach to approximate offset computation

Li, C. L.; ZHOU, Gang; CHAN, C. W.

Generation of the offset of a curve is an important operation in many CAD/CAM applications. In the generation of CNC toolpath for 2.5D machining, the toolpath is the offset of the part boundary. A major problem in the computation of the offset of a curve is the detection and the subsequent removal of self-intersecting loop. While many different techniques have been reported in the literature, in general they are complex and not efficient. In this paper, the problem is re-formulated as a graphical problem and solved using the graphics hardware. The generation of the offset, the detection and the removal of self-intersection are achieved through a rendering process. With the recent advent in the processing power of the GPU, this process is very efficient. This new technique can be used to compute offsets of planar curves and offsets of curves on free-form surfaces.

A New Model of Univariate and Bivariate Bases for Curves, Rectangular surfaces and Triangular surfaces;

Jangchai, Jaratpong; Dejdumrong, Natasha

In this paper, a new basis for polynomial curve modeling is presented with its linear computation. This new proposed curve can be formed by the convex combination of its

blending functions and related control points. Moreover, several important geometric properties for this curve are identified, for examples, a partition of unity, convex hull property and symmetry. Later the recursive algorithm, coefficient matrix representation, the derivatives and the relationships between B^ézier curve and this proposed curve are defined. Finally, a new proposed rectangular and triangular basis functions are also presented with their surface definitions.

Blending functions generating a cubic curve that closely approximates a polygon from four control points

Chang, Lawrence Hooi Tuang

We introduce a set of cubic blending functions that generate a curve that allows closer approximation of a control polygon defined by four control points. The curve interpolates both endpoints and the direction of the tangent line at each endpoint follows the direction of the respective end of the control polygon. Our curve also interpolates the midpoint of the two inner control points and the direction of the tangent line at this point is in the same direction as the central segment of the control polygon. Importantly, our blending functions satisfy the Partition of Unity, Positivity, Local Support and Variation Diminishing properties. All these make our scheme suitable for the constrained piecewise interpolation of 2-dimensional data points.

General Shape Grammar Interpreter for Intelligent Designs Generations

Trescak, Tomas; Rodriguez, Inmaculada; Esteva, Marc

In this work we present a general tool named Shape Grammar Interpreter (SGI) for the automatic generation of designs. The developed shape grammar framework allows the designers to obtain automatically generated designs and to participate in the design process. In that way the generated design complies with both the desired functionality and an attractive aspect. Great effort has been devoted on having a comfortable way of defining shapes and later using them in shape grammar rules and designs' generation process. We have also implemented and incorporated in the tool an optimized subshape detection algorithm. Hence, subshapes of the existing shapes can be detected in the generation process obtaining more appealing designs.

Fuzzy Geometric Modeling

Ali, Jamaludin Md. Wahab, Abd. Fatah; Majid, Ahmad Abd.

Fuzzy geometric modeling provides a useful tool to introduce uncertainty into mathematical spline model. In this paper a new concept of a geometric modeling is presented, based on the theory of fuzzy numbers. By the notion of fuzzy number we introduce fuzzy control point for fuzzy curve and fuzzy surface model for CAGD. We study the properties concerning approximation of fuzzy control points by means of fuzzy Bezier, fuzzy B-spline and fuzzy NURBS.

Session CGIV09_3.3: Spatial/Geographic Data Visualization_II

Chair: Jiawan Zhang, Tianjin University, China

3D Modelling Of A Famosa Fortress, Malaysia Based on Comparison of Textual and Visual Data

Izani, Mohd; Bridges, A.; Razak, A

This paper presents an attempt to model the "A Famosa Fortress" in Malaysia into 3D. This building was built in 1511 by the Portuguese and went through several architectural developments and changes before being largely destroyed during the British occupation in 1824. The biggest challenge in this research is to determine the original fortress layout due to the lack of any authoritative documentation pertaining to the fortress. Detail analysis has been conducted to identify reliable sources for references which are available in the form of text and visual. In this paper, we focus on comparison of selected textual and visual data to come out with a verifiable conjectural layout of the fortress. We then pre-visualized the layout in 3D model. Some samples of the model are presented here however there are still room for improvements before it is finalized. The output of this research will be tested for application in tourism and education.

Integrated Tourist Navigation System

Wang, Haomian; Cui, Weiwei; Zhou, Hong; Qu, Huamin

Tourist navigation systems have used digital maps to provide users with location and route information for a long time. However, without detailed 3D building models, users may miss important turns at some intersections and have

problems to find their target buildings. With the advent of Google Earth and Microsoft Virtual Earth, 3D models of buildings in major cities worldwide can be conveniently created and shared. In this paper, we present two methods, i.e., overlay-style blending and Escher-style blending, to seamlessly integrate 2D maps and 3D buildings into a tourist navigation system. We also develop some visualization techniques which can create more empty space around roads for information overly and provide useful visual cues indicating occluded roads and buildings. Our solutions can be applied to other navigation systems such as interactive city guide maps.

Total Suspended Solids (TSS) Mapping Using ALOS Imagery over Penang Island, Malaysia

Lim, Hwee-San; Mat jafri, Mohd Zubir; Abdullah, Khiruddin

Remote sensing technique is very effective method for water quality mapping through analysis of satellite images over a large coverage of study area. The objective of this study was to test the feasibility of using the ALOS digital image for Total Suspended Solids (TSS) mapping over Penang Island, Malaysia. A new algorithm was developed for detecting and mapping water pollution from the ALOS satellite image. The algorithm used was based on the reflectance model, which is a function of the inherent optical properties of water, and these in turn can be related to the concentration of the pollutants. Water samples were collected using a small boat simultaneously with the acquisition of the satellite image and later analyzed in the laboratory to determine the real concentration of the TSS level. Water sample's locations were determined by using a handheld GPS. A simple atmospheric correction, namely darkest pixel technique was performed in this study. This is

a very simple correction, based on 2 assumption: The first assumption is that in the darkest water pixel of the image there is total light absorption and the radiation light recorded by this pixel comes from the atmospheric path radiance and secondly it is assumed that the atmospheric path radiance is uniform all over the image. The radiation of the darkest water pixel (assumed to represent the atmosphere) is subtracted from the whole image. The darkest pixel is found by searching for the lowest values over water for all wavelengths. The digital numbers for each band corresponding to the sea-truth locations were extracted and then converted into radiance values and reflectance values. The reflectance values were used for calibration of the water quality algorithm. The calibrated TSS algorithm was then used to generate the water quality maps of the study areas. The newly developed algorithm can estimate TSS concentration with linear correlation coefficient square (R) of 0.92. The result obtained indicated that reliable estimates of TSS values for the Penang Island, Malaysia, could be retrieved using this technique.

Session CGIV09_3.4: Animation

Chair: Xiaochun Cao, Tianjin University, China

The hierarchical perception model for crowd simulation

Sun, Libo; Liu, Yan; Sun, Jizhou; Lu, Wenyu

This paper proposes a hierarchical perception model for simulation of crowd perception in different density. In this model, there are two tiers: the low density and high density perception modules. They are both composed of perceptual filters, short-term and long-term memory. However,

considering the changes of the perception as the density increases, we adopt different methods to model them. We also take into account the impact of the human subjective factors on the selection of the object the virtual agent focuses. Our hierarchical perception model can well reflect the characteristics of the human perception; moreover, it can provide more plausible information for the virtual human among the crowd to respond properly to certain event.

A Preliminary Study Of Human Motion Based On Actor Physiques Using Motion Capture

Sze Joon, Jong

This study aims to study the detail of human motion by experimenting and extracting the subjects' core motions for analysis. Sampling various subjects of physical differences, this study attempts to acquire various motion parameters based on certain predefined actions. In addition, this study also applies enhanced motion editing techniques to retarget and constraint the captured data. This study concentrates on the level of details of motions of various subjects with differences in physical attributes. We outline how different physique produces different behavioural patterns based upon mass and proportion. In a nutshell, this study considers 'motion' to identify the differences in each subject's physical attributes by sampling subjects of physical differences.

Providing novel and useful data for game development using usability expert evaluation and testing

Choi, Yong Jun

A case study is done to study whether usability expert evaluation and testing are appropriate for game development. In this study, it identifies if the usability expert evaluation and testing provide novel and useful data for game development. For this experiment, a computer game is first evaluated and then tested. Then game developers are asked to rate the findings and give other feedback about the methods used and the results gained. The usability expert evaluation and testing have considerable face validity in game development because the results of a case study were both novel and useful for game development.

Session CGIV09_3.5: Spatial/Geographic Data Visualization_III

Chair: Prof. Ghassan Kanaan, Arab Academy, Jordan

Retrieval of Aerosol Optical Thickness (AOT) and its Relationship to Air Pollution Particulate Matter (PM10)

Othman, Nadzri; Mat Jafri, Mohd Zubir; Hwee San, Lim; Abdullah, Khiruddin

Aerosols are one of the major air pollutants responsible for human health problems related with the respiratory system and that are in the origin of several climate change inducing

mechanisms. This paper will focus on the transmittance measurements collected by using handheld spectroradiometer to derive the aerosol optical thickness (AOT) in the atmosphere at 550nm to improve the PM10 concentrations mapping. The concentrations of particulate matters of less than 10 micron (PM10) were measured simultaneously with the atmospheric transmittance measurements using a DustTrak Aerosol Monitor 8520 at several selected locations around study area. A handheld spectroradiometer was used for transmittance measurements from the ground monitoring stations and their locations were determined by using a Global Positioning System (GPS). Regression graph were plotted and value of linear correlation coefficient (R2) were determined to see on the accuracies of the data collected in term of linear relationship between AOT and PM10 values, where the value of R2=1 represent the theoretically perfect fit.. This study proved that AOT measurements can be determined by using handheld spectroradiometer. The results produced in this study showed a strong linear relationship between AOT and PM10 values over Makkah, Mina and Arafah.

Study on Land Surface Temperature Based on Landsat Image over Penang Island, Malaysia

Kok Chooi, TAN; HWEE SAN, LIM; MOHD ZUBIR, MAT JAFRI; KHIRUDDIN, ABDULLAH

Land surface temperature (LST) have been widely used for environmental studies and urban heat island (UHI), using satellite derived images. LST retrieval from satellite images has many advantages for research as compared with in-situ measurement of air temperatures. For example, it will help to reduce the time consuming, more coverage of the study

area with the high spatial resolution, etc. The objective of our study is to retrieve the LST over Penang Island and compare the trend and average value of LST within different types of (land use or land cover) LULC changes in single satellite image. LST was retrieved by ATCOR3_T using PCI Geomatica 10.1 image processing software. The supervised classification was chosen to classified LULC changes over Penang Island. From the result obtained from different classification method, maximum likelihood classification showed the most accurate result compared with minimum distance-to-mean and parallelepiped methods. The urban areas with high density resulted shown the highest LST between different LULC changes. These changes in LULC yield the significant difference in LST between urban and rural area. Therefore, LST proved to be a good and effective tool to predict the impact of LST to different LULC. Besides, the relationship between LST and NDVI also been investigated for different LULC changes in this study. The strong negative and positive correlation was observed between LST and NDVI for different LULC changes.

Merging Infrared and Microwave SST data at South China Sea

Ng, Hou Guan; Othman, Nadzri; Jafri, Mohamad Zubir; Abdullah, Khiruddin

The sea surface temperature (SST) data availability by infrared measurement was low compared to microwave measurement. The infrared radiation cannot penetrate the cloud, so their availabilities are severely limited by clouds. The microwave can penetrate the clouds and give accurate SST measurements under clouds. The TRMM Microwave Imager (TMI) derived SST data has an RMS error of 0.6-0.7

K. TMI is a microwave radiometer onboard the Tropical Rainfall Measurement Mission (TRMM) Satellite. The infrared derived SST data has low data availability but has higher spatial resolution compared to microwave derived data. The spatial resolution of infrared radiometer, Moderate-resolution Imaging Spectroradiometer (MODIS) is about 1km, but the spatial resolution of TMI is 25km. The objective of our study is to increase the spatial resolution of microwave derived SST data and increase the availability of infrared derived SST data.

In this study, we used MODIS SST data with grid size of about 0.01° and TMI SST data with grid size of 0.25° . We re-sampled these data into the new map with grid size of 0.1° . We find the new merged SST data from the MODIS SST and TMI SST. If any of the MODIS or TMI SST data is available, then the merged SST was assigned the value of the existing data. If both of the SST data are available, then the new merged SST was given the value of the average of these data. Otherwise, the new SST data was determined by interpolation method. We used the neighbourhood pixels for interpolation. All of the processing steps were programmed in MATLAB code. However we checked our results by comparing the SST data availability of TMI and MODIS images before processing and data availability of new image after processing.

Transformation of Spatial Data Format for Interoperability between GIS Applications

Budiarto, Rahmat; Isawasan, Pradeep

In today's Information Age, an application to be claimed "being interoperable" has many benefits and advantages. Our attempt is to propose transformation methods on spatial attributes so that interoperability between spatial

data can be obtained. Interoperability state can only be obtained by equalizing two attributes utilized in identifying a location, which are coordinate of the location and LoD of the spatial data through transformation processes. We use GLOBALBASE & Google Maps as the case study to verify the proposed transformations. Through running some experiments we showed the utilization's of the proposed transformation.

<POSTER>

Digital Imaging in Singapore: The Integration of digital imagery with traditional art media and techniques for site specific architectural, urban and landscape settings of Singapore

Conradi Chavez, Ina

Innovative approach toward image creation methodologies, integration of emotive and subjective abstract imagery in digital, traditional and non-traditional forms is currently an area of active research with the financial support from Academic Research Fund (AcRF). Implementing the latest technologies in image creation this research project is attempting to document emotive spaces and impressions of Singapore to build illusions of three-dimensional creative vision; moving forward to using this imagery as a resource for more creative work that will comprised of an exploration of manipulated surfaces and mixed media structures in site specific settings.

Project aim is to explore abstract imagery in the Singaporean context using techniques commonly used in the feature film visual effects industry and advertising, e.g. high quality large-sale image creation for banners, posters and projection.

There are four basic problems that I am currently exploring in this research project, 1) oversized image creation using algorithmic paint strokes, 2) high resolution computer rendering techniques, 3) over-painting techniques and 4) reactive painted surfaces and imagery integrating animation and physical motion.

With a focus on exploring techniques for integrated image generation, painting with digital technologies and integrating traditional art and materials, the emphasis is on exploring the limitations of the digital medium, painting and reactive imagery and then pushing to achieve greater creative levels. This research is looking into how the image combined with digital and traditional painted and drawn mediums, affect the significance of the surface. In part, by exploring commercial and custom-coated substrates and an assortment of special surfaces such as metal, plastic laminates in a digital printmaking approach as well as an interactive prototype depicting the illusion of surface.

Implemented methods and art work developed is going to be exhibited in several galleries and site specific locations (Post Museum, Esplanade Concourse, NTU/ADM Gallery, ION Orchard, Krannert Art Museum University of Illinois, Los Angeles Center for Digital, Ljubljana Municipal Gallery, Slovenia Europe) and screened at animation festivals.

Session CGIV09_3.6: POSTER

Chair: Prof. Meijun Sun, Tianjin University, China

<POSTER>

An Efficient Off-line Signature Identification Method Based On Fourier Descriptor and Chain Codes

Samak, Ahmed; Amr, Ismail; Ramadan, Mohmmmed; Eldanf, Talaat

This paper proposes a novel off-line signature identification method based on Fourier Descriptor (FDs) and Chain Codes features. Signature identification classified into two different problems: recognition and verification. In recognition process we used Principle Component Analysis. In verification process we designed a multilayer feed forward artificial neural network. The main steps of constructing a signature identification system are discussed and experiments on real data sets show that the average error rate can reach 3.8%.

<POSTER>

Three Dimensional Lip Animation Engine for Thai Pronunciation

Sanguansatjapong, Achara; Ponprajak, Thidaporn; Dejdumrong, Natasha

Lip animation engine for Thai language pronunciation was proposed in order to create 3D virtual animation characters, which is based on the pronunciation in Thai royal institute dictionary 1999. When Thai words/sentences entered, the program would first create a Merl script. The Mel script would be further processed in Autodesk Maya. As a result, the program will show lip movement that is similar to the real human speaking for Thai language.

<POSTER>

Approximating From Scattered Data Using Moving Least Square method

Li, Ting ting; Lee, Byung Gook

This paper presents an efficient implementation of moving least square (MLS) approximation for scattered data. We will expatiate on the idea of moving least square method. To calculate and connect a set of scattered point, moving least square will be a good method. Furthermore, this paper proposes that compute the error using RMS (root mean square) for moving least square approximations in one dimensional case. The results show that scattered data approximation can use moving least square method to get exactly and the weight function is an important part in the moving least square method. The several numerical results also show the good behavior of the method.

<POSTER>

Painting Using Experimental Animation

Conradi Chavez, Ina

Within this research proposal I am exploring the image making methodologies, merging fine art painting and art of animation. Focus is on inventive using of algorithmic brushes to create imagery to be transformed into experimental and immersive computer animation. Fusing abstract painting, computer animation, sound, and film, the distinct imagery would create aesthetically engaging and inspiring experience that balances between the virtual and the real. There is an emphasis in this particular project and that is of integrating state of the art of fluid and growth simulation technologies with the contemporary art practice of painting resulting in malleable but concrete animated

compositions. Different image making methodologies are explored through experimentation with creative and unorthodox use of 3D software: Maya Paint Effects and Next Limit Real flow, MX/MSP. The aim is of using digital tools in the same expressive manner as painter would in creating piece of art, trying to form image out of no sensible object presented and out of pure unpredictable source of algorithmic nature.

The current challenge is in elaborately repurposing the software's real world calculations of natural phenomena of flow and growth, crunching those algorithms into rich palette to be used for sophisticated painting and wide range of visual effects. While adjusting given programmed algorithmic brushes parameters through change in flow, dynamic forces or brush texture, the goal is to dematerialize existing preset directly into new condensed brush stroke,-resulting in new style of computer generated unusually sensuous and aesthetically engaging compositions. The multiple re-combinations of few minimal image sequence frames will create infinite constellations out of limited numbers of basic algorithmic brush presets as well as basic geometric shapes. Using Paint Effects liquid preset brushes as starting point new brushes are created using the feature 'Brush Preset Blending' and their capabilities are tested in short animation tests. After generating enough sequences in motion, we would pre plan design of galleries and the display methods using Max/Msp, Jitter. Further experimentation will result in fusing aspects of fine art painting with computer animation to create a type of moving abstraction that is expressive and immersive. The goal of the project is to transcend the traditional gallery installation into digital audiovisual multimedia presentations.

<POSTER>

Haptic Glove for Augmented Reality

Ping, Lee Shang

In an interactive augmented reality (AR) system, users are, most of the time, immersed in an environment rich of visual and audio feedbacks. Usually the users are immersed in the AR environment with the aid of head mounted display (HMD) and speakers – seeing and hearing the 3D virtual human avatars which are rendered in a real environment. Very few prior works have included any interaction with the virtual avatars except for 3D visual changes seen through the HMD whenever the users change viewpoint. The “sense of touch” is lacking in most of the AR environment. Only a handful of research works have looked into haptic interaction of human user with the virtual avatar.

This work builds an interactive system which incorporates high fidelity haptic feedbacks to the user. We want the user to have a rich multimodal sensory experience in an interactive AR environment. Within this setup, the users can interact intuitively with the virtual avatars. Haptic interaction in AR is an interesting feature to have – imagine in a popular online virtual community environment, user can not only talk but also shake hand with the virtual avatar. One psychologist says that no other sense is more able to convince us of the reality of an object than does our sense of touch.

In this setup, user puts on a HMD which has two camera mounted on it. He also puts on our own custom-made haptic glove. The user is allowed to freely walk around the designed area which has a bar table and a chair. Through his HMD, he is able to see a life-size, realistic virtual human avatar sitting in the chair. As the user approaches the virtual avatar and pats his shoulder, the avatar turns his

head towards the user and greets him. In another scene, the avatar initiates interaction by holding out his hand. The user then extends his hand and interactively controls the avatar’s virtual hand. Through haptic feedback, the user can feel the pressure of pushing on the avatar’s hand.

Two separate computer vision tracking techniques are used for two different purposes. First of all, tracking of the physical environment (in order to establish the frame of reference of the user’s cameras with respect to the environment) uses Parallel Tracking and Mapping (PTAM) technique. With this the 3D virtual avatar can have a fixed frame of reference with respect to the world coordinate; and with robust tracking the avatar can be rendered in a stable manner. Secondly, tracking of the user’s glove is achieved by using the two cameras and employing stereo matching technique. Color segmentation of the glove is first carried out, followed by matching of each and every single pixel of the silhouettes from both camera images. The depth information of the glove can then be obtained. The haptic glove consists mainly of an inflatable air bladder inserted between the linings. The air bladder is connected to a pneumatic system. When triggered, the pneumatic system pumps air into the bladder and creates haptic sensation to the user’s hand. It is crucial to pump air into the bladder and subsequently release it at precise moments – when user’s hand/glove is in contact with the 3D model, air should be pumped; and when there is no contact, air should be released. Collision detection technique is used to determine whether there is contact between the user’s hand and the 3D model.

<POSTER>

**Exploring the Potential of Mobile In-Game Advertising
Among The Undergraduate Students in Malaysia**

Che Din, Sharkawi; Faiz, Shahrul

Advertising within Mobile In-Games are two different components of communication but these can be an interesting combination because its offers some great marketing opportunities among the professional in the design related areas. In Malaysia, this type of advertising is still considered as a new platform which prominently depicted a new concept of advertising which has been proven a success in overseas. The aim of this research is to explore the Mobile In-Game advertising among undergraduate students and to examine their awareness of the existence of the advertisement embedded in the mobile game. The student's perception of the Mobile In-Game advertising will also be examined. The data of this research was collected based on an interview session and a set of questionnaire distributed among the respondents ranging from the professional in the field of advertising industry and the undergraduate students at the selected Malaysian Universities. A prototype of two mobile in-game advertising is being tested during the survey. The findings indicated that there is a potential in this advertising method. The success of this advertising platform in Malaysia can be made possible with further research on the related topics in the future.

<POSTER>

**The real time simulation on route planning and route
monitoring in navigation simulator**

Xinyu, Zhang; Hongxiang, Ren; Yong, Yin

In order to avoid the sudden events and deal with the safety problem in practical navigation in time, the simulation models of route planning and route monitoring are put forward, the theory and the algorithm of Indicator Kirge are applied in the research of the route planning so that the water depth of anyplace is computed by fitting curved surface of sea-bottom terrain, the way of human-machine interaction is taken to amend planned sea route to realize auto-deciding of feasibility according to ECDIS information, and the algorithm of route monitoring is improved by avoiding the imprecision caused by screen coordinate making use of coordinate conversion, all these methods are correct and credible which are validated through working on High Quality Navigation Simulator developed by Dalian Maritime University.

Session CGIV09_3.7: CGIV

Chair: Prof. Jizhou Sun; Tianjin University, China

**Applying Fractal and Chaos Theory to Animation in
the Chinese Literati Tradition**

Balsys, Ronald J.; Huang, Qing

This paper describes and tests the hypothesis that that which ancient Chinese philosophy searched for, the Tao, is the same principle as that found in modern Chaos and Fractal Theories. An elucidation of several key principles

and notions of Chinese art theory is offered, coupled with fractal notions from Chaos theory. It is argued that Chinese art is an abstract form of symbolic brush-strokes, which elicit intrinsic mathematic values. An example of a modern evolving (animated) fractal form based on this notion is given to test our hypothesis.

Information

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NOTES

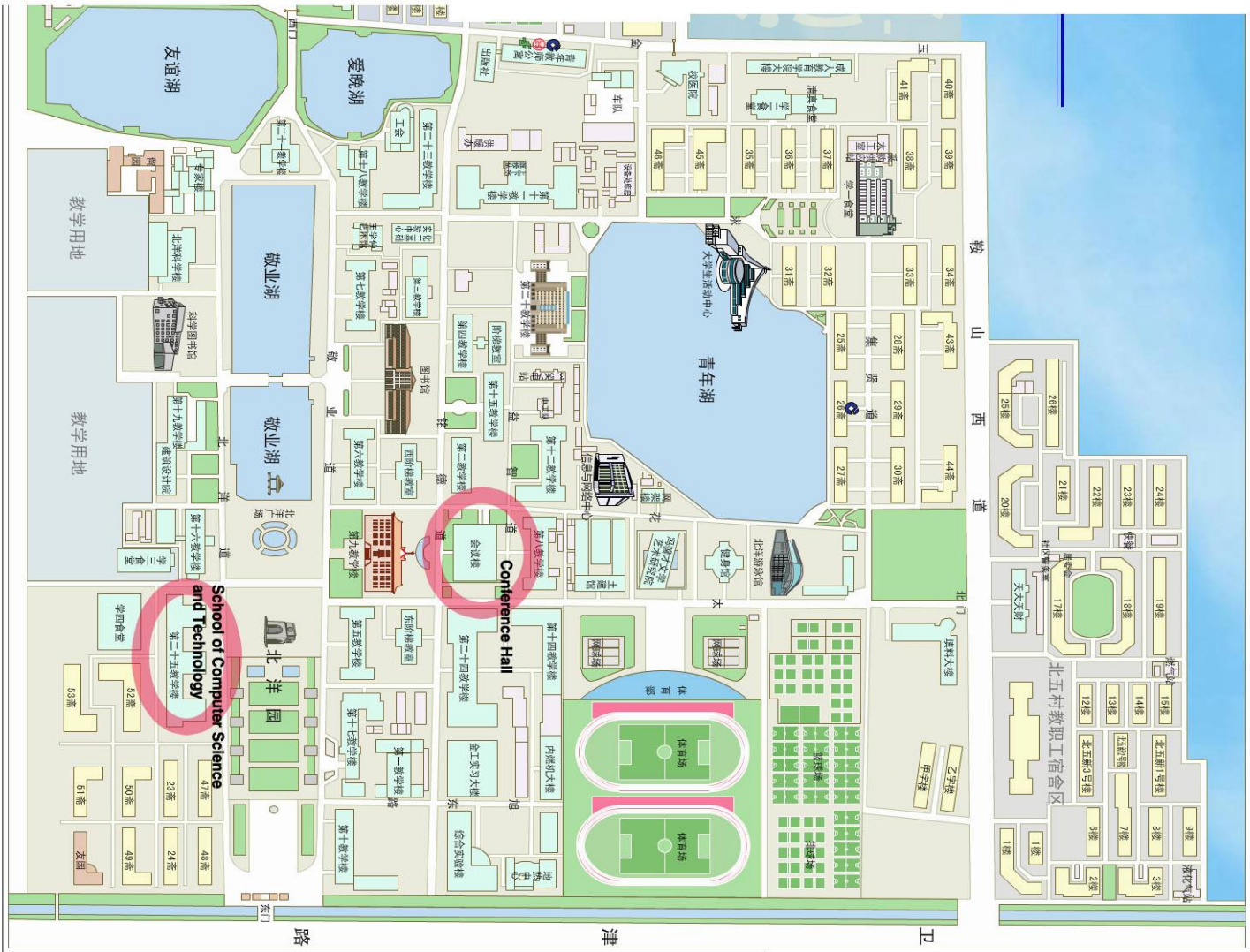


NOTES



Guide Map





DIGITAL ART GALLERY an online exhibition July 2009 ~ June 2010

VIRTUAL GALLERY
VENUE www.graphicslink.co.uk/DART.htm



Visual Styles of Wayang Kulit Kelantan
Khor Kheh, Kiah and Yuen May Chan Limkokwing University & Multimedia University, Malaysia



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