9th International Symposium on Visual Computing (ISVC'13)

July 29-31, 2013, Rethymnon, Crete, Greece

Contents

Final Program

9th International Symposium on Visual Computing (ISVC'13)

Symposium Overview

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8:30 am – 9:30 am	**Keynote**		
9:40 am – 10:40 am	**Parallel Sessions**		
10:40 am – 11:10 am	*Coffee Break*		
11:10 am – 12:10 am	**Parallel Sessions**		
12:10 pm – 1:30 pm	*Lunch Break* (on your own)		
1:30 pm – 2:30 pm	**Keynote**		
2:40 pm – 3:40 pm	**Parallel Sessions** **Poster Session** (*July 30th:2:30pm-4:00pm*)		
3:40 pm – 4:10 pm	*Coffee Break (July 30th: 4:00pm -4:30pm)*		
4:10 pm – 5:10 pm	**Parallel Sessions** *(July 30th: 4:30pm -6:10pm)*		

Registration Desk hours: Sunday, July 28th: 5:00pm - 8:00pm
Monday, July 29th – Wednesday, July 31st: 8:00am – 5:30pm

Banquet Dinner: Tuesday, July 30th: 7:30pm – 10.30pm ("Mournies" Tavern)

Monday, July 29th

8:30-9:30		*Keynote:* **Dennis Zorin**, **New York University, USA** (Megas Alexandros)	
		Parallel Sessions	
9:40-12:10		**ST: Computational Bioimaging I** Chair: Michael Gadermayr (Megas Alexandros)	**Computer Graphics I** Chair: Kalman Palagyi (Achilles)
	9:40	What is the Role of Color Symmetry in the Detection of Melanomas? *Margarida Ruela, Catarina Barata, and Jorge S. Marques*	Rotation-aware LayerPaint System *Jiazhi Xia, Shenghui Liao, and Juncong Lin*
	10:00	Automatic Quantitative Assessment of the Small Bowel Motility with Cine-MRI Sequence Analysis *Xing Wu, Shaojian Zhuo and Wu Zhang*	Digital Circlism as Algorithmic Art *Sourav De and Partha Bhowmick*
	10:20	Pharynx Segmentation from MRI Data for Analysis of Sleep Related Disoders *Tatyana Ivanovska, Johannes Dober, Rene Laqua,Katrin Hegenscheid, and Henry Volzke*	Color edge preserving smoothing *Ali Alsam and Hans Jakob Rivertz*
10:40-11:10		*Coffee Break*	
	11:10	Fully Automated Brain Tumor Segmentation using two MRI Modalities *Mohamed Ben Salah, Idanis Diaz, Russell Greiner, Pierre Boulanger, Bret Hoehn, and Albert Murtha*	Parallel 3D 12-Subiteration Thinning Algorithms Based on Isthmuses *Kalman Palagyi*
	11:30	Evaluation of Color Based Keypoints and Features for the Classification of Melanomas Using the Bag-of-Features Model *Catarina Barata, Jorge S. Marques, and Jorge Rozeira*	Depth Peeling Algorithm for the Distance Field Computation of Overlapping Objects *Marcin Ryciuk and Joanna Porter-Sobieraj*
	11:50	Barrel-Type Distortion Compensated Fourier Feature Extraction *Michael Gadermayr, Andreas Uhl, and Andreas Vecsei*	Evaluation of Rendering Algorithms using Position-Dependent Scene Properties *Claudius Jahn, Benjamin Eikel, Matthias Fischer, Ralf Petring, Friedhelm Meyer auf der Heide*
9:40-12:10		**Motion, Tracking, and Recognition** Chair: Sotirios Diamantas (Poseidon)	
	9:40	Improving Robustness and Precision in GEI + HOG Action Recognition *T.P. Whytock, A. Belyaev, N.M. Robertson*	
	10:00	A Unified Framework for 3D Hand Tracking *Rudra P K Poudel, Jose A S Fonseca, Jian J Zhang, Hammadi Nait-Charif*	
	10:20	A Multiple Velocity Fields Approach to the Detection of Pedestrians Interactions using HMM and Data Association Filters? *Ricardo A. Ribeiro, Jorge S. Marques, João M. Lemos*	
10:40-11:10		*Coffee Break*	
	11:10	Human Activity Recognition using Hierarchically-mined Feature Constellations *Antonios Oikonomopoulos and Maja Pantic*	
	11:30	An Active Vision Approach to Height Estimation with Optical Flow *Sotirios Ch. Diamantas and Prithviraj Dasgupta*	
	11:50	Structure Descriptor for Articulated Shape Analysis *Li Han, Jiangyue Hu, Lin Li*	
12:10-1:30		*Lunch* (on your own)	

		Keynote: Serge Belongie, University of California, San Diego, USA (Megas Alexandros)	
1:30-2:30			
		Parallel Sessions	
2:40-5:10		**Segmentation** Chair: Xenophon Zabulis (Megas Alexandros)	**Visualization I** Chairs: Valentin Brimkov (Achilles)
	2:40	A Machine Learning Approach to Horizon Line Detection Using Local Features *Touqeer Ahmad, George Bebis, Emma Regentova, and Ara Nefian*	On Connectedness of Discretized Objects *Valentin E. Brimkov*
	3:00	Pose Invariant Deformable Shape Priors Using L1 Higher Order Sparse Graphs *Bo Xiang, Nikos Komodakis, and Nikos Paragios*	Visualizing 3D Time-Dependent Foam Simulation Data *Dan R. Lipsa, Robert S. Laramee, Simon Cox, and I. Tudur Davies*
	3:20	Connected Components Labeling on the GPU with Generalization to Voronoi Diagrams and Signed Distance Fields *Rasmusson, A. Sorensen,T.S. and Ziegler, G.*	Analyzing and Reducing DTI Tracking Uncertainty by Combining Deterministic and Stochastic Approaches *Khoa Tan Nguyen, Anders Ynnerman, and Timo Ropinski*
3:40-4:10		*Coffee Break*	
	4:10	Foreground detection with a moving RGBD camera *P. Koutlemanis, X. Zabulis, A. Ntelidakis, and A. A. Argyros*	TimeExplorer: Similarity Search Time Series by Their Signatures *Tuan Nhon Dang and Leland Wilkinson*
	4:30	Image Segmentation Using Iterated Graph Cuts with Residual Graph *Michael Holusa and Eduard Sojka*	A New Visual Comfort-based Stereoscopic Image Retargeting Method *Sang-Hyun Cho and Hang-Bong Kang*
	4:50	Pressure Based Segmentation in Volumetric Images *Thamer S. Alathari , Mark S. Nixon*	
2:40-5:10		**ST: 3D Mapping, Modeling and Surface Reconstruction** Chair: Andreas Savakis (Poseidon)	
	2:40	Simultaneous Color Camera and Depth Sensor Calibration with Correction of Triangulation Errors *Jae-Hean Kim, Jin Sung Choi, and Bon-Ki Koo*	
	3:00	Improving Image-Based Localization Through Increasing Correct Feature Correspondences *Guoyu Lu, Vincent Ly, Haoquan Shen, Abhishek Kolagunda, and Chandra Kambhamettu*	
	3:20	Reconstructing Plants in 3D from a Single Image using Analysis-by-Synthesis *Jerome Guenard, Geraldine Morin, Frederic Boudon and Vincent Charvillat*	
3:40-4:10		*Coffee Break*	
	4:10	Rapid disparity prediction for dynamic scenes *Jun Jiang, Jun Cheng, Baowen Chen*	
	4:30	A Solution to The Similarity Registration Problem of Volumetric Shapes *Wanmu Liu, Sasan Mahmoodi, Michael J. Bennett, Tom Havelock*	
	4:50	3D Surface Reconstruction Using Polynomial Texture Mapping *Mohammed Elfarargy, Amr Rizq and Marwa Rashwan*	

Tuesday, July 30th

8:30-9:30		*Keynote:* **Thomas Ertl**, **University of Stuttgart, Germany** (Megas Alexandros)	
		Parallel Sessions	
9:40-12:10		**Feature Extraction, Matching and Recognition** Chair: Yoshinori Kuno (Megas Alexandros)	**Computer Graphics II** Chair: Jiazhi Xia (Achilles)
	9:40	Keypoint Detection and Matching on High Resolution Spherical Images *Christiano Couto Gava, Jean-Marc Hengen, Bertram Taetz, and Didier Stricker*	Reconstruction of Wire Structures from Scanned Point Clouds *Kotaro Morioka, Yutaka Ohtake, Hiromasa Suzuki*
	10:00	Scene Perception and Recognition in industrial environments for Human-Robot Interaction *Nikhil Somani, Emmanuel Dean-Leon, Caixia Cai and Alois Knoll*	Real-time Simulation of Vehicle Tracks on Soft Terrain *Xiao Chen and Ying Zhu*
	10:20	Good Appearance and Shape Descriptors for Object Category Recognition *Pedro F. Proença, Filipe Gaspar, Miguel Sales Dias*	Real-Time 3D Rendering of Heterogeneous Scenes *Ralf Petring, Benjamin Eikel, Claudius Jahn, Matthias Fischer, Friedhelm Meyer auf der Heide*
10:40-11:10		*Coffee Break*	
	11:10	Object Recognition for Service Robots through Verbal Interaction Based on Ontology *Hisato Fukuda, Satoshi Mori, Yoshinori Kobayashi, Yoshinori Kuno, and Daisuke Kachi*	Sketch-based Image Warping Interface *Jiazhi Xia and Zhi-Quan Cheng*
	11:30	Corner detection in spherical images via the accelerated segment test on a geodesic grid *Hao Guan, William A. P. Smith and Peng Ren*	Saliency-Guided Color Transfer between Images *Jiazhi Xia*
	11:50	Object Categorization in Context based on Probabilistic Learning of Classification Tree with Boosted Features and Co-occurrence Structure *Masayasu Atsumi*	Memory Efficient Shortest Path Algorithms for Cactus Graphs *Boris Brimkov*
9:40-12:10		**ST: Sparse Methods for Computer Vision, Graphics and Medical Imaging** Chair: Dimitris Metaxas (Poseidon)	
	9:40	Keynote talk – Leon Axel	
	10:00	*Keynote talk – Leon Axel*	
	10:20	Localization of Multi-pose and Occluded Facial Features via Sparse Shape Representation *Yang Yu, Shaoting Zhang, Fei Yang, and Dimitris Metaxas*	
10:40-11:10		*Coffee Break*	
	11:10	Collaborative Sparse Representation in Dissimilarity Space for Classification of Visual Information *Ilias Theodorakopoulos, George Economou and Spiros Fotopoulos*	
	11:30	A Novel Technique for Space-Time-Interest Point Detection and Description for Dance Video Classification *Soumitra Samanta and Bhabatosh Chanda*	
	11:50	Efficient Transmission and Rendering of RGB-D Views *Zahid Riaz, Thorsten Linder, Sven Behnke, Rainer Worst, Hartmut Surmann*	
12:10-1:30		*Lunch* (on your own) (**poster setup:** 12:00pm to 1:30pm – Megas Alexandros)	

1:30-2:30	*Keynote:* **Anthony Hoogs, Kitware, USA** (Megas Alexandros)			
2:30-4:00	**Poster Session** (Megas Alexandros)			
4:00-4:30	*Coffee Break*			
	Parallel Sessions			
4:30-6:10	**Face Processing and Recognition** Chair: Antonis Argyros (Megas Alexandros)		**Visualization II** Chair: Chandra Kambhamettu (Achilles)	
	4:30	Shared Gaussian Process Latent Variable Model for Multi-view Facial Expression Recognition *S. Eleftheriadis, O. Rudovic and M. Pantic*	The Reflection Layer Extension to the Stereoscopic Highlight Technique for Node-Link Diagrams: An Empirical Study *Ragaad AlTarawneh, Jens Bauer, Shah Rukh Humayoun, Patric Keller and Achim Ebert*	
	4:50	Face Verification Using Local Binary Patterns and Maximum A Posteriori Vector Quantization Model *Elhocine Boutellaa, Farid Harizi, Messaoud Bengherabi, Samy Ait-Aoudia, and Abdenour Hadid*	Adaptive Semantic Visualization for Bibliographic Entries *Kawa Nazemi, Reimond Retz, Jurgen Bernhard, Jorn Kohlhammer, and Dieter Fellner*	
	5:10	Face box shape and verification *E. Christiansen, I. S. Kwak, S. Belongie, and D. Kriegman*	A Methodology for Interactive Spatial Visualization of Automotive Function Architectures for Development and Maintenance *Moritz Cohrs, Stefan Klimke and Gabriel Zachmann*	
	5:30	3D Face Pose and Animation Tracking via Eigen-Decomposition based Bayesian Approach *Ngoc-Trung Tran, Fakhr-Eddine Ababsa, Maurice Charbit, Jacques Feldmar, Dijana Petrovska-Delacretaz and Gerard Chollet*	Navigation Recommendations for Exploring Hierarchical Graphs *Stefan Gladisch, Heidrun Schumann, Christian Tominski*	
	5:50	Local Orientation Patterns for 3D Surface Texture Analysis of Normal Maps: Application to Facial Skin Condition Classication *A. Seck, H. Dee and B. Tiddeman*	A Tool for Visualizing Large-Scale Interactions Between Turbulence and Particles in 3D Space through 2D Trajectory Visualization *Guoyu Lu, Vincent Ly, Xiaolong Wang, Rohith MV, Orlando Ayala, Lian-Ping Wang and Chandra Kambhamettu*	
4:30-6:10	**ST: Visual Computing with Multimodal Data Streams** Chair: Mario Aehnelt (Poseidon)			
	4:30	Visual Query Specification and Interaction with Industrial Engineering Data *Alberto Malagoli, Mariano Leva, Stephen Kimani, Alessandro Russo, Massimo Mecella, Sonia Bergamaschi, Tiziana Catarci*		
	4:50	Performance Anchored Score Normalization for Multi-biometric Fusion *Naser Damer, Alexander Opel, and Alexander Nouak*		
	5:10	Towards a Contextualized Visual Analysis of Heterogeneous Manufacturing Data *Mario Aehnelt, Hans-Jorg Schulz, and Bodo Urban*		
	5:30	Visual Statistics Cockpits for Information Gathering in the Policy-Making Process *Dirk Burkhardt, Kawa Nazemi, Christian Stab, Martin Steiger, Arjan Kuijper, Jörn Kohlhammer*		
	5:50			
7:30-10:30	*Banquet Dinner & Best Paper Award* *("Mournies" Tavern)*			

Wednesday, July 31st

8:30-9:30	*Keynote:* **Dimitris Metaxas, Rutgers University, USA** (Megas Alexandros)	
	Parallel Sessions	
9:40-12:10	**ST: Visual Computing in Digital Cultural Heritage** Chair: Tasos Doulamis (Megas Alexandros)	**ST: Intelligent Environments: Algorithms and Applications** Chair: George Bebis (Achilles)
	9:40 Feature weight optimization and pruning in historical text recognition *Fredrik Wahlberg, Anders Brun*	People Tracking based on Predictions and Graph-Cuts Segmentation *Amira Soudani , Ezzeddine Zagrouba*
	10:00 A Constraint Inductive Learning- Spectral Clustering Methodology for Personalized 3D Navigation *Nikolaos Doulamis, Christos Yiakoumettis, George Miaoulis, Eftychios Protopapadakis*	A Framework for Quick and Accurate Access of Interesting Visual Events in Surveillance Videos *Fei Yuan, Chu Tang, Shu Tian, and Hongwei Hao*
	10:20 Beat Synchronous Dance Animation based on Visual Analysis of Human Motion and Audio Analysis of Music Tempo *Costas Panagiotakis, Andre Holzapfel, Damien Michel, and Antonis A. Argyros*	Detecting and Tracking Unknown Number of Objects with Dirichlet Process Mixture Models and Markov Random Fields *Ibrahim Saygin Topkaya, Hakan Erdogan, and Fatih Porikli*
10:40-11:10	*Coffee Break*	
	11:10 Combining Unsupervised Clustering with a Non-Linear Deformation Model for Efficient Petroglyph Recognition *Vincenzo Deufemia and Luca Paolino*	Grassmannian Spectral Regression for Action Recognition *Sherif Azary and Andreas Savakis*
	11:30 Analysing User Needs for a Unified Metadata Recording and Exploitation of Cultural Heritage Monuments System *E. Maravelakis, A. Konstantaras, A. Kritsotaki, D. Angelakis , M. Xinogalos*	Layered RC Circuit Model for Background Subtraction *Karel Mozdren, Eduard Sojka, Radovan Fusek, and Milan Surkala*
	11:50 Precise 3D Reconstruction of Cultural Objects using Combined Multi-Component Image Matching and Active Contours Segmentation *Christos Stentoumis, Georgios Livanos, Anastasios Doulamis, Eftychios Protopapadakis, Lazaros Grammatikopoulos and Michael Zervakis*	Pairwise Kernels for Human Interaction Recognition *Saeid Motiian, Ke Feng, Harika Bharthavarapu, Sajid Sharlemin, and Gianfranco Doretto*
	.	
12:10-1:30	*Lunch* (on your own)	

1:30-2:30		*Keynote:* **Mel Slater, Event Lab, ICREA-University of Barcelona, Spain** (Megas Alexandros)	
		Parallel Sessions	
2:40-5:10		**Applications** Chair: Alexandru Vasile (Megas Alexandros)	**Virtual Reality** Chairs: Kin-Hong Wong (Achilles)
	2:40	A Vision-based Algorithm for Parking Lot Utilization Evaluation Using Conditional Random Fields *Tomas Fabian*	Simultaneous Bidirectional Geometric Model Synchronization between CAD and VR Applications *Dimo Chotrov, Stoyan Maleshkov*
	3:00	Automatic Pain Intensity Estimation with Heteroscedastic Conditional Ordinal Random Fields *Ognjen Rudovic, Vladimir Pavlovic and Maja Pantic*	A Hand-held 3-D Display System with Haptic Sensation *Kai Ki Lee, Kin-Hong Wong, Michael Ming-Yuen Chang and Ying-Kin Yu*
	3:20	Robot Trajectory Planning using OLP and Structured Light 3D Machine Vision *M. Rodrigues, M. Kormann, C. Schuhler, and P. Tomek*	Primitive Human Action Recognition Based on Partitioned Silhouette Block Matching, *Toru Abe, Masaru Fukushi, and Daisuke Ueda*
3:40-4:10		*Coffee Break*	
	4:10	Improving Accessibility of Virtual Worlds by Automatic Object Labeling *Ilias Apostolopoulos, Eelke Folmer, and George Bebis*	Fast and Accurate Unknown Object Segmentation for Robotic Systems *Lazaros Nalpantidis, Bjarne Grovmann, and Volker Kruger*
	4:30	Hierarchical Image Geo-Location on a World-Wide Scale *Alexandru N. Vasile, Octavia Camps*	Differential Progressive Path Tracing for High-Quality Previsualization and Relighting in Augmented Reality *Peter Kan and Hannes Kaufmann*
	4:50	An image based approach for content analysis in document collections *Reinhold Huber-Mork and Alexander Schindler*	Projection on Suitable Sub-Surface Selected in Indoor Environment *Shafaq Mussadiq and Rehan Haz*
2:40-5:10		**Visualization III** Chair: Thomas Ertl (Poseidon)	
	2:40	A Framework for the Visualization of Finite-Time Continuum Mechanics Effects in Time-Varying Flow *Alexy Agranovsky, Harald Obermaier, and Kenneth I. Joy*	
	3:00	Visual Access to Optimization Problems in Strategic Environmental Assessment *Tobias Ruppert, Jurgen Bernard, Alex Ulmer, Arjan Kuijper, Jorn Kohlhammer*	
	3:20	Mesh Generation From Layered Depth Images Using Isosurface Raycasting *Steffen Frey, Filip Sadlo, and Thomas Ertl*	
3:40-4:10		Coffee Break	
	4:10	FractVis: Visualizing Microseismic Events *Ahmed E. Mostafa, Sheelagh Carpendale, Emilio Vital Brazil, David Eaton, Ehud Sharlin, Mario Costa Sousa*	
	4:30	Visualization of Frequent Itemsets with Nested Circular Layout and Bundling Algorithm *Gwenael Bothorel, Mathieu Serrurier, and Christophe Hurter*	
	4:50		

Poster Session
Tuesday, July 30th (2:30pm – 4:00pm)
(poster setup: 12:00pm to 1:30pm – Megas Alexandros)

Automatically Extracting Hairstyles from 2D Images *Chuan-Kai Yang and Chia-Ning Kuo*
Evaluation of Image Forgery Detection Using Multi-Scale Weber Local Descriptors *Sahar Q. Saleh, Muhammad Hussain, Ghulam Muhammad and George Bebis*
Energy-Transfer Features for Pedestrian Detection *Radovan Fusek, Eduard Sojka, Karel Mozdren and Milan Surkala*
Basic Shape Classification using Spatially Normalised Fourier Shape Signature *C. Y. Wong, S. C. F. Lin, G. Jiang, and N. M. Kwok*
Normalized matting of interest region *Jaehwan Kim and Ilkwon Jeong*
Speeding Up SURF *Peter Abeles*
Distortion Adaptive Image Classification - an Alternative to Barrel-Type Distortion Correction *Michael Gadermayr, Andreas Uhl, and Andreas Vecsei*
Moving Horizon Estimation of Pedestrian Interactions Based on Multiple Velocity Fields *Ana Portelo, Sandra Pacheco, Mario A. T. Figueiredo, Joao M. Lemos, Jorge S. Marques*
Evaluating and comparing of 3D shape descriptors for object recognition *Alexander Ceron and Flavio Prieto*
Gender Recognition using Fusion of Local and Global Facial Features *A.M. Mirza, M. Hussain, H. Almuzaini, G. Muhammad, H. Aboalsamh and G. Bebis*
Curvelet Transform and Local Texture Based Image Forgery Detection *Muneer H. Al-Hammadi, Ghulam Muhammad, Muhammad Hussain, and George Bebis*
Camera distance from face images *Arturo Flores, Eric Christiansen, David Kriegman, and Serge Belongie*
Towards Robust Gait Recognition *T.P. Whytock, A. Belyaev, N.M. Robertson*
Direct Encoding for Sampled Color Pictures with Location Consideration *Chulhee Lee, Jaehoon Lee and Guiwon Seo*
Real-Time Hand Gesture Recognition for Uncontrolled Environments using Adaptive SURF Tracking and Hidden Conditional Random Fields *Yi Yao and Chang-Tsun Li*
Examination of Hybrid Image Feature Trackers *Peter Abeles*
3D Shape Estimation Based on Sparsity in Stereo Matching *Naoto Hirose, Tatsuki Yasunobe, and Akira Kawanaka*
Color image compression by Riemannian B-Tree triangular coding *Olfa Triki and Mourad Zera*

Poster Session (cont'd)

Tuesday, July 29th (2:30pm – 4:00pm)
(poster setup: 12:00pm to 1:30pm – Megas Alexandros)

Human tracking and counting using the KINECT range sensor based on Adaboost and Kalman Filter *Lei Zhu, Kin-Hong Wong*
Hand pose estimation from a single RGB-D image *Alina Kuznetsova and Bodo Rosenhahn*
3D Human Tracking in a Top View Using Depth Information Recorded by the Xtion Pro-Live Camera *Cyrille Migniot and Fakhreddine Ababsa*
Determination of Object Directions Using Optical Flow for Crowd Monitoring *Aravinda S. Rao, Jayavardhana Gubbi, Slaven Marusic, Andrew Maher, and Marimuthu Palaniswami*
Evolutionary Techniques for Procedural Texture Automation *Alaa Eldin M. Ibrahim*
Voxel-Based Harmonic Map for Voxel-Based Model Deformation/Manipulation *Tomoaki Nagaoka*
A Novel Approach to Retrieval of Similar Patterns in Biological Images *Andrzej Sluzek*
Variational Model for Image Segmentation *Qiong Lou, Jialin Peng, Fa Wu, and Dexing Kong*
Sky Segmentation by Fusing Clustering with Neural Networks *Ali Pour Yazdanpanah, Emma E. Regentova, Ajay Kumar Mandava, and George Bebis*
An Interactive Web Based Spatio-Temporal Visualization system *Anil Ramakrishna, Yu-Han Chang, and Rajiv Maheswaran*
One-to-two Digital Earth *Ali Mahdavi Amiri, Faraz Bhojani, Faramarz Samavati*
Storygraph: Telling stories from spatio-temporal data *Ayush Shrestha, Ying Zhu, Ben Miller, Yi Zhao*
Organizing Visual Data in Structured Layout by Maximizing Similarity-Proximity Correlation *Grant Strong, Rune Jensen, Minglun Gong, Anne C. Elster*
Mixing Geometrically Diverse Window Managers *Anthony Savidis, Andreas Maragudakis*
Classier Comparison for Repeating Motion based Video Classication *Kahraman Ayyildiz and Stefan Conrad*
Implementation of Source Engine for Virtual Tours in Manufacturing Factories *P. Horejsi, J. Polcar*
Evaluating 3D Vision for Command and Control Applications *Britton Wolfe, Beomjin Kim, Benjamin Aeschliman, and Robert Sedlmeyer*

KEYNOTE TALK
Monday, July 29, 2013
8:30AM – 9:30 AM / MEGAS ALEXANDROS

ISVC 2013: 9th International Symposium on Visual Computing
Crete, Greece, July 29-31, 2013

How to break things with least effort

Dennis Zorin
Departments of Computer Science and Mathematics
New York University, USA

Abstract

3D printing and other types of direct digital manufacturing are rapidly expanding industries that provide easy ways to manufacture highly customized an unique products. The development pipeline for such products is radically different from the conventional manufacturing pipeline: 3D geometric models are designed by users often with little or no manufacturing experience, and sent directly to the printer. Structural analysis on the user side with conventional tools is often unfeasible as it requires specialized training and software. Trial-and-error, the most common approach, is time-consuming and expensive. The goal of the work that I will present is to develop a method that would identify structural problems in objects designed for 3D printing based on geometry and material properties only, without specific assumptions on loads and manual load setup, and present them to the user in an intuitive way. We formulate the problem as a constrained optimization problem to determine the ``worst'' load distribution for a shape that will cause high local stress or large deformations. While in its general form this optimization has a very high computational cost even for relatively small models, we demonstrate an efficient heuristic based on modal analysis and an approximation by a linear programming problem that can solve the problem quickly for the typical size of printed models. We validate our method both computationally and experimentally and demonstrate that it has good predictive power for a number of diverse 3D printed shapes.

Speaker Bio-Sketch: Denis is a professor of computer science and mathematics at the Courant Institute of Mathematical Sciences at New York University (NYU). He received his PhD from California Institute of Technology in 1997, and was a postdoctoral researcher at Stanford in 1997-98. Denis's research interests span the domains of geometric modeling, geometry processing and scientific computing. His main contributions are in the theory and practical algorithms for subdivision surfaces, surface deformation and mapping and efficient computational methods for integral equations. He has received the NSF Career Award, Sloan Foundation Fellowship, several IBM Partnership awards and shared the ACM Gordon Bell Prize in 2010. His work has won a number of best paper awards. Denis is an associate editor of ACM Transactions on Graphics. Denis Zorin is also a Founding Faculty Fellow of the Skolkovo Institute of Science and Technology (Skoltech), a new university in Moscow, Russia, developed in cooperation with MIT.

KEYNOTE TALK
*Monday, July 29, 2013*
1:30 PM – 2:30 PM / MEGAS ALEXANDROS

ISVC 2013: 9ᵗʰ International Symposium on Visual Computing
Crete, Greece, July 29-31, 2013

Visual Recognition with Humans in the Loop

Serge Belongie
Department of Computer Science and Engineering
University of California, San Diego, USA

Abstract

We present an interactive, hybrid human-computer method for object classification. The method applies to classes of problems that are difficult for most people, but are recognizable by people with the appropriate expertise (e.g., animal species or airplane model recognition). The classification method can be seen as a visual version of the 20 questions game, where questions based on simple visual attributes are posed interactively. The goal is to identify the true class while minimizing the number of questions asked, using the visual content of the image. Incorporating user input drives up recognition accuracy to levels that are good enough for practical applications; at the same time, computer vision reduces the amount of human interaction required. The resulting hybrid system is able to handle difficult, large multi-class problems with tightly-related categories. We introduce a general framework for incorporating almost any off-the-shelf multi-class object recognition algorithm into the visual 20 questions game, and provide methodologies to account for imperfect user responses and unreliable computer vision algorithms. We evaluate the accuracy and computational properties of different computer vision algorithms and the effects of noisy user responses on a dataset of 200 bird species and on the Animals With Attributes dataset. Our results demonstrate the effectiveness and practicality of the hybrid human-computer classification paradigm.
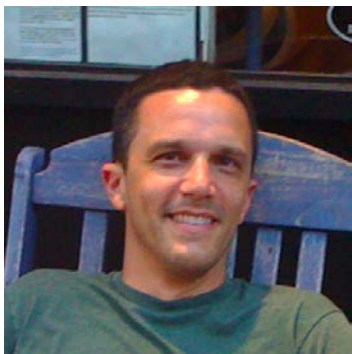
Speaker Bio-Sketch: Serge Belongie received the B.S. degree (with honor) in Electrical Engineering from the California Institute of Technology in 1995 and the M.S. and Ph.D. degrees in Electrical Engineering and Computer Sciences (EECS) at U.C. Berkeley in 1997 and 2000, respectively. While at Berkeley, his research was supported by a National Science Foundation Graduate Research Fellowship. He is also a co-founder of Digital Persona, Inc., and the principal architect of the Digital Persona fingerprint recognition algorithm. He is currently a Professor in the Computer Science and Engineering Department at U.C. San Diego. His research interests include computer vision and pattern recognition. He is a recipient of the NSF CAREER Award and the Alfred P. Sloan Research Fellowship. In 2004 MIT Technology Review named him to the list of the 100 top young technology innovators in the world (TR100).

ISVC 2013: International Symposium on Visual Computing
Crete, July 29-31, 2013

Visualization Research Trends

Thomas Ertl
Visualization Research Center
University of Stuttgart, Germany

Abstract

Visualization is a major area of visual computing focusing on displaying and graphically exploring abstract information. Driven by the ever increasing amounts of data generated by sensors, simulations and digital events interactive visual analysis plays an increasingly important role in organizing, understanding and communicating the information hidden in these data sets. This talk will give an overview of the field and look at current research trends from the perspective of the Visualization Research Institute of the University Stuttgart (VISUS). The examples will cover visualization of bio-molecular and higher order finite element simulations, visual analytics of text and social media and our high-resolution PowerWall.

Speaker Bio-Sketch: Thomas Ertl received a MSc degree in computer science from the University of Colorado at Boulder and a PhD in theoretical astrophysics from the University of Tuebingen. Currently, Dr. Ertl is a full professor of computer science at the University of Stuttgart, Germany and the head of the Visualization and Interactive Systems Institute (VIS) and the Visualization Research Center (VISUS). His research interests include visualization, computer graphics and human computer interaction in general with a focus on volume rendering, flow and particle data, parallel and hardware accelerated graphics, large datasets and interactive steering, visual analytics of text and trajectories, user interfaces and navigation systems for the blind. Dr. Ertl is coauthor of more than 300 scientific publications and he has been a member of numerous program committees and a paper co-chair for several conferences (e.g. Eurographics, IEEE Visualization, EuroVis, PacificVis, VAST, Volume Graphics). Dr. Ertl served as Editor-in-Chief of the IEEE Transactions on Visualization and Graphics and as Chairman of the Eurographics Association. He received the Outstanding Technical Contribution Award of the Eurographics Association and the Technical Achievement Award of the IEEE Visualization and Graphics Technical Committee in 2006 and he was elected as a Member of the Heidelberg Academy of Sciences and Humanities in 2007. He was awarded an honorary doctorate from Vienna University of Technology in 2011.

KEYNOTE TALK
Tuesday, July 30, 2013
1:30 PM – 2:30 PM / MEGAS ALEXANDROS

ISVC 2013: 9ᵗʰ International Symposium on Visual Computing
Crete, Greece, July 29 - 31, 2013

Recognizing Actions, Events and Complex Activities in Large-Scale Video Datasets

Anthony Hoogs
Kitware, Inc.
Clifton Park, NY, USA

Abstract

The scale of video data is growing exponentially. In addition to huge growth in consumer video captured by mobile devices, surveillance cameras are becoming larger, more numerous and ubiquitous. Extracting the most interesting, salient content from all of these video types is of increasing importance as the data volume grows. At Kitware we have developed methods for detecting events, actions, complex activities and anomalies in various video domains. In surveillance video, we have focused on large-scale problems posed by aerial and ground video, including city-scale wide-area aerial video showing hundreds or thousands of simultaneous movers. We detect events, anomalies and complex activities efficiently in such video by detecting and tracking all movers, then characterizing their behavior using event-independent descriptors. Efficient inference is achieved through layered, approximate evaluation as model complexity increases. In addition, we recognize functional scene elements such as parking spots by analyzing behavior within and around them. In consumer video, we recognize complex events such as weddings through the fusion of semantic descriptors such as ObjectBank with low-level features. The talk will provide an overview of these methods, including how they are related across disparate video domains.

Speaker Bio-Sketch: Anthony Hoogs is the Senior Director of Computer Vision at Kitware, a small software R&D firm based on open source. Dr. Hoogs joined Kitware in August 2007 and founded the Computer Vision group, which now has more than 30 members including 12 PhDs. He has initiated and led more than two dozen contracts in video and motion analysis, involving more than 15 universities. At GE Global Research (1998-2007), Dr. Hoogs led a team of researchers in video and imagery analysis on projects sponsored by the US Government, Lockheed Martin and NBC Universal. For more than two decades, he has supervised and performed research in various areas of computer vision including: event, activity and behavior recognition; motion pattern learning and anomaly detection; tracking; visual semantics; image segmentation; object recognition; and content-based retrieval. Dr. Hoogs received a Ph.D. in Computer and Information Science from the University of Pennsylvania in 1998; an M.S. from the University of Illinois at Urbana Champaign in 1991; and a B.A. magna cum laude from Amherst College in 1989.

KEYNOTE TALK
Wednesday, July 31, 2013
8:30AM – 9:30 AM / MEGAS ALEXANDROS

ISVC 2013: 9th International Symposium on Visual Computing
Crete, Greece, July 29-31, 2013

Deformable Models, Learning and Sparse Methods for Human Behavioral Analysis and Medical Applications

Dimitris Metaxas
Rutgers University

Abstract

Many of our cognitive abilities, communication and intentions are based on our nonverbal behaviors. Over the past 20 years we have pioneered stochastic deformable modeling methods for the 3D facial and human body based nonverbal communication analysis. In the first part of the talk we will present a general framework for nonverbal behavior recognition that is based on facial and body movement analysis. We will then present the use of these methods in various important applications such as deception detection, emotion recognition, sign language and crowd behavior. In the second part of the talk we will present recent extensions of our framework based on novel sparse learning formulations and in particular structured sparsity, which is an extension of the sparsity concept in statistical learning and compressive sensing. We will show how this new and important concept can be incorporated in deformable models and result in new and efficient ways to cope with complex segmentation, big-data learning, behaviors and medical application

Speaker Bio-Sketch: Dr. Dimitris Metaxas is a Distinguished Professor and Chair of the Computer Science Department at Rutgers University. He is directing the Center for Computational Biomedicine, Imaging and Modeling (CBIM). From September 1992 to September 2001 he was a tenured faculty member in the Computer and Information Science Department of the University of Pennsylvania and Director of the VAST Lab. Prof. Metaxas received a Diploma in Electrical Engineering from the National Technical University of Athens Greece in 1986, an M.Sc. in Computer Science from the University of Maryland, College Park in 1988, and a Ph.D. in Computer Science from the University of Toronto, Ontario, Canada in 1992. Dr. Metaxas has been conducting research towards the development of formal methods upon which both computer vision, computer graphics and medical imaging can advance synergistically. In computer vision, he works on the simultaneous segmentation and fitting of complex objects, shape representation, deterministic and statistical object tracking, sparse methods for segmentation and restoration, learning and ASL, gesture recognition and human activity analysis. Dr. Metaxas has published over 400 research articles in these areas and has graduated 35 PhD students. The above research has been funded by NSF, NIH, ONR, AFOSR, DARPA, HSARPA and the ARO. Dr. Metaxas research has received several best paper awards and he has 7 patents. He was awarded a Fulbright Fellowship in 1986, is a recipient of an NSF Research Initiation and Career awards, an ONR YIP, and is a Fellow of the American Institute of Medical and Biological Engineers. He has been involved with the organization of several top conferences in vision and medical image analysis such as ICCV 2007, ICCV 2011, MICCAI 2008 and CVPR 2014.

Body Semantics and Self-Transformation in Immersive Virtual Reality

Mel Slater
Event Lab, ICREA University of Barcelona, Spain

Abstract

There is growing evidence for the significant plasticity of the human brain's body representation. Using immersive virtual reality it is quite straightforward to generate in people the strong illusion that the virtual body that they see substituting their real body is their body. Although there is substantial evidence that such illusions can easily be generated there has been scant research on the behavioural and attitudinal correlates of such apparent body transformations. We introduce the concept of 'body semantics' that is, where the visual appearance of the virtual body suggests particular personal attributes - for example, due to stereotyping. In this talk I will describe some experiments that show that a body ownership illusion with respect a transformed virtual body leads to changes in attitudes and behaviours that are appropriate to the semantics of that body. We conclude that adoption of a body type experienced from first person perspective carries with it behavioural correlates, that could be exploited in a number of rehabilitative applications, as well as being a powerful tool in cognitive neuroscience. Moreover, virtual reality, typically used for the illusion of transfer to another place - the place depicted by the virtual reality displays - can be harnessed also to generate the illusion of being another 'self', with behavioural, attitudinal and possibly cognitive changes as a result.

Speaker Bio-Sketch: Mel Slater is an ICREA Research Professor at the University of Barcelona. He became Professor of Virtual Environments at University College London in 1997. He was a UK EPSRC Senior Research Fellow from 1999 to 2004, and has received substantial funding for virtual reality installations in both London and Barcelona. Twenty nine of his PhD students have obtained their PhDs since 1989. In 2005 he was awarded the Virtual Reality Career Award by IEEE Virtual Reality 'In Recognition of Seminal Achievements in Engineering Virtual Reality.' He leads the eventLab (www.event-lab.org) at UB. He is Coordinator of the EU 7th Framework Integrated Project VERE (www.vereproject.org), and scientific leader of the Integrated Project BEAMING (www.beaming-eu.org). He holds a European Research Council grant TRAVERSE (www.traverserc.org) on the specific topic virtual embodiment, and the general topic of a new area of application of virtual reality based on this theme.

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(Area 4) Visualization

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Special Tracks

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Visual Computing in Digital Cultural Heritage

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Sparse Methods for Computer Vision, Graphics and Medical Imaging

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Visual Computing with Multimodal Data Streams

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