IS&T International Symposium on

Electronic Imaging

SCIENCE AND TECHNOLOGY

28 January 2018 – 1 February 2018 • Burlingame, CA, USA

PROCEEDINGS

Visualization and Data Analysis 2018

Editors: **Thomas Wischgoll,** Wright State Univ. (United States)
Song Zhang, Mississippi State Univ. (United States)
David Kao, NASA Ames Research Center (United States)
Yi-Jen Chiang, New York University (United States)

These papers represent the program of Electronic Imaging 2018,
held 28 January – 1 February 2018, at the Hyatt Regency San Francisco Airport in Burlingame, CA.

Copyright 2018

Visualization and Data Analysis 2018

Symposium Chairs
Joyce Farrell, Stanford University (United States)
Andrew Woods, Curtin University (Australia)

Symposium Short Course Chairs
Susan Farnand, Rochester Institute of Technology (United States)
Mohamed-Chaker Larabi, University of Poitiers (France)
Jonathan B. Phillips, Google, Inc. (United States)

At-large Conference Chair Representative
Adnan Alattar, Digimarc (United States)

Past Symposium Chair
Nitin Sampat, Rochester Institute of Technology (United States)

Conference Chairs
Thomas Wischgoll, Wright State Univ. (United States)
Song Zhang, Mississippi State Univ. (United States)
David Kao, NASA Ames Research Center (United States)
Yi-Jen Chiang, New York University (United States)

Conference Committee
Madjid Allili, Bishop's Univ. (Canada)
Abon Chaudhuri, WalmartLabs (United States)
Guoning Chen, University of Houston (United States)
Joseph Cottam, Pacific Northwest National Laboratory (United States)
Sussan Einakian, California Polytechnic State University (United States)
John Gerth, Stanford Univ. (United States)
Matti Gröhn, Finnish Institute of Occupational Health (Finland)
Christopher Healey, North Carolina State Univ. (United States)
Mario Hlawitschka, Univ. of Leipzig (Germany)
Halldor Janetzko, Univ. of Konstanz (Germany)
Ming Jiang, Lawrence Livermore National Laboratory (United States)
Alark Joshi, Univ. of San Francisco (United States)
Andreas Kerren, Linnaeus Univ. (Sweden)
Peter Lindstrom, Lawrence Livermore National Laboratory (United States)
Lars Linsen, Westfälische Wilhelms-Universität Münster (Germany)
Zhanping Liu, Old Dominion Univ. (United States)
Aidong Lu, Univ. of North Carolina at Charlotte (United States)
G. Elisabeta Marai, Univ. of Illinois at Chicago (United States)
Donald Pellegrino, The Dow Chemical Co. (United States)
Theresa-Marie Rhyne, Computer Graphics and E-Learning (United States)
René Rosenbaum, meeCoda (Germany)
Jibonananda Sanyal, Oak Ridge National Lab. (United States)
Pinaki Sarder, Univ. of Buffalo (United States)
Graig Sauer, Towson Univ. (United States); Inga Scheler, Technische Univ. Kaiserslautern (Germany)
Inga Scheler, Technische University Kaiserslautern (Germany)
Tobias Schreck, Graz University of Technology (Austria)
Jürgen Schulze, Univ. of California, San Diego (United States)
Chad Steed, Oak Ridge National Laboratory (United States)

Kalpathi Subramanian, Univ. of North Carolina at Charlotte (United States)
Shigeo Takahashi, Univ. of Aizu (Japan)
Chaoli Wang, Univ. of Notre Dame (United States)
Tino Weinkauf, Royal Institute of Technology (Sweden)
Leishi Zhang, Middlesex Univ. London (United Kingdom)

Introduction

This year marks the twenty-fifth anniversary of the Visualization and Data Analysis (VDA) Conference. VDA covers all R&D and application aspects of data visualization and visual analytics. For this year's program, 9 submissions were accepted papers. This high-quality selection is possible due to the excellent reviews from the international program committee members. This is the third year that authors had the option to submit their work as journal submissions. Based on the journal review process, two papers were selected to appear in the Journal of Imaging Science and Technology.

The conference program for this year includes a keynote address by Dr. Kwan-Liu Ma from the University of California, Davis. Dr. Ma's keynote covers several aspects of visualizing large, complex data. Specifically, this keynote presentation goes over effective ways to design visualizations according to its purpose and targeted audience. It discusses several designs his group has made for exploratory or explanatory visualization of large data found in real-world applications.

Lastly, we thank Kitware and IS&T for sponsoring the conference. We also thank the authors, program committee members, and external reviewers for their hard work that makes this conference such a success.

— Thomas Wischgoll, David Kao, Yi-Jen Chiang, and Song Zhang

VDA 2018 thanks Conference Sponsor

Visualization and Data Analysis 2018

Wednesday January 31, 2018

Keynote: Purpose-designed Visualization
8:50 – 9:40 AM
Sandpebble A

VDA-294

Audience-targeted exploratory and explanatory visualization designs, *Kwan-Liu Ma, University of California, Davis (United States)*

Prof. Kwan-Liu Ma is a professor of computer science and the chair of the Graduate Group in Computer Science (GGCS) at the University of California-Davis, where he directs VIDI Labs and UC Davis Center of Excellence for Visualization. His research spans the fields of visualization, computer graphics, high-performance computing, and user interface design. Prof. Ma received his PhD in computer science from the University of Utah (1993). During 1993-1999, he was with ICASE/NASA Langley Research Center as a research scientist. He joined UC Davis in 1999. Prof. Ma is presently leading a team of over 25 researchers pursuing research in scientific visualization, information visualization, visual analytics, visualization for storytelling, visualization interface design, and immersive visualization. For his significant research accomplishments, Prof. Ma received the NSF Presidential Early-Career Research Award (PECASE) in 2000, was elected an IEEE Fellow in 2012, and received the 2013 IEEE VGTC Visualization Technical Achievement Award. Professor Ma actively serves the research community by playing leading roles in several professional activities including VizSec, Ultravis, EGPGV, IEEE VIS, IEEE PacificVis, and IEEE LDAV. He has served as a papers co-chair for SciVis, InfoVis, EuroVis, PacificVis, and Graph Drawing. [no paper]

Complex Visualization

9:40 – 10:20 am
Sandpebble A

9:40 VDA-314
Visualization of complex familial and social structures, *John Hott, Worthy Martin, and Kathleen Flake, University of Virginia (United States)*

10:00 VDA-315
Display infrastructure for virtual environments (DIVE) (JIST-first), *Thomas Wischgoll, Madison Glines, Tyler Whitlock, Bradley Guthrie, Corinne Mowrey, Pratik Parikh, and John Flach, Wright State University (United States)*

10:00 am – 4:00 pm   Industry Exhibition

10:20 – 10:50 am   Coffee Break

Medical Visualization

10:50 am – 12:10 pm
Sandpebble A

10:50 VDA-332
FitViz-Ad: A non-intrusive reminder to encourage non-sedentary behaviour, *Tim Bodyka Heng, Ankit Gupta, and Christopher Shaw, Simon Fraser University (Canada)*

11:10 VDA-333
High quality volume rendering of dark matter simulations, *Ralf Kaehler; SLAC and KIPAC (United States)*

11:30 VDA-334
A semi-automated method for measuring Fels indicators for skeletal maturity assessment in children, *Sara Gharabaghi and Thomas Wischgoll, Wright State University (United States)*

11:50 VDA-335
RemBrain: Exploring dynamic biospatial networks with mosaic-matrices and mirror glyphs (JIST-first), *Chihua Ma[1], Filippo Pellolio[2], Daniel Llano[3], Kevin Ambrose Stebbings[3], Robert Kenyon[1], and G. Elisabeta Marai[1]; [1]University of Illinois at Chicago, [2]HERE Technologies, and [3]University of Illinois at Urbana-Champaign (United States)*

Visualization and Data Analysis 2018 Interactive (Poster) Papers Oral Previews

12:10 – 12:40 pm
Sandpebble A

In this session interactive poster authors will each provide a brief oral preview of their poster presentation, which will be presented fully in the Visualization and Data Analysis 2018 Interactive Papers Session at 5:30 pm on Wednesday.

12:10 VDA-355
Contrast enhancement effect on high dynamic range image registration using mutual information, *Ibrahim Atli[1,2], Ahmet Saraçoğlu[2], and Osman Serdar Gedik[1,2]; [1]Yildirim Beyazit University and [2]Kuartis Technology and Consulting (Turkey)*

12:20 VDA-356 [no paper]
Deep variational auto-encoders for unsupervised glomerular classification, *Brendon Lutnick[1], Rabi Yacoub[1], Kuang-Yu Jen[2], John Tomaszewski[1], Sanjay Jain[3], and Pinaki Sarder[1]; [1]University of Buffalo, [2]University of California, Davis, and [3]Washington University in St. Louis (United States)*

12:30 VDA-357 [no paper]
ViDy, ViGly: Visualization of dynamical flexibility of virtual N-Glycans on proteins, *Camille Besançon, Alexandre Guillot, Sébastien Blaise, Manuel Dauchez, Nicolas Belloy, Jessica Jonquet-Prevoteau, and Stéphanie Baud, University of Reims (France)*

12:40 – 2:00 pm   Lunch

Plenary Session

2:00 – 3:00 pm
Grand Peninsula Ballroom D

Ubiquitous, Consumer AR Systems to Supplant Smartphones, *Ronald T. Azuma, Intel, Corp. (United States)*

Dr. Ronald T. Azuma, researcher and augmented reality pioneer, shares his vision for achieving ubiquitous, consumer AR systems. Recent large investments in augmented reality reflect the commercial interest in its inherent potential to replace current smartphone technology, but much remains to be done. In his talk, Dr. Azuma gives a vision for achieving this goal, which requires not just solving numerous technical challenges but also determining new, compelling AR experiences that will establish AR as a new platform and novel form of media.

Dr. Azuma leads a team in Intel Labs that designs and prototypes novel experiences and key enabling technologies to enable new forms of media. These technology areas include computational imaging and photography, computational displays, and head-worn displays. Dr. Azuma is recognized as a pioneer and innovator in augmented reality, and has held prominent leadership roles in that research area, including leading and implementing research projects and demonstrations in areas such as AR, visualization, and mobile applications. Dr. Azuma received his BSc (1988) in electrical engineering from University of California, Berkeley, and MS (1990) and PhD (1995) in computer science from University of North Carolina, Chapel Hill. Prior to joining Intel, he was a research leader at Nokia Research Center Hollywood, and a senior researcher at Hughes Research Laboratories.

3:00 – 3:30 pm   Coffee Break

Visual Analytics

3:30 – 5:10 pm
Sandpebble A

3:30   VDA-376
CNVis: A web-based visual analytics tool for exploring conference navigator data, *Samuel Bailey[1], Justin Wei[2], Chaoli Wang[1], Denis Parra[3], and Peter Brusilovsky[4]; [1]University of Notre Dame (United States), [2]University of North Texas (United States), [3]Pontificia Universidad Católica de Chile (Chile), and [4]University of Pittsburgh (United States)*

3:50   VDA-377
A step towards automatic visual analytics pipeline generation, *Benjamin Karer, Inga Scheler, and Hans Hagen, University of Kaiserslautern (Germany)*

4:10   VDA-378
BGS: A large-scale graph visualization tool, *Fangyan Zhang[1], Song Zhang[1], Christopher Lightsey[1], Sarah Harun[1], and Pak Wong[2]; [1]Mississippi State University and [2]ACT (United States)*

4:30   VDA-379
Implementation and evaluation of distributed graph sampling methods with Spark, *Fangyan Zhang, Song Zhang, and Christopher Lightsey, Mississippi State University (United States)*

4:50   VDA-380
A visual technique to analyze flow of information in a machine learning system, *Abon Chaudhuri, Walmart Labs (United States)*

Symposium Interactive Papers (Poster) Session

5:30 – 7:30 pm
The Grove

Meet the Future: A Showcase of Student and Young Professionals Research

5:30 – 7:30 pm
The Grove