

February 14-18, 2016  
San Francisco, CA

## Visualization and Data Analysis (VDA) 2016

### Introduction

This year marks the twenty-third anniversary of the Visualization and Data Analysis (VDA) Conference. VDA covers all R&D and application aspects of data visualization and visual analytics. This year's program consists of 22 full papers and 13 poster papers. This high-quality selection is possible due to the excellent reviews from the international program committee members. Furthermore, two papers were selected as best papers. We wish to pay special recognition to Kostas Pantazos, IT University of Copenhagen, whom sadly passed away before knowing that his paper was selected as one of the best papers.

This year is the first time that authors have the option to submit their work as journal submissions. Based on the journal review process, three papers were selected to appear in the Journal of Imaging Science and Technology.

The conference program for this year includes a keynote address by Prof. Alex Pang, University of California, Santa Cruz. Prof. Pang's keynote covers several important topics related to visualization. One probing question is as to why visualization does not seem useful to a broader audience or more widely used, particularly when the visualization is for public consumption.

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 the conference such a success.

David Kao, Thomas Wischgoll, and Song Zhang

Conference Sponsor



Photo: San Francisco Travel Association-Can Balcioglu

**Symposium Chairs:** Choon-Woo Kim, Inha University (Korea, the Republic of), **Nitin Sampat**, Rochester Institute of Technology (United States)

**Symposium Short Course Chairs:** Majid Rabbani, Eastman Kodak Co. (United States), **Mohamed-Chaker Larabi**, University of Poitiers (France)

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

**Local Liaison Chair:** Joyce Farrell, Stanford University (United States)

**Exhibit and Sponsorship Chair:** Kevin Matherson, Microsoft Corp. (United States)

**Past Symposium Chair:** Sheila Hemami, Northeastern University (United States)

**Conference Chairs:** David Kao, NASA Ames Research Center (United States), **Thomas Wischgoll**, Wright State University (United States), **Song Zhang**, Mississippi State University (United States)

**Conference Committee:** **Madjid Allili**, Bishop's University (Canada), **Barry Becker**, SGI (United States), **Abon Chaudhuri**, WalmartLabs (United States), **Guoning Chen**, University of Houston (United States), **Yi-Jen Chiang**, New York University (United States), **Hank Childs**, University of Oregon (United States), **Jaegul Choo**, Korea University (Korea, Republic of), **Joseph Cottam**, Indiana University (United States), **Sussan Einakian**, University of Alabama in Huntsville (United States), **Christoph Garth**, Technische University Kaiserslautern (Germany), **John Gerth**, Stanford University (United States), **Mohammad Ghoniem**, Luxembourg Institute of Science and Technology (Luxembourg), **Matti Gröhn**, Finnish Institute of Occupational Health (Finland), **Ming Hao**, Hewlett-Packard Company (United States), **Christopher Healey**, North Carolina State University (United States), **Haldor Janetzko**, University of Konstanz (Germany), **Ming Jiang**, Lawrence Livermore National Laboratory (United States), **Alark Joshi**, University of San Francisco (United States), **Andreas Kerren**, Linnaeus University (Sweden), **Harinarayan Krishnan**, Lawrence Berkeley National Laboratory (United States), **Tong-Yee Lee**, National Cheng Kung University (Taiwan), **Robert Lewis**, Washington State University (United States), **Peter Lindstrom**, Lawrence Livermore National Laboratory (United States), **Lars Linsen**, Jacobs University Bremen GmbH (Germany), **Zhanping Liu**, Kentucky State University (United States), **Aidong Lu**, University of North Carolina at Charlotte (United States), **Dmitriy Morozov**, Lawrence Berkeley National Laboratory (United States), **Theresa-Marie Rhyne**, Computer Graphics and E-Learning (United States), **Ian Roberts**, Pacific Northwest National Laboratory (United States), **René Rosenbaum**, meeCoda (Germany), **Jibonananda Sanyal**, Oak Ridge National Lab (United States), **Inga Scheler**, Technische University Kaiserslautern (Germany), **Tobias Schreck**, Graz University of Technology (Austria), **Jürgen Schulze**, University of California, San Diego (United States), **Chad Steed**, Oak Ridge National Laboratory (United States), **Kalpathi Subramanian**, University of North Carolina at Charlotte (United States), **Shigeo Takahashi**, University of Aizu (Japan), **Shyh-Kuang Ueng**, National Taiwan Ocean University (Taiwan), **Chaoli Wang**, University of Notre Dam (United States), **Yingcai Wu**, Zhejiang University (China), **Caixia Zhang**, Google, Inc. (United States), **Wenjin Zhou**, Oakland University (United States), **Caroline Ziemkiewicz**, Brown University (United States)

# Visualization and Data Analysis 2016

## Tuesday, February 16, 2016

### Flow Visualization

Session Chair: Thomas Wischgoll, Wright State University (USA)

**8:40 – 10:10 am**

Golden Gate 3

8:40

#### Opening Remarks

8:50

VDA-476

**FlowVisual: A visualization app for teaching and understanding 3D flow field concepts**, Man Wang<sup>1</sup>, Jun Tao<sup>1</sup>, Jun Ma<sup>1</sup>, Yang Shen<sup>2</sup>, and Chaoli Wang<sup>2</sup>; <sup>1</sup>Michigan Technological University and <sup>2</sup>University of Notre Dame (USA)

9:15

VDA-477

**Morse decomposition of 3D piecewise linear vector fields**, Marzieh Berenjkoub and Guoning Chen, University of Houston (USA)

9:40

VDA-478

**Flow visualization based on a derived rotation field**, Lei Zhang<sup>1</sup>, Robert S. Laramée<sup>2</sup>, David Thompson<sup>3</sup>, Adrian Sescu<sup>3</sup>, and Guoning Chen<sup>1</sup>; <sup>1</sup>University of Houston (USA), <sup>2</sup>Swansea University (United Kingdom), and <sup>3</sup>Mississippi State University (USA)

10:10 – 10:40 am Coffee Break

### Keynote: Visualization for the Masses, Redux

Session Chair: David Kao, NASA Ames Research Ctr. (USA)

**10:40 – 11:40 am**

Golden Gate 3

VDA-479

**Visualization for the masses, redux**, Alex Pang, University of California at Santa Cruz (USA)

### Biomedical Visualization

Session Chair: Thomas Wischgoll, Wright State University (USA)

**11:40 am – 12:30 pm**

Golden Gate 3

11:40

VDA-480

**Segmentation of zebrafish larva inhomogeneous 3D images using the level-set method**, Zhan Xiong and Fons Verbeek, LIACS (Netherlands)

12:05

VDA-481

**Visualizing the intrinsic geometry of the human brain connectome**, Giorgio Conte, Alex Leow, and Angus Forbes, University of Illinois at Chicago (USA)

12:30 – 2:00 pm Lunch Break

### EI 2016 Tuesday Plenary and Symposium Awards

Session Chair: Nitin Sampat (Rochester Institute of Technology)

**2:00 – 3:00 PM**

Continental Ballroom 5

**Pushing computational photography deeper into imaging system design**, Ren Ng, University of California, Berkeley (USA)

3:00 – 3:30 pm Coffee Break

### Usability

Session Chair: Alex Pang, University of California at Santa Cruz (USA)

**3:30 – 4:50 pm**

Golden Gate 3

3:30

VDA-482

**Towards the involvement of end-user developers in visualization development (JIST-first)**, Kostas Pantazos and Soren Lauesen, IT University of Copenhagen (Denmark)

3:55

VDA-483

**Multiple independent highlighting techniques**, Colin Ware<sup>1</sup> and Nicholas Pioch<sup>2</sup>; <sup>1</sup>University of New Hampshire and <sup>2</sup>Systems Technology Research (USA)

4:20

VDA-484

**JASPER: Just A new Space-filling and Pixel-oriented layout for large graph overVIEW**, Jason Vallet, Guy Melancon, and Bruno Pinaud, Univ. Bordeaux (France)

### Visualization and Data Analysis 2016 Interactive Papers Oral Previews I

Session Chair: Angus Forbes, University of Illinois at Chicago (USA)

**4:50 – 5:40 pm**

Golden Gate 3

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 2016 Interactive Papers Session at 5:30 pm on Wednesday.

4:50

VDA-485

**Weatherbin: Visually exploring similar days in air traffic weather**, Christopher Skeels and Kyle Murray, RAND Corporation (USA)

5:00

VDA-486

**Enhancing parallel coordinates: Statistical visualizations for analyzing soccer data**, Halldor Janetzko<sup>1</sup>, Manuel Stein<sup>1</sup>, Dominik Sacha<sup>1</sup>, and Tobias Schreck<sup>2</sup>; <sup>1</sup>University of Konstanz (Germany) and <sup>2</sup>Graz University of Technology (Austria)

5:10

VDA-487

**Togpu: Automatic source transformation from C++ to CUDA using Clang/LLVM**, Matthew Marangoni and Thomas Wischgoll, Wright State University (USA)

5:20 VDA-488  
**An effective visualization technique for determining co-relations in high-dimensional medieval manuscripts data**, Swati Chandna<sup>1</sup>, Danah Tonne<sup>1</sup>, Rainer Stotzka<sup>1</sup>, Philipp Vanschiedt<sup>2</sup>, Celia Krause<sup>2</sup>, and Hanah Busch<sup>3</sup>; <sup>1</sup>Karlsruhe Institute of Technology, <sup>2</sup>Technical University of Darmstadt, and <sup>3</sup>Universität Trier (Germany)

5:30 VDA-489  
**Visualization tools for network security**, Antoinette Attipoe and Jie Yan, Bowie State University (USA)

**El 2016 Symposium Demonstration Session and Exhibit Hall Happy Hour**  
**5:30 – 7:00 PM**  
 Continental Ballroom Foyer

## Wednesday, February 17, 2016

### High-dimensional and Big Data

Session Chair: Song Zhang, Mississippi State University (USA)

**8:50 – 10:10 am**  
 Golden Gate 3

8:50 VDA-490  
**Parameter space visualization for large-scale datasets using parallel coordinate plots (JIST-first)**, Kurtis Glendenning<sup>1</sup>, Thomas Wischgoll<sup>1</sup>, Jack Harris<sup>2</sup>, Rhonda Vickery<sup>3</sup>, and Leslie Blaha<sup>2</sup>; <sup>1</sup>Wright State University, <sup>2</sup>Wright Patterson Air Force Base, and <sup>3</sup>Engility Corporation (USA)

9:15 VDA-491  
**Interactive visualization for interdisciplinary research**, Naomi Keena and Mohamed Aly, RPI (USA)

9:40 VDA-492  
**Interactive high-dimensional data analysis using the “Three Experts”**, Georg Albrecht and Alex Pang, University of California, Santa Cruz (USA)

10:10 – 10:40 am Coffee Break

### Visual Analytics

Session Chair: Guoning Chen, University of Houston (USA)

**10:40 am – 12:00 pm**  
 Golden Gate 3

10:40 VDA-493  
**MaVis: Machine learning aided multi-model framework for time series visual analytics**, Kaiyu Zhao, Worcester Polytechnic Institute (USA)

11:05 VDA-494  
**TRI-DIRECT: Interactive visual analysis of TRI data**, David Burlinson, Kalpathi Subramanian, and Aidong Lu, The University of North Carolina at Charlotte (USA)

11:30 VDA-495  
**Interactive visual analytics in support of image-encoded LIDAR analysis**, Todd Eaglin, Xiaoyu Wang, and William Ribarsky, The University of North Carolina at Charlotte (USA)

### Comparison

Session Chair: David Kao, NASA Ames Research Ctr. (USA)

**12:00 – 12:30 pm**  
 Golden Gate 3

**Spherical similarity explorer for comparative case analysis**, Leishi Zhang<sup>1</sup>, Chris Rooney<sup>1</sup>, Lev Nachmanson<sup>2</sup>, William Wong<sup>1</sup>, Bum Chul Kwon<sup>3</sup>, Florian Stoffel<sup>3</sup>, Michael Hund<sup>3</sup>, Nadeem Qazi<sup>1</sup>, Uchit Singh<sup>1</sup>, and Daniel Keim<sup>3</sup>; <sup>1</sup>Middlesex University (United Kingdom), <sup>2</sup>Microsoft Research (USA), and <sup>3</sup>University of Konstanz (Germany)

12:30 – 2:00 pm Lunch Break

### El 2016 Wednesday Plenary and Symposium Awards

Session Chair: Choon-Woo Kim (Inha University)

**2:00 – 3:00 PM**  
 Continental Ballroom 5

**Intel® RealSense Technology: Adding human-like sensing and interactions to computing devices**, Achin Bhowmik, Intel Corporation (USA)

3:00 – 3:30 pm Coffee Break

### Visualization Tool and Techniques

Session Chair: Song Zhang, Mississippi State University (USA)

**3:30 – 4:00 pm**  
 Golden Gate 3

**Tweether: A visualization tool displaying correlation of weather to tweets**, Shruti Daggumati, Igor Soares de Oliveira, Jieting Wu, Hongfeng Yu, and Jun Wang, University of Nebraska-Lincoln (USA)

### Visualization and Data Analysis 2016 Interactive Papers Oral Previews II

Session Chair: Kalpathi Subramanian, The University of North Carolina at Charlotte (USA)

**4:00 – 5:10 pm**  
 Golden Gate 3

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 2016 Interactive Papers Session at 5:30 pm on Wednesday.

4:00 VDA-498  
**Metrics visualization templates case study in aerospace product development**, Kathy Sonderer and Kevin Lynch, Raytheon Company (USA)

4:10 VDA-499  
**The Aleph data relation in structured data, a tree within the tree structure**, H. Paul Zellweger, ArborWay Labs (USA)

4:20 VDA-500  
**Exploiting regions of influence to visualize class boundaries**, Pallav Tinna<sup>1</sup> and Kamalakar Karlapalem<sup>2</sup>; <sup>1</sup>International Institute of Information Technology, Hyderabad and <sup>2</sup>Indian Institute of Technology, Gandhinagar (India)

4:30 VDA-501  
**Exploring VR displays for malware analysis**, Myles Black, Swastik Singh, Song Zhang, Jean Mohammadi-Aragh, and Derek Irby, Mississippi State University (USA)

4:40 VDA-502  
**Supporting hypotheses management during asynchronous collaboration for visual analytics for text analysis**, Ankit Gupta and Chris Shaw, Simon Fraser University (Canada)

4:50 VDA-503  
**Visual data mining in closed contour coordinates**, Boris Kovalerchuk<sup>1</sup> and Vladimir Grishin<sup>2</sup>; <sup>1</sup>Central Washington University and <sup>2</sup>View Trends, Ltd. (USA)

5:00 VDA-504  
**TennisMatchViz: A tennis match visualization**, Xi He and Ying Zhu, Georgia State University (USA)

**EI 2016 Symposium Interactive Papers Session**  
**5:30 – 7:00 PM**  
 Continental Ballroom 6

**Visualization and Data Analysis 2016 Interactive Papers Session**

**5:30 – 7:00 pm**  
 Continental Ballroom 6

The VDA interactive papers will be presented in the EI 2016 Symposium Interactive Papers Session.

**Thursday, February 18, 2016**

**Multivariate Visualization**

Session Chair: Thomas Wischgoll, Wright State University (USA)

**8:50 – 10:10 am**  
 Golden Gate 3

8:50 VDA-505  
**Ensemble traces: Interactive visualization of ensemble multivariate time series data**, Swastik Singh<sup>1</sup>, Song Zhang<sup>1</sup>, William Pruett<sup>2</sup>, and Robert Hester<sup>2</sup>; <sup>1</sup>Mississippi State University and <sup>2</sup>University of Mississippi Medical Center (USA)

9:15 VDA-506  
**Star glyph insets for overview preservation of multivariate data**, Dominik Jäckle, Johannes Fuchs, and Daniel Keim, University of Konstanz (Germany)

9:40 VDA-507  
**Visual descriptors for dense tensor fields in computational turbulent combustion: A case study (JIST-first)**, G. Elisabeta Marai<sup>1</sup>, Timothy Luciani<sup>1</sup>, Adrian Maries<sup>2</sup>, S. Levent Yilmaz<sup>3</sup>, and Mehdi Nik<sup>4</sup>; <sup>1</sup>University of Illinois at Chicago, <sup>2</sup>UPMC, <sup>3</sup>Mathworks, and <sup>4</sup>Stanford University (USA)

10:10 – 10:40 am Coffee Break

**Exploratory Data Visualization**

Session Chair: David Kao, NASA Ames Research Ctr. (USA)

**10:40 am – 12:10 pm**  
 Golden Gate 3

10:40 VDA-508  
**Visual analysis of transport similarity in 2D CFD ensembles**, Brad Hallister and Alex Pang, University of California (USA)

11:05 VDA-509  
**Visualizing ensembles for effective shape and data comparison**, Lihua Hao<sup>1</sup>, Christopher Healey<sup>1</sup>, Steffen Bass<sup>2</sup>, and Hsuan-Ya Yu<sup>1</sup>; <sup>1</sup>North Carolina State University and <sup>2</sup>Duke University (USA)

11:30 VDA-510  
**Visual-interactive search for soccer trajectories to identify interesting game situations**, Lin Shao<sup>1</sup>, Dominik Sacha<sup>1</sup>, Benjamin Neldner<sup>1</sup>, Manuel Stein<sup>1</sup>, and Tobias Schreck<sup>2</sup>; <sup>1</sup>Univ. of Konstanz (Germany) and <sup>2</sup>Graz University of Technology (Austria)

11:55  
**Chair Remarks**