

Visualization Curriculum Panel – or The Changes We Have Made to Our Visualization Courses Over the Last 10 Years

Panel Chair: G. Domik¹; Panelists: D. Ebert², J. Kohlhammer³, H. Rushmeier⁴, B. Sousa Santos⁵ and D. Weiskopf⁶

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Abstract

The last ten years have seen profound changes in algorithms, techniques, and applications of visualization. Additionally, we see changes in the sophistication and expectations of our students in visualization courses. This panel will reflect changes in teaching visualization courses through the personal reflections of renowned researchers and educators on their alterations on course content over the past 10 years.

Categories and Subject Descriptors (according to ACM CCS): K.3.2 [Computers and Education]: Computer and Information Science Education—Education in Visualization and Visual Analytics

1. Motivation for an Update of Visualization Courses Content

The last ten years have seen profound changes in computer-generated visualization algorithms, techniques, methodologies and applications of visualization. E.g. we are seeing

- improved algorithms for flow or volume visualizations;
- a strong emphasis on highly interactive visual interfaces;
- the advent of visual analytics;
- changes in the “average student” we teach in visualization courses;
- greater needs for professional use of visualization at the future work place;
- evaluation frameworks for effective visualization.

All this forces alterations to our visualization courses, especially what, how, or whom we teach.

A basic problem for educators of visualization courses has always been the fact that they could not rely on standard textbooks to put a frame around mandatory knowledge in this field - contrary to Computer Graphics, where a few textbooks are widely acknowledged as “standard” to the community. Visualization curricula suggestions, e.g. from the ACM SIGGRAPH Education Committee at www.upb.de/cs/vis are partly outdated or incomplete by today. A collection of links to visualization courses world wide on the same website might still be of good use as long as educators have updated their website. Computer Science curricula guidelines, such as the IEEE and ACM Computing Curricula

are also lagging behind in their recommendations of content for this novel and dynamic knowledge area.

Outdated course content recommendations together with profound changes in the underlying technology and methodology produce an instable ground for educators at a time when visual representations have gained great importance in economy, science, and many other areas of society.

Each of the panelists has to offer many years of experience in teaching visualization courses at their university, though their course titles vary between Scientific Visualization, Information Visualization, Visualization Techniques, or Visual Analytics. Each of the panelists has also contributed strongly to research in graphics and/or visualization. Statements of panelists and discussions between panelists and audience will reflect novel course content and methods. The panel will also address the needs of industry from university graduates as experienced from collaboration over joint projects. Thus gained ideas and knowledge will be valuable input to other educators and can be a basis for a general update on the visualization curriculum.

2. Biographies of Panelists

David S. Ebert is a professor in the School of Electrical and Computer Engineering at Purdue University, a University Faculty Scholar, director of the Purdue University Rendering and Perceptualization Lab, and director of the Purdue University Regional Visualization and Analytics Center. His research interests include novel visualization

techniques, visual analytics, volume rendering, information visualization, perceptually based visualization, illustrative visualization, and procedural abstraction of complex, massive data. David Ebert has a PhD in computer science from Ohio State University and is a fellow of the IEEE and member of the IEEE Computer Society Publications Board.

Jörn Kohlhammer heads the Fraunhofer IGD competence center for Information Visualization and Visual Analytics with currently 16 employees. His research interests include visual analytics, information visualization, semantics-based visualization, and their industry applications. He coordinated the FET Open Coordination Action “VisMaster CA” with 27 European partners from science and industry. From 1999-2003 he worked on context-based visualization at the Fraunhofer Center for Computer Graphics Research in Providence, USA. Jörn Kohlhammer received a PhD degree in computer science from the Technical University of Darmstadt in 2004 and an MSc (Diplom) degree in computer science from the Ludwig-Maximilian-University in Munich in 1999.

Holly Rushmeier is a professor of computer science at Yale University. Her research interests are material and texture models, recovering shape and reflectance, sketching and alternative design techniques, modeling and interacting with architectural scale scenes, applications of perception to computer graphics, and cultural-heritage applications of computer graphics. Rushmeier has a PhD in mechanical engineering from Cornell University. She’s a former associate Editor-in-Chief of IEEE Computer Graphics and Applications and is currently co-Editor-in-Chief of Computer Graphics Forum and a fellow of the Eurographics Association. She is part of a team at Yale developing an initiative on “Computing and the Arts” that includes new undergraduate major and multiple graduate research threads in the area of computing and art, art history, music, drama and architecture. Dr. Rushmeier was appointed chair of the Computer Science Department, effective July 1, 2011.

Beatriz Sousa Santos is an associate professor in the University of Aveiro’s Department of Electronics, Telecommunications and Informatics and a researcher at the Institute of Electronics Engineering and Telematics of Aveiro, Portugal. She got a PhD in Medical Imaging, has been lecturing Visual Computing, Visualization and Human-Computer Interaction and her main interests are in the fields of Medical and Scientific Data Visualization.

Daniel Weiskopf is a professor of computer science at the University of Stuttgart, Germany. His research interests include visualization, visual analytics, GPU methods, computer graphics, and special and general relativity. He received the Diplom (MSc) degree and the Dr. rer. nat. (PhD) degree, both in physics, from the University of Tübingen, Germany. His Habilitation degree in computer

science is from the University of Stuttgart. He chairs the Eurographics working group on Parallel Graphics. He is co-editor of the Visualization Corner of Computing in Science & Engineering, associate editor of IEEE Transactions on Visualization and Computer Graphics, and member of the editorial board of The Visual Computer. Since 2010, he has been the dean of studies for the programs in computer science and software engineering at the University of Stuttgart.

3. Biography of Panel Chair

Gitta Domik is a professor at the Institute of Computer Science at the University of Paderborn. She holds a PhD in Technical Sciences from the Graz University of Technology. From 1985 to 1993 she worked at Vexcel Corporation and the University of Colorado, both at Boulder, Colorado. She is a member of the ACM SIGGRAPH Education committee and maintains a website on “Visualization Education” at www.upb.de/cs/vis. Since 2010 she has been a member of the editorial board of IEEE Computer Graphics and Applications, co-editing the Education Department together with G. Scott Owen. Her current research interests are in Medical Visualization and Serious Games.

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