SIGGRAPH 1990

17th International Conference On Computer Graphics and Interactive Techniques

Dallas Convention Center
August 6th—10th

COURSE NOTES 27

STATE OF THE ART IN DATA VISUALIZATION

Chair
Mark Smith
Cognivision, Inc.

Lecturers
Matthew Arrott
University of Illinois, Urbana-Champaign
Todd Elvins
San Diego Supercomputer Center
Larry Gelberg
Stardent Computer, Inc.
George Grinstein
University of Lowell
Arie Kaufman
SUNY at Stony Brook
Rainald Loehner
The George Washington University
Hikmet Senay
The George Washington University
Mark Smith
Cognivision, Inc.

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Course Overview

COURSE OVERVIEW

COURSE DESCRIPTION

Active participants in data visualization relay the latest research, ideas, and experiences. Each speaker appears more briefly in favor of providing exposure to a larger number of different views, keeping the discussion focused on the truly latest and state-of-the-art work. Course also discusses the latest technical details of visualization research in-depth. A unique opportunity to hear ideas and experiences that are not ready for, or are usually omitted from, formal publication. No representation of earlier papers or 1989 technical session topic repeats.

WHO SHOULD ATTEND

Technical individuals, with a strong interest and some acquaintance with data visualization, wanting to learn about the work of active researchers in the field. Useful for those looking to solve a particular data visualization problem.

RECOMMENDED BACKGROUND/DIFFICULTY

A good grasp of computer graphics recommended. A strong interest or experience with data visualization helpful.

SCHEDULE

I.	Introduction - Mark Smith	8:30-8:40
II.	A Visualization Computing Environment for a Widely Dispersed Scientific Community - T. Todd Elvins	8:40-9:20
III.	The Visualization of Scientific Data: Current Issues - Georges Grinstein	9:20-10:00
	BREAK	10:15-10:30
IV.	Communication as it Pertains to Scientific Visualization - Matthew Arrott	10:30-11:15
V.	Compositional Analysis and Synthesis of Scientific Data Visualization Techniques - Hikmet Senay	11:15-12:00
	LUNCH	12:00-1:30
VI.	VERITAS, Volume Visualization and CUBE - Arie Kaufman	1:30-2:45
	BREAK	2:45-3:00
VII.	Fast Graphics Algorithms Using Unstructured Grids - Rainald Lohner	3:00-4:00
VIII.	Visualization Techniques for Structured and Unstructured Scientific Data - Lawrence Gelberg	4:00-5:00

LECTURER BIOGRAPHIES

Matthew Arrott, National Center for Supercomputing Applications

Matthew Arrott has a B.A. from Harvard University. He is currently Producer and Technical Lead for the Visualization Services and Development Group at the National Center for Supercomputing Application, University of Illinois Urbana-Champaign. He is responsible for the direction of a staff of scientific animators and software programmers. He has worked as a Technical Director for both Vertigo in Vancouver and Digital Production in Los Angeles were he was responsible for creating animation for television commercials. He has also been a graphics programmer at Wavefront Technology where he worked specifically on texture mapping issues.

T. Todd Elvins, San Diego Supercomputer Center

T. Todd Elvins earned a B.A. in Business Economics and a B.S. in Computer Science, both at U.C. Santa Barbara, and a M.S. in computer Science at the University of Utah. Elvins worked at Culler Scientific Systems in Santa Barbara, California from 1984 to 1986 where he developed system software for a minisupercomputer project. He is currently a Senior Visualization Programmer at San Diego Supercomputer Center where he has been involved in organizing the Advanced Scientific Visualization Laboratory and has participated in numerous collaborative visualization projects.

Elvins has been active in the computer graphics community for the past five years and has attended the SIGGRAPH conferences in 1985, 1987, 1988, and 1989. Several of Elvins' computer-generated images have been included in SIGGRAPH Technical Slide Sets and have appeared in several journals and magazines. His computer animated movies have been shown in the SIGGRAPH Computer Graphics Theater, in the SIGGRAPH Video and Visualization Reviews, and on PBS television.

Lawrence Gelberg, Stardent Computer Inc.

Lawrence Gelberg works in the Visualization Software Group at Stardent Computer. His interests include scientific visualization and computer animation. Prior to working for Stardent, he worked in the Computer Graphics and Image Processing Laboratory at TASC (The Analytic Sciences Corporation), and as a video game designer for Parker Brothers Games, Inc. He received his B.S. in Computer Science from Boston University in 1981.

Georges Grinstein, University of Lowell

Georges Grinstein is a full time Associate Professor of Computer Science at University of Lowell and the Director of the Graphics Research Laboratory, He received his B.S. from the City College of N.Y., his M.S. from the Courant Institute of Mathematical Sciences of New York University and his PhD from the University of Rochester in 1978. Dr. Grinstein has developed several short courses for the University of Massachusetts, which are taught via videotape sessions. He is well known in the computer graphics field and is frequent

speaker at conferences on graphics, visualization and standards. He is a reviewer for IEEE's Computer Magazine, IEEE's Computer Graphics and Applications and has recently been appointed to the editorial board of the European Journal Computers and Graphics. He has sat on several committees for the American National Standards Institute (ANSI) and the International Standards Organization (ISO). He is currently the chairman of X3H3.6, the ANSI Window Standard Committee and Rapporteur of the User Requirements Group of ISO TC97/SC24/WG1. He is also vice-chair of the executive board of IFIP WG 5.10 (Computer Graphics) and co-chair of the Conference on Experimental Workstations that was held in Boston 1989. He has had grants to implement the Graphics Kernel System (GKS), in use both nationally and internationally, the Image Kernel System (IKS), The Computer Graphics Interface (CGI), the Computer Graphics Metafile (CGM), research grants to develop graphical benchmarks and long range support to develop experimental visualization workstation environments under X Windows. He recently was one of the keynote speakers at the Open Software Foundation's Research Institute kick-off symposium and the keynote speaker at Germany's Information Society 20th year anniversary.

Arie E. Kaufman, State University of New York at Stony Brook

Arie E. Kaufman is currently a Professor of Computer Science at the State University of New York at Stony Brook. Professor Kaufman is the director of the Cube project for volume visualization supported by the National Science Foundation, Hughes Aircraft Company, and the State of New York. He has held positions as a Senior Lecturer and the Director of the Center of Computer Graphics of the Ben-Gurion University in Beer Sheva, Isreal, and as an Associate and Assistant Professor of Computer Science at Florida International University in Miami. His research interests include computer graphics architectures, algorithms, and languages, volume visualization, user interfaces, computer vision, and scientific visualization. Professor Kaufman has published over 70 papers in these areas, has received 23 grants and awards, and has filed 5 patent applications. He received a B.S. in Mathematics and Physics from the Hebrew University of Jerusalem in 1969, an M.S. in Computer Science from the Weizmann Institute of Science, Rehovot, in 1973, and a Phd in Computer Science from the Ben-Gurion University in 1977. He is a member of ACM, SIGGRAPH, IEEE-CS, EUROGRAPHICS, NCGA, and IPA.

Rainald Lohner, The George Washington University

Rainald Lohner is an Associate Research Professor for the Dept. of Civil, Mechanical and Environmental Engineering, at George Washington University, Washington, D.C., He received his M.S. in mechanical engineering from Technische Universitat Braunschweig, W. Germany and his PhD from the University College of Swansea, Wales, United Kingdom. He has consulted for NASA Langley Research Center, McDonnell Douglas, Lockheed as well as several small high-tech companies on topics related to computational methods for unstructured grids. He has also lectured on computational mechanics and conducted research on finite element methods for high speed compressible flows. He is currently developing adaptive refinement strategies for 3-D unstructured grids, 3-D graphics packages for unstructured Grids, unstructured grid flow solvers for incompressible flows, Maxwell Solvers and Particle-in Cell Codes. He is a member of the editorial panel of the international Journal "Communications in Applied Numerical Methods", published by J. Wiley & Sons.

Mark Smith, Cognivision, Inc.

Mark Smith is vice-president and co-founder of Cognivision, Inc. While under the employment of Conoco Inc. a subsidiary of DuPont, Mr. Smith designed and was the principle author of a computer program for multi-dimensional visualization of numerical simulations and experimental data. The program is now being applied in many disciplines including reservoir modeling, oceanography, meteorology, finite element analysis, material sciences, cartography and bio-medical.

At Cognivision, Smith is presently responsible for the further development and enhancement of that program. In particular, he is interested in the advancement of new visualization techniques, the rapid manipulation of large data sets, and the user/computer interface. A 1982 graduate of Purdue University with a M.S. and B.S. in Civil Engineering, Smith was with Conoco from 1982 to 1988 until co-founding Cognivision.

Hikmet Senay, The George Washington University

Hikmet Senay is an assistant professor in the Department of Electrical Engineering and Computer Science at The George Washington University. He currently is responsible for the development of a knowledge-based advisory system for scientific data visualization for the Center of Excellence in Space Data and Information Sciences (CESDIS) at NASA/Goddard Space Flight Center. His previous research was concerned with intelligent help in user-computer interfaces and was funded by IBM and Software Productivity Consortium. His research interests include scientific data visualization, user-computer interfaces, artificial intelligence, and visual programming environments for artificial intelligence languages.

Senay Received his B.S. degree in electrical engineering from Istanbul Technical University in 1979. He was awarded an M.S. in computer engineering, an M.S. in computer science, and a PhD in computer engineering from Syracuse University in 1982, 1986, and 1987, respectively. Dr. Senay is a member of the IEEE Computer society, ACM(SIGCHO and SIGART), AAAI, and Software Psychology Society.