NorVis07

May 21 & 22, 2007
Bergen, Norway

Copper etching: Harald Kryvi

Gathering to discuss visualization and its applications…

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Visualization Gathering 2007 in Bergen, Norway
May 21 & 22, 2007; Høyteknologisenteret (HiB), auditorium 2144 on etasje 2
http://www.ii.UiB.no/vis/events/NorVis07/

Monday, May 21

08:30   Registration

09:00   **Opening**
Introduction
Six high-profile experts in visualization from *(in alph. order)* Austria, Canada, Switzerland, The Netherlands, and the US gather with four high-profile experts from medicine, the oil&gas sector, scientific computing, as well as from marine life research at NorVis07 in Bergen to discuss application demands and visualization opportunities. Visualization can aid the exploration, analysis, and presentation of data from various sources if the application questions are well understood and addressed. A goal of NorVis07 is to establish vivid exchange between various fields of research and development in Bergen and visualization research, now new in Bergen.

09:15   **Chuck Hansen** (SCI inst., Univ. of Utah in Salt Lake City, USA)
Interdisciplinary Research at the Scientific Computing and Imaging Institute
Computers have changed the way we live, work, and even recreate. Now, they are transforming how we think about science, engineering, and medicine. Advances in computational modeling, imaging, and simulation allow researchers to build and test models of increasingly complex phenomena and thus to generate unprecedented amounts of data. These advances have created the need to make corresponding progress in our ability to understand large amounts of data and information arising from multiple sources. Although these machines offer enormous potential for solving very large-scale realistic modeling, simulation, and optimization problems, their effectiveness will hinge upon the ability of human experts to interact with their computations and extract useful information. In fact, to effectively understand and make use of the vast amounts of information *[...]*

(short break)

10:00   **Frits Post** (CG and CAD/CAM group, Techn. Univ. Delft, The Netherlands)
Highlights of Medical Visualization at TU Delft
In this talk, we will give a compact overview of currently running Medical Visualisation research in the TU Delft Data Visualisation Group. To provide a generic context for the techniques developed, we will present a simple pipeline model for medical image processing and visualization. The first project is about automatic polyp detection in virtual colonoscopy. We will show a technique for feature-based detaection using curvature lines, or streamlines of a principal curvature direction field. Secondly, we will discuss the development of techniques for surgical planning and intra-operative guidance for shoulder joint replacement. Interactive, visual simulation of joint mobility will be used in the pre-surgical planning. The third project concerns multi-field data visualization, where structural MRI, functional MRI and diffusion tensor imaging (DTI) are combined for planning a brain tumor resection.

(coffee break)

11:00   **Odd Helge Gilja** (Helse Bergen, Haukeland Univ. Hospital, Norway)
The "MedViz" initiative in Bergen
In Bergen a new initiative has been launched to build bridges between researchers working in the field of medial visualisation. There are many R&D groups in the Bergen area with a longstanding experience in analysis and visualisation of medical data. These groups are located at the University of Bergen, at Haukeland University Hospital at several departments, at Christian Michelsen Research and several commercial companies. So far, these groups have not been coordinated. The "MedVis" initiative seek to bring these groups together in a united action in order to improve analysis and visualisation of medical data to enhance diagnosis and treatment.

Christopher Giertsen (Christian Michelsen Research CMR in Bergen, Norway)
Trends in Visualization Research for Oil&Gas
The Norwegian oil companies and the Research Council of Norway have a long tradition for sponsoring oil&gas related visualization research projects. In the future, it is reasonable to believe that there will be new opportunities in this area. Such opportunities will cover the entire range from academic research to industrial research and development. However, to succeed with new initiaties, it may be useful to understand the historic development. This talk will summarize trends within oil&gas related visualization research over the past 20 years. Examples of drivers for visualization research will be presented, and key points will be illustrated with examples from ongoing and new projetcs. Finally, the lessons learned will be summarized in an attempt to stimulate discussions around new initiatives.

12:15   Lunch break

Monday, May 21 *(cont'd)*

13:30 **Klaus Johannsen** (Parallab, Univ. or Bergen, Norway)
High-Performance- and Scientific Computing at Parallab/BCCS
Parallab is the unit for High Performance Computing at the University of Bergen and operates the universities supercomputer facilities. It is organized as a unit of the Bergen Center for Computational Science (BCCS), a department of the University of Bergen's research company UniFOB. Parallab has its origin in (massively) parallel computing dating back to 1985. As the universities computing center it provides high performance computing services since the early 1990's. Being involved in numerical simulation on various levels, Parallab is one of the major groups concerned with Scientific Computing in Bergen. At the end of the 1990's Parallab became active in various Grid activities and is, since then, one of the pioneers world-wide.
In this presentation we give an overview over the currently ongoing activities at Parallab and sketch future perspectives *[...]*

Olav Rune Godø (Inst. of Marine Research IMR in Bergen, Norway)
Advances in Detection, Mapping and Quantification of Marine Life
Marine research for sustainable management of the marine environment and its resources is a major focus for the research institutions in Bergen. In my talk I will introduce methodologies associated with assessment and management of renewable resources. Particularly, I will exemplify how advances in technology can improve sustainability, e.g. through remote sensing techniques, and particularly demonstrate the expected increasing demand for visualisation. New technologies are characterised by a tremendous increase in data, and new sensor systems open for possibilities of new combining the collected data. The complexity of marine life and the inability of any method to reflect the absolute densities of the target organisms represent a major challenge, particularly when bearing in mind that marine resources are supposed to be managed according to the ecosystem approach. *[...]*

(coffee break)

15:00 **Ronny Peikert** (CG lab, Swiss Fed. Inst. of Tech. ETH Zürich, Switzerland)
Analysis and Visualization of Features in Flow Data
Visual analysis of simulated or measured flow data typically aims at the study of particular phenomena such as vortices, flow separation, or recirculation. For detecting, analyzing and visualizing such structures, a variety of tools has been developed by the visualization community in the past ten years, based on either geometry, physics, or topology. Especially if data are time-dependent there is a need for automatic extraction methods. A wide range of methods is based on the assumption of locally detectable features. Algebraic expressions built from scalar, vector or tensor fields, either original or derived, can characterize a good part of the relevant features. Such local feature criteria allow efficient computation and can result in various geometric representations such as isosurfaces for region-type features or curve sets for line-like features. A complementary approach is *[...]*

15:45 **Krešimir Matković** (VRVis Research Center in Vienna, Austria)
Interactive Visual Analysis for Engineering Applications
Visualization has been used in engineering applications from its early days. Traditionally, scientific visualization techniques were extensively used in this field. We in VRVis have started to combine various visualization techniques and applying them to engineering data. From the data point of view, we deal with two different kinds of data. The first one comes from 3D CFD simulation, and the second one follows an unusual data model which will be described. This data comes from a series of 1D CFD simulations. It is a special case of multidimensional data. The main difference is that certain dimensions can contain mappings (1D, 2D, ... functions) and not only scalar values as basic items. We will present various innovative interactive visualization techniques applied to such a model. The curve view, segmented curve view and color lines view are only a subset of these. *[...]*

Tuesday, May 22

09:00   Welcome

09:15   **Torsten Möller** (CS dep., Simon Fraser Univ. in Vancouver, Canada)
The BCC Lattice -- its advantages for volume graphics
In this talk I would like to summarize our research on BCC lattices and highlight its advantages. We found it to have better numerical accuracy, as well as better perceptual accuracy. Further, it performs twice as fast for comparable ray-casting implementations. On the example of a Lattice-Boltzmann Method solver, we recently have also shown that the acquisition of data on the BCC lattice leads to a more stable solver with less dissipation than the Cartesian counterpart.

(short break)

10:00   **Eduard Gröller** (CG inst., Vienna Univ. of Techn., Austria)
Visualization -- I see it my way
Visualization provides computer-supported tools to enable users with insight into their data. Over the last 25 years visualization as a discipline has come a long way in terms of maturity and in providing a rich set of algorithms and systems for visual exploration, analysis and presentation of data. New data sources like novel imaging modalities and refined numerical simulation schemes, expanding application domains, and novel display devices pose considerable research challenges for the visual display of information. Based on current research activities of our group the talk will give a personal view on future potential visualization-research directions.

(coffee break)

11:00   **Panel discussion "future trends in visualization"**
The panel will try to address the question of upcoming new trends in visualization research, very much also influenced by the question of utility -- where in the future do the panelists see visualization as a *must-have* (in contrast to a *nice-to-have*). A question to be discussed in this context will be where visualization really makes difference in the sense that a (measurable) benefit is achieved which otherwise is impossible (or much more expensive). An ambitious goal of this panel discussion is to take an honest look at maturity in the field of visualization -- where do we already have sufficient (though maybe not optimal) solutions and where do we urgently need not yet known solutions (the panelists will be invited to comment on the question of what it means to visualization research that customers, or application partners if you like ;-), search for the sufficient whereas research usually aim at the optimal. Where in visualization did we pass this boarder of sufficiency?

12:15   Lunch & end of gathering…