Insight Through Images: Visualization and Collaboration Technologies for Exploring Big Data

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Electronic Visualization Laboratory, University of Illinois at Chicago
Established 1973
4 full-time staff
Currently 15 funded grad students, 6 undergrads
Interdisciplinary CS, Art, Biomedical, Communications, etc.
Work in partnership with universities, research labs, non-profit orgs and industry.
EVL’s Focus – Integrated, Visualization and Virtual Reality Collaboration Spaces

“Lenses” for Data Exploration

- Immersive Visualisation
- Data Processing and Analytics, HPC, Tools
- Data Capture Instrumentation
- Dissemination and Data Services

BIG DATA

Image: Paul Bonnington, eResearch Centre, Monash University

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Today The World Is Increasingly Data Driven

• Data is now easy to acquire and growing faster than we can analyze it.
• Data is growing in complexity – multiple and different types of data need to be fused to enable discovery.
• Getting a handle on scale and complexity are the challenges.
How Do Mortals Deal With Scale and Complexity? Merging Northwest & Delta Airlines

IN THE BEGINNING: BRIDGING
In the months around October 2008, when the merger was closed, there was a flurry of “bridging” projects: opening up access between the airlines’ computer systems so each could see what the other was doing. A priority was to quickly show customers the benefits of the merger.

THE NEXT STEP
About five months after the merger, the two airlines began “cross-fleeting,” when critical systems like reservations had to start talking to each other. But they remain separate operations.

ONE AIRLINE, ONE BRAND
Delta received final government approval to operate as a single airline in January 2010. At that point, all the computer systems could be switched to unified platforms. Many, like reservations and seat availability and pricing, had to be switched over at the same time.

A photograph of the master guide, taken by Delta Air Lines, in its headquarters in Atlanta in September 2008.
How Do Mortals Deal With Scale and Complexity?

Antarctic Drilling Program
“War” Rooms / Project Rooms help us come together to solve problems that are too complex for us to individually manage.
What Lessons Can We Learn?

• Spread information out
• Organize information in a variety of ways- e.g. spatially
• Link between information
• Work together with others on the information
• Make the result persistent for later referral
EVL Enables Discoveries Through Interdisciplinary Collaborations Using Visualization Technologies
SAGE2: Scalable Amplified Group Environment

- Middleware to access, display, and share high-resolution digital media on scalable resolution display environments
- SAGE2 is a total rewrite of SAGE using web technologies
- Multi-touch interaction (one or many people)
- Push laptop windows or laptop screens onto a wall

www.sagecommons.org
Electronic Visualization Laboratory, University of Illinois at Chicago
SAGE2: Scalable Amplified Group Environment
Display Walls in Shared Offices and Single Offices
How EVL Developers Work

Electronic Visualization Laboratory, University of Illinois at Chicago
EVL Local and Remote Collaborations

Teaching Visual Analytics Class

EVL Brainstorming Session

Geoscientists Analyze Data

EVL/NCSA Virtual School

Electronic Visualization Laboratory, University of Illinois at Chicago
Global Lambda Integrated Facility
CAVE: Local and Remote Collaboration

CAVE, introduced 1992

Rem Koolhaas, IIT and SARA

Virtual Harlem, with U Missouri

General Motors Research

NCSA and Caterpillar

Electronic Visualization Laboratory, University of Illinois at Chicago
CAVE2™ Merges Benefits of Immersive Virtual Reality with Ultra High Resolution Tiled Display
CAVE2 Applications
5-Million Atom Simulation from Argonne Leadership Computing Facility for Nanoscale Material Science Research
Connectome: Map of Brain’s Neural Connections
Streamlines Depict White Matter Fiber Tracts in the Brain (MRI Diffusion Tensor Images), Color-Coded by their Primary Direction
NASA ENDURANCE Project

Environmentally Non-Disturbing Under-ice Robotic ANtarctiC Explorer
UIC Hands-on Automated Nursing Data System (HANDS)

Patients’ Care During Nurse Hand-Offs Studied to Understand Care vs. Outcomes in Standardized Formats Across Time and Units.
City of Chicago, Office of CIO
City-Wide Understanding of Crime Data
EVL Sponsors

- Funding from Federal agencies, industry and non-profit institutions
- Fostering early adoption by supporting user communities
- Providing educational experiences to students, who receive jobs upon graduation
Thank You!

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