Geovisual Analytics ISPRS Workshop

A/Prof Chris Pettit, Uni of Melb. Australia
Dr Arzu Coltekin, Uni of Zurich, Switzerland
Dr Amy L. Griffin, Uni of NSW, Australia
Dr Anthony Robinson, Penn State Uni, U

7 CPD points for SSSI Members

Geovisual analytics couples visually-enabled software tools with dynamic methods for supporting analytical reasoning about geographic phenomena. They support decision-making as well as the process of obtaining new insights and inferences from complex data sets. Examples of geovisual analytics tools include interactive maps, digital globes, geo-virtual environments, space time cubes and coordinated multiple view visualization environments. Geovisual analytics tools are used to support decision-making about problems involving complex, dynamic phenomena, whose solutions require the synthesis of multiple visual, statistical, and analytical methods. This workshop will provide both theoretical grounding for the design and use of geo-visual analytic tools as well as practical experience with geovisual analytics applications for exploring spatial data and decision spaces. The workshop will expose participants to a range of geovisual analytic tools and techniques for understanding their use.

The workshop is planned for a full day from 9am to 5:30pm. The first half of the workshop consists of four lectures approaching geovisual analytics from four different perspectives.

**Lecture 1:** How can user-friendly geo-visualisation tools such as digital globes, gaming engine tools, 3d object libraries and touch screens assist planners and decision-making in exploring complex spatial-temporal information? This lecture will examine some of the practical considerations and lessons learnt in providing end users (planners and decision-makers) access to geographical data products and computer simulation models in dealing with real world issues such as population growth and climate change.

**Lecture 2:** How can our knowledge of human vision can support visualization design? This lecture will provide an overview of vision inspired visualizations taking the ‘human factors’ into account, hence potentially enabling more efficient visual analytics processes. The lecture will further focus on stereoscopic vision and visualization as well as virtual and augmented environments, and use of multimedia to enhance and support analytical reasoning.

**Lecture 3:** Technological capabilities for producing new visualizations have outstripped our understanding of how well users can explore, think and reason with visual tools. For example, we know from change blindness studies that users can miss significant amounts of information presented in animated maps. So how can we design better animated maps that help to mitigate this problem? This lecture will review what we know about which human perceptual and cognitive limits and capabilities should be kept in mind when putting together suites of tools for geovisual analytics.

**Lecture 4:** Developing connections between emerging analytical needs, new geographic visualization methods, and end-users requires us to choose among a wide range of user-centered design techniques. This lecture will review a diverse range of approaches taken by the GeoVISTA Center at Penn State University to design and evaluate geovisual analytics tools for crisis management, homeland security, and disease surveillance contexts.

The second half of the workshop will include demos and hands-on exercises for investigating the usability of these tools. Workshop participants will work with a range of geovisual analytics tools including online visualisation interfaces that leverage geospatial social media, and usability methodologies such as eye-tracking.
Who would benefit from attending this workshop?

While we welcome anyone interested; this workshop will be of particular benefit to people whose work involves generating information to support spatial decision-making in complex problem contexts. You will be introduced to state-of-the-art tools and methods that can help you understand how to choose and design tools that are most effective for your application area. The workshop is also beneficial to scientists and researchers who are interested in user-centered geovisualization design and evaluation.
Provisional Program

Morning Presentations

9-9.45 Presentation Applications of geographical visualization in spatial planning and decision-making – Chris Pettit

9.45-10:30 Presentation: What can we learn from vision to enhance geographic visualizations? – Arzu Coltekin

Coffee break (morning tea)

11:00-11:45 Presentation: How should perceptual and cognitive factors inform the design of geovisual analytics displays? – Amy Griffin

11:45-12:30 Presentation: User-centered design and evaluation to support analytical reasoning with geographic information– Anthony Robinson

12:30-13:30 Lunch

Afternoon practical sessions

13:30-17:30 Practical sessions:

13:30-14:00 Intro & Demo 1: Exploring and visualising urban research data through the Australian Urban Research Infrastructure (AURIN) portal, Chris Pettit & Martin Tomko

14:00-15:00 Exercise 1: Social media mapping with SensePlace2, Anthony Robinson (eye tracking hands-on experience in parallel)

15:00-15:30 Coffee break (afternoon tea) (eye tracking hands-on experience in parallel)

15:30-16:30 Exercise 2: Use of Digital Globe for exploring what if? Future scenarios (eye tracking hands-on experience in parallel)

16:30-17:30 Demo 2: Wrap-up and initial results from eye tracking, discussion (focus group for eye tracking), Arzu Coltekin & Amy Griffin
**Organisers**

Chris Pettit (University of Melbourne), Arzu Çöltekin (University of Zurich), Amy Griffin (University of New South Wales Canberra), Anthony Robinson (Penn State University)

**Chris Pettit, PhD**

Associate Professor Chris Pettit is the Strategic Implementation Coordinator of the Australian Urban Research Infrastructure Network (AURIN), the University of Melbourne. He is Chair of the ISPRS working group on Geographical Visualization and Virtual Reality. He has published more than 100 papers in the areas of geographical visualization, e-research, spatial planning and decision support systems. His current research interests lie in the design of user-centric participatory planning tools which can be applied to a myriad of spatial planning problems including climate change adaptation and managing the built and urban environment.

**Arzu Çöltekin, PhD**

Dr. Arzu Çöltekin is a Senior Researcher and Lecturer in the Geographic Information Visualization and Analysis Unit in GIScience Center of Department of Geography in University of Zurich, Switzerland. She is an executive member of the ISPRS working group on Geographical Visualization and Virtual Reality. Arzu has an interdisciplinary research agenda with a focus on geographic visualization design. She leads and takes part in projects that investigates theories based on human vision to inform visualization, stereoscopic vision and displays, eye tracking for gaze contingent displays and user experience studies, image and video processing, temporal information visualization and analysis based on image and video, and multimedia visual analytics.

**Amy Griffin, PhD**

Dr. Amy Griffin is a Senior Lecturer in the School of Physical, Environmental and Mathematical Sciences at the University of New South Wales-Canberra. Her research seeks to understand the perceptual and cognitive processes people invoke when they read maps and information graphics and think and reason with spatial information. Knowledge of these processes is fundamental to producing useful and usable geovisualization and geovisual analytics tools. Her recent research has looked at how highlighting helps to connect different visualization tools together and how different visualization methods can mitigate change blindness in animated maps.

**Anthony C. Robinson, PhD.**

Dr. Anthony Robinson is Assistant Director for the Department of Geography’s GeoVISTA research center at the Pennsylvania State University. Robinson’s research focuses on the science of interface and interaction design for geographic visualization software tools. He has developed interface design and usability assessment methods for integrating geographic visualization tools with work in epidemiology, crisis management, and homeland security. Robinson’s recent research projects have focused on the design of map symbol standards, developing tools for collecting and adding meaning to geographic information, and eye-tracking to design new geovisualization techniques. In addition to externally-funded research activity, Robinson serves as the lead faculty member for Penn State’s M.S. in GIS and post-baccalaureate GIS Certificate programs.