VAC Newsletter

Integrated Visualization and Analytics Community

iVAC@dhs.gov

Volume II, Issue II

February 2010

Inside this issue:

VACCINE and CCICADA at 2010 TCIP	2-3
US-UK Collaboration in Anomaly Detection Research	4
Data Sciences Summer Institute	4
Quadrennial Homeland Security Review	5
Risk and Economic Analysis at World Trade Center Site	6
IEEE VAST Call for Papers	7
VACCINE & Capitol Forum Indiana	7
Schedule of Events	back

Social Network Research at UP Summit

Command, Control, and Interoperability Center for Advanced Data Analytics (CCICADA)

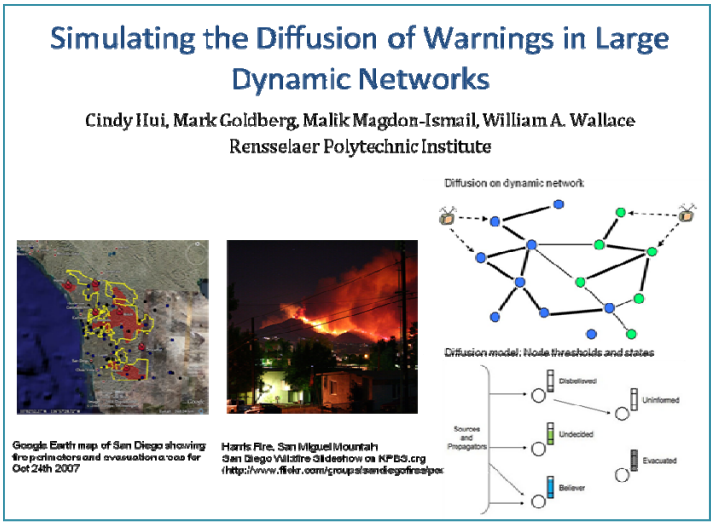
Cindy Hui, a CCICADA researcher and PhD Candidate in the Industrial and Systems Engineering Department at Rensselaer Polytechnic, has been selected to present at the DHS University Programs Summit in March, 2010.

Her research in modeling the dynamics of information diffusion in social networks, and her poster submission, which uses the 2007 San Diego firestorms as a framework, won her recognition at the 2010 DHS University Network Summit Poster Abstract Competition.

The title of the project, "Simulating the Diffusion of Warnings in Large Dynamic Networks", seeks to understand the social communication network in communities during hazardous events. Under examination are questions concerning how these networks spread warnings to a larger audience and help ensure that people at risk act on the information they receive.

This work involves formulating an axiomatic framework for modeling the diffusion of warnings in dynamic social networks through the concept of trust. A network is dynamic when individuals may leave the network and disrupt the flow of information as warnings are being diffused. Social group structure, distribution of trust, and existence of weak ties affect the spread of evacuation warnings and are the subject of the modeling process.

By using multiple data sources relevant to an event, this project contributes to the area of emergency preparedness and response. The resulting simulation can serve as a tool for emergency response teams to gain insights on how demographics can influence and social communities and demographics may respond to various warning technologies.



CCI COE at 2010 TCIP

U.S. Department of Homeland Security (DHS)

The Command, Control and Interoperability (CCI) Division of the DHS Science and Technology Directorate, invited teams from the Command, Control and Interoperability Center of Excellence (CCI COE), VACCINE and CCICADA, to demonstrate selected technologies at the CCI demo booth at the 2010 Technologies for Critical Incident Preparedness (TCIP) conference.

The VACCINE and CCICADA demonstrations allowed the presenters a chance to show-off their tools for the conference attendees, which included personnel from several government agencies, the emergency response community, academia and industry, as well as interface with each other and the program managers of the CCI Division.

Special thanks to the presenters from VACCINE and CCICADA!

Rob Roth and Kevin Ross (Penn State University)

Bill Pottenger (Rutgers University)

Tim Collins (Purdue University)

Andre Doumitt (Geosemble)

In total, six technologies were demonstrated. A brief description of each is provided here. For more information on or contact information for any of these technologies, please email iVAC@dhs.gov.

Rosetta Phone—VACCINE, Purdue University

The Rosetta Phone is a real-time, autonomous, visual translation and interpretation device in the form of a handheld, camera-equipped mobile device (e.g., mobile telephone, iPhone).

The Rosetta Phone captures images of street signs, building placards or documents found in the field, in multiple character sets and languages, and then performs character recognition and language translation in concert to translate the signs or printed matter into spoken English.

GeoXRay—CCICADA, Geosemble Technologies

GeoXray is a tool that brings content to aerial imagery and maps being viewed. That content can include information on individual feature points, such as addresses, businesses and building names, and dynamic content such as news, blogs, and tweets. Using a set of software tools, the content is automatically integrated and displayed on the feature points that relate to the content. Geosemble offers its own user interface for the system, so that it can integrate with existing systems. GeoXRay can be run as a service or delivered to work securely behind government and corporate firewalls. By identifying and integrating content relevant to specific geographic areas, GeoXray allows users a more complete and intuitive geographic search and discovery experience.

Andre Doumitt demos Geosemble's GeoXRay.

iVAC@dhs.gov
Volume II, Issue II
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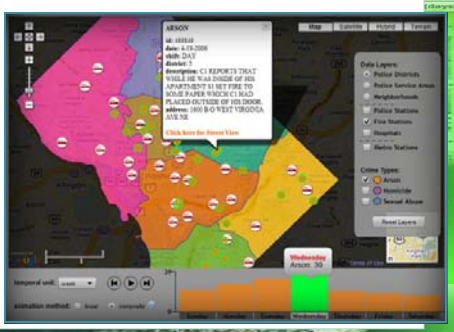
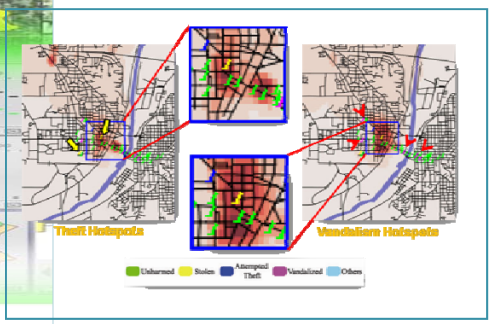
GeoVISTA—VACCINE, Penn State University

GeoVISTA CrimeViz is an extensible web-based map application that supports temporal and spatial exploration and sensemaking of criminal activity. The current prototype illustrates the potential of the tool by visualizing a rich dataset of violent crimes published to the web in near real-time by the District of Columbia Data Catalog (http://data.octo.dc.gov/). The prototype implementation includes a central interactive map, filtering by crime type, linear and composite animations and VCR controls, an interactive temporal legend that doubles as a frequency histogram, and a set of togglable reference map layers.



Scalable Visual Analytics for Law Enforcement (VALET)—VACCINE, Purdue University



Law enforcement agencies handle and file criminal activities creating large amounts of data which, when analyzed, can provide insights into criminal behaviors and in turn help them operate more efficiently. In this project, VACCINE developed a scalable toolkit for visual analysis of law enforcement data to enable both in and off-field analysis. The desktop and mobile toolkits provide spatial and temporal exploration, prospective and predictive integrated analytics of police records enabling improved analytics, hotspot detection, and strategic planning.

Law Enforcement Information Framework (LEIF)—CCICADA, Rutgers University

The Law Enforcement Information Framework (LEIF) is part of a new generation of "lightweight" analytic components that scale across use contexts – from hand-held devices to desktops to collaborative settings – and enable analysts to rapidly detect patterns, trends, events, and entities of interest in streaming incident data. LEIF aids in decision support, enabling individuals and organizations to intelligently leverage their ever-growing data stores. The development of LEIF was driven by real-world user feedback gathered through deployments in operational law enforcement organizations. LEIF is currently deployed at the Port Authority of New York and New Jersey, Seattle Police Department and San Diego ARJIS.

Multimodal Information Access—CCICADA, University of Illinois at Urbana-Champaign

The goal of the Center for Multimodal Information Access and Synthesis (MIAS) at UIUC is to develop the fundamental theories, computational models, algorithms, and tools for analysts to access a variety of data formats and models, to integrate them with existing resources, and to transform raw data into useful and understandable information, in support of productive and efficient analysis. The demonstration illustrated entity identification and relationship discovery.

MIAS MULTIMODAL INFORMATION ACCESS AND SYNTHESIS

Anomaly Detection

U.S. Department of Homeland Security (DHS) & U.K. Home Office

The Basic/Futures Research (BFR) Enterprise is engaged with the United Kingdom (UK) Home Office in a collaborative research initiative in Anomaly Detection. Conversations with the UK have led the BFR-Home Office team to begin organizing an Anomaly Detection Sandpit.

A Sandpit is an innovative and free thinking event, where a diverse group of 20-30 people, from diverse backgrounds and disciplines come together for an intensive 5-day workshop. The design of the Sandpit immerses the participants in an exciting, interactive collaborative environment, to uncover innovative solutions to cross-disciplinary problems.

At the end of the 5 days, outcomes and peer-reviewed research topics will be outlined, leading to formal joint US-UK projects in the area of Anomaly Detection.

Data Sciences Summer Institute (DSSI)

Command, Control and Interoperability Center for Advanced Data Analytics (CCICADA)

The 3rd Annual Data Sciences Summer Institute (DSSI) will be held May 24-July 2, 2010, on the campus of the University of Illinois at Urbana-Champaign (UIUC).

This 6-week long program will expose students to the mathematical foundations of Data Sciences, allow them to attend advanced tutorials and seminars on a diverse set of topics in this area given by leading experts in the field, and provide hands-on experience working on research on topics such as:

- Machine Learning approaches for Natural Language Understanding and Information Extraction
- Knowledge Discovery in Social and Information Networks
- Information Retrieval and Text Mining
- Computer Vision

Eligibility Requirements include:

- College Junior or Senior Computer Science students (majors or minors) and beginning graduate students.
- Students should show strong academic performance and must have sufficient mathematical and programming experience.
- Applicants must currently be living in the United States as citizens, residents or Visa holders.
- Room, board and stipend will be provided to qualified students.

The deadline for registration is March 31, 2010. For more information and the online application form for DSSI, visit: http://mias.illinois.edu/DSSI. This program is funded by the DHS Center of Excellence—CCICADA at UIUC's Multimodal Information Access & Synthesis (MIAS) Center.

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Volume II, Issue II
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Quadrennial Homeland Security Review (QHSR)

U.S. Department of Homeland Security (DHS)

On February 1, 2010, DHS delivered the first-ever Quadrennial Homeland Security Review (QHSR) Report to Congress. This report outlines the strategic framework designed to guide the activities of the homeland security community toward a common end.

The QHSR is the beginning of a multi-step process, and involved the input of 20,000 homeland security stakeholders. It offers a vision for a secure homeland, specifies key mission priorities, outlines goals for each of those mission areas, and lays the necessary groundwork for the subsequent steps.

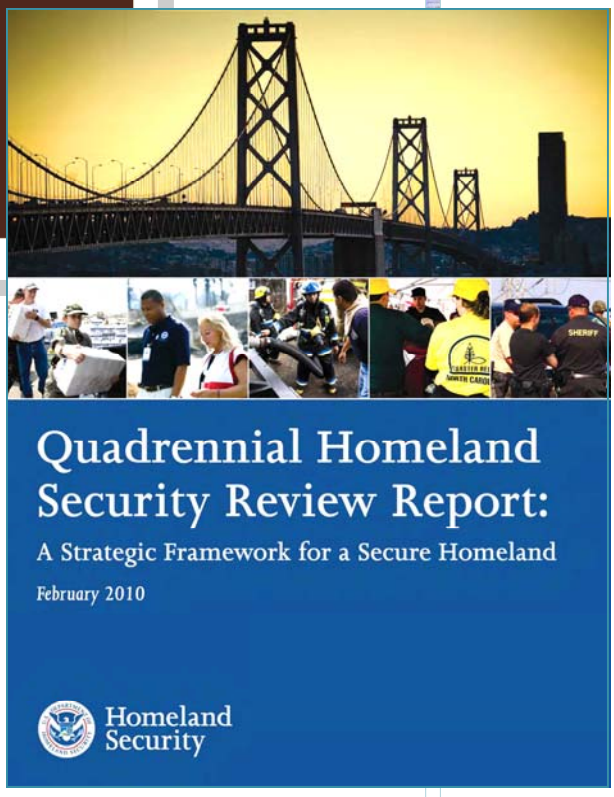
The next step is a bottoms-up review of DHS, which strives to align the programmatic activities and organizational structure of DHS with the framework set out in the QHSR. This process will culminate in the DHS fiscal year 2012 budget submission.

Excerpt from the QHSR Executive Summary:

"...While the importance of preventing another terrorist attack in the United States remains undiminished, much has been learned since September 11, 2001, about the range of challenges we face."

Outlined in the QHSR are five missions for the homeland security enterprise:

- Preventing Terrorism and Enhancing Security
- Securing and Managing U.S. Borders
- Enforcing and Administering U.S. Immigration Laws
- Safeguarding and Securing Cyberspace
- Ensuring Resilience to Disasters



In addition to these specific missions, the QHSR focuses on maturing the homeland security enterprise, which includes enhancing shared awareness of risks and threats, building capable communities, fostering unity of efforts, and fostering innovative approaches and solutions through leading-edge science and technology. Of note, here, is the expansive definition of that Enterprise, which now includes federal, state, tribal, and local government organizations, as well as community groups and individuals.

For the full report and more information on the QHSR, visit: www.dhs.gov/qhsr

Risk and Economic Analysis of World Trade Center

U.S. Department of Homeland Security (DHS)

The attack on World Trade Center (WTC) on September 11, 2001, remains the most significant anti-American terrorist incident to date. Ground zero is a symbol of our nation's determination to protect the homeland but remains a potential target for further terrorist attacks. Two opposing forces dictate activities at ground zero. One is the need to employ security measures that can deter, prevent or reduce the likelihood of terrorists again attacking this location. The other force is the desire to return to normalcy in terms of business and economic activity.

The new World Trade Center complex, illustrated above, will include five new skyscrapers (the tallest of which is to be 1 WTC, nicknamed the "Freedom Tower", at 1,776 feet tall—about 50 feet taller than the buildings destroyed on September 11, 2001), the National September 11 Memorial and Museum, the World Trade Center Transportation Hub, a Retail Complex and a Performing Arts Center. It will provide a significant economic boost for the area and dramatically enhance the quality of life for the people who live, work and visit downtown NYC.

The lack of economic viability at the location of the WTC is a continuing consequence of the September 11 attack and is troubling to the Port Authority of New York and New Jersey (PANYNJ), which has oversight and financial responsibility for its operations. Numerous other stakeholders have security and economic goals for the downtown New York City (NYC) area, and the problem is complicated by the presence of a variety of political and social considerations that go beyond security and economics.

DHS, through the CREATE and CCICADA Centers of Excellence, has proposed a research project with the PANYNJ, NYC, and the States of New Jersey and New York. This research will involve the development of micro-models of economic activity at the WTC site and the surrounding neighborhood, including tourism and small business activity, and analysis of connections between economic activities near the WTC site and the rest of NYC. The work will seek to understand the economic effects of different security measures, understanding that sometimes security and economic development are synergistic.

The study will investigate security measures that can be deployed at the WTC site against various threats, the major potential risks, the direct and indirect economic consequences of successful terrorist actions, as well as the economic costs of and benefits derived from security measures. These elements will be combined through a risk-based economic analysis to provide a model that assesses the relative costs and benefits of varying combinations of security measures and policies and develop a tool that policy makers and stakeholders can use to compare different security measures as to their risk and economic consequences.

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Volume II, Issue II
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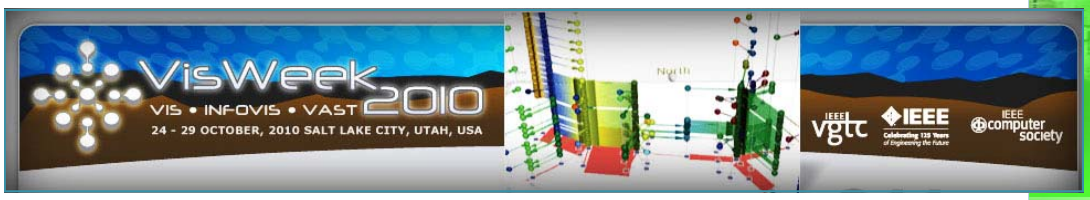
IEEE VAST Call for Papers

Pacific Northwest National Laboratory (PNNL)

There have been continual increases in attendance and the quality of work presented at the previous IEEE Symposiums on Visual Analytics Science and Technology (VAST) in the past. Consequently, IEEE VAST will be a conference starting in 2010. Founded in 2006, IEEE VAST is the first international meeting dedicated to advances in Visual Analytics Science and Technology. Co-located with the annual IEEE Visualization Conference and the IEEE Information Visualization Conference, the scope of the VAST conference will include both fundamental research contributions within visual analytics, as well as applications of visual analytics, including applications in science, engineering, medicine, health, media, business, social interaction, and security and investigative analysis.



Selected best papers from IEEE VAST 2010 will be invited to submit extended versions for publication in special issues of peer-reviewed journals after the conference. The call for papers may be found at: http://vis.computer.org/VisWeek2010/vast.html

VACCINE & Capitol Forum Indiana

Visual Analytics for Command, Control and Interoperability Environments (VACCINE)

Marti Burns, Assistant Director of Engagement and Education for VACCINE and Bryan Sims, DHS HS-STEM Career Development Grant awardee, spoke at a February 2010 teacher workshop, whose purpose was curriculum development for the Capital Forum Indiana (CFI).

Capital Forum Indiana is a civic engagement and international education program that focuses on current global issues and U.S Foreign Policy. This program is intended for high school teachers and students across Indiana, and is part of a larger, multi-state initiative of *The Choices Program* at Brown University.

CFI engages classes from various types of schools in active research, deliberation, writing and reflection. At this workshop, Bryan Sims spoke about his HS-STEM research in nuclear engineering and nuclear cargo detection. Marti Burns spoke to attendees about the work of VACCINE and educational opportunities within the visualization sciences field. Both topics apply directly to the Capitol Forum curriculum.

Teachers will work with selected students to complete the CFI program at the State Capitol in April 2010. During the forum, student teams will report on the international concerns of their classmates and engaged in a deeper exploration of alternative policy directions. The two-day program culminates in a dialog among students, teachers, and elected officials and policy makers.

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Schedule of Events

Paper Submission Deadline for EuroVis 2010
March 1, 2010

IEEE Pacific Visualization
Taipei, Taiwan | March 2-5, 2010

S&T University Programs University Summit
Washington, DC | March 9-11, 2010
(student day March 9th)

ISCRAM 2010
Seattle, Washington | May 2-5, 2010

GeoVA(t) Workshop
Guimarães, Portugal | May 11, 2010

IVAPP 2010
Angers, France | May 17-21, 2010

Data Sciences Summer Institute
University of Illinois at Urbana-Champaign
May 24 –July 2, 2010

Advanced Visual Interfaces Conference
Rome, Italy | May 25-29, 2010

EuroVAST and EuroVis 2010
Bordeaux, France | June 8-11 2010

SOUPS
Redmond, WA, USA | July 14-16, 2010

SIGGRAPH 2010
Los Angeles, CA, USA | July 27-29, 2010

IEEE VAST
Salt Lake City, UT, USA | Oct. 24-29, 2010

March 2010

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June 2010

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