Features:

Visual Analytics at Boeing: The Boeing Company is partnering with universities to develop visual analytics solutions to highly complex industry problems (page 6)

Purdue Visual Analytics Center: PURVAC performs visual analytics research applicable to numerous fields, including emergency response, health care, food production and network security (page 12)

An Imagination Toolbox: Middle and high school students and teachers are using a graphical programming environment to create 3D games and simulations to solve real-world problems (page 20)
Purdue University Regional Visualization and Analytics Center

PURVAC is an interdisciplinary research center with expertise in visual analytics, visualization, data integration and management, statistical analysis, image and video processing and analysis, mobile computing, data intensive computing, epidemiology, command and control, public health, veterinary health, medicine, homeland security and law enforcement. PURVAC’s overall goal has been to develop visual analytic environments for the communication of information and insight from massive, disparate, incomplete and time-evolving homeland security data sets. These environments are comprehensive, providing analytic capabilities that enable the entire process from receiving massive, multisource and multimedia raw data, to the integration and extraction of relevant data necessary for the information analysis task, to the integrated visual presentation and analysis environment for evidence-based planning, decision making and response.

Mission-Oriented Research Goals

In order to have a direct impact on DHS missions in the near term, PURVAC is focused on mission-oriented research goals in two broad areas:

1. Integrated visual analytic and command and control environments for emergency planning, response and incident investigation:
   - Mobile analytics/sensor analytics
   - Emergency operations center/first responder visual analytic environments
   - Emergency response training
   - Video analytics
   - Network security analytics.

2. Novel, effective visual analytic tools for situational monitoring, event detection, planning and response for improved health and safety:
   - Healthcare monitoring
   - Pandemic and syndromic surveillance, management and interdiction planning
   - Biological sensing
   - Animal health and food production monitoring and management.

Mobile Analytics

Mobile devices bring computing power to personnel in any location. By leveraging their mobility factor, researchers can deliver visualization and data exploration solutions to problems that require on-site analysis where traditional desktop solutions are impractical. Typically, mobile visual analytic solutions are useful for in-field personnel, such as emergency responders and investigators. Emergency responders can take advantage of mobility coupled with wireless connectivity to be situationally aware. These devices can also be used to communicate and collaborate among field personnel. Real-time situational updates enable personnel to make critical decisions intelligently and rapidly in the wake of emergencies. Additionally, in-field investigators, such as network analysts and diagnostic personnel, can leverage the advantage of real-time connectivity and readily available computing power to interactively explore, analyze and diagnose situations directly in the field. The goal of this work is to explore the challenges in creating compact and interactive visualizations supported by limited mobile hardware on devices ranging from Tablet PCs to Pocket PCs, PDAs and cell phones. PURVAC is developing systems to address these issues.
Healthcare Analytics

The role of public health surveillance is to collect, analyze and interpret data about biological agents, diseases, risk factors and other health events in order to provide timely dissemination of collected information to decision makers. Unfortunately, data sources vary widely in accuracy and reliability, and frequently, unusual health trends, such as outbreaks or poisonings, have an incidence profile (signal) that is obscured by the statistical noise. To help investigators overcome these issues, PURVAC has developed a suite of statistical and visual analytical tools that couple novel data sources with human health data and enable more effective, advanced and timely analysis and investigation of unusual health events. Primary data sources include emergency room data from the Indiana State Department of Health, general visits of pets to Banfield, The Pet Hospital locations, Indiana Board of Animal Health data and data from public health news feeds, such as ProMed. These analytical tools and data sets are brought together in a visual analytics environment called Linked Animal-Human Health Visual Analytics. The LAHVA application provides investigators with the ability to visually search the data for clusters in both a statistical model view and a spatio-temporal view. By providing linked graphical and statistical analysis views for public health officials, PURVAC will improve event detection and response, while reducing false positives.

For more information about the Purdue University Regional Visualization and Analytics Center, see http://www.purvac.org

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Public health monitoring, investigation, analysis and response planning visual analytic display for the state of Indiana. This example shows inquiry and visual analysis for gastrointestinal case totals for the time period per county along with detailed statistical analysis plots for advanced analysis of three specific regions of interest, indicated by the circles in the main window.