



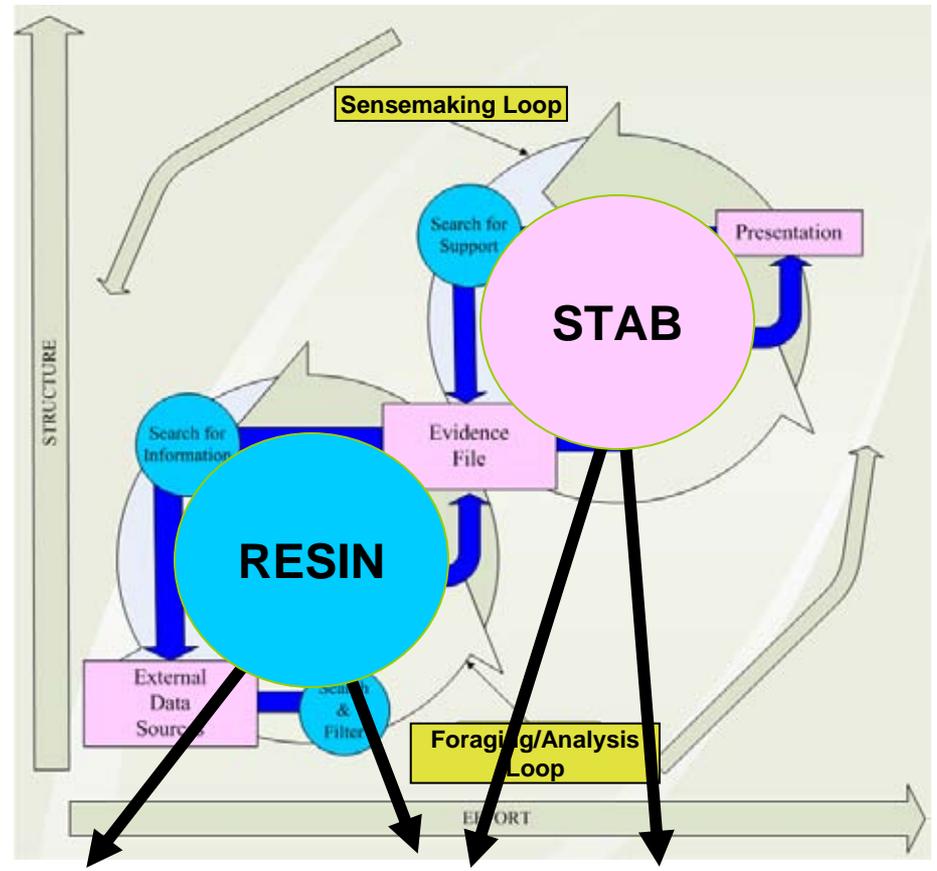
SouthEast RVAC Research that Supports CCI



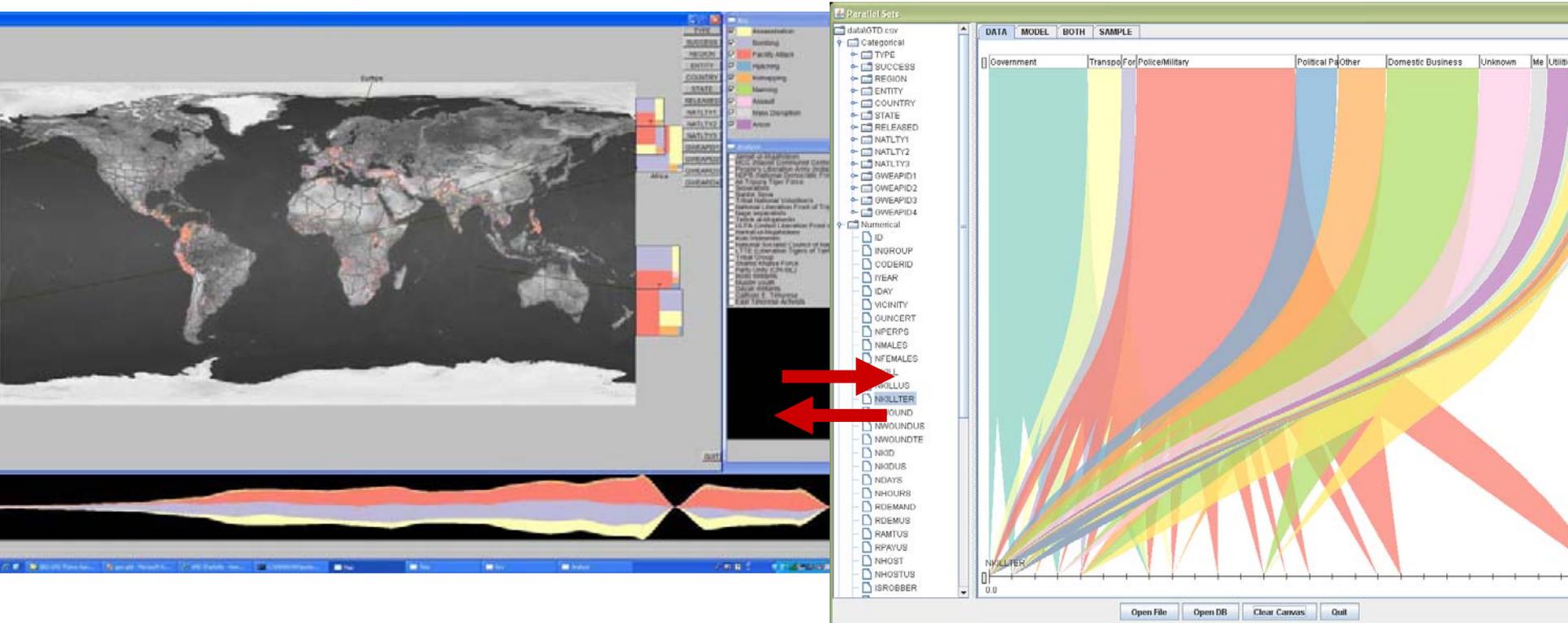


Foraging, Analysis, Reasoning, and Decision-Making for Large Data and Complex Problems

- Objective – Develop capabilities for collecting evidence from large and multiple data sources, with multiple analysis tools. Build hypotheses and use to steer data collection. Methods must be automated but subject to user control. Integrate all for presentation or decision.
- DHS Mission Impact – New means of support for intelligence analysts, disaster prevention planners, and emergency responders.



Terrorism Data Analysis



Side-by-side geo-temporal and categorical relation interfaces with “balanced interaction

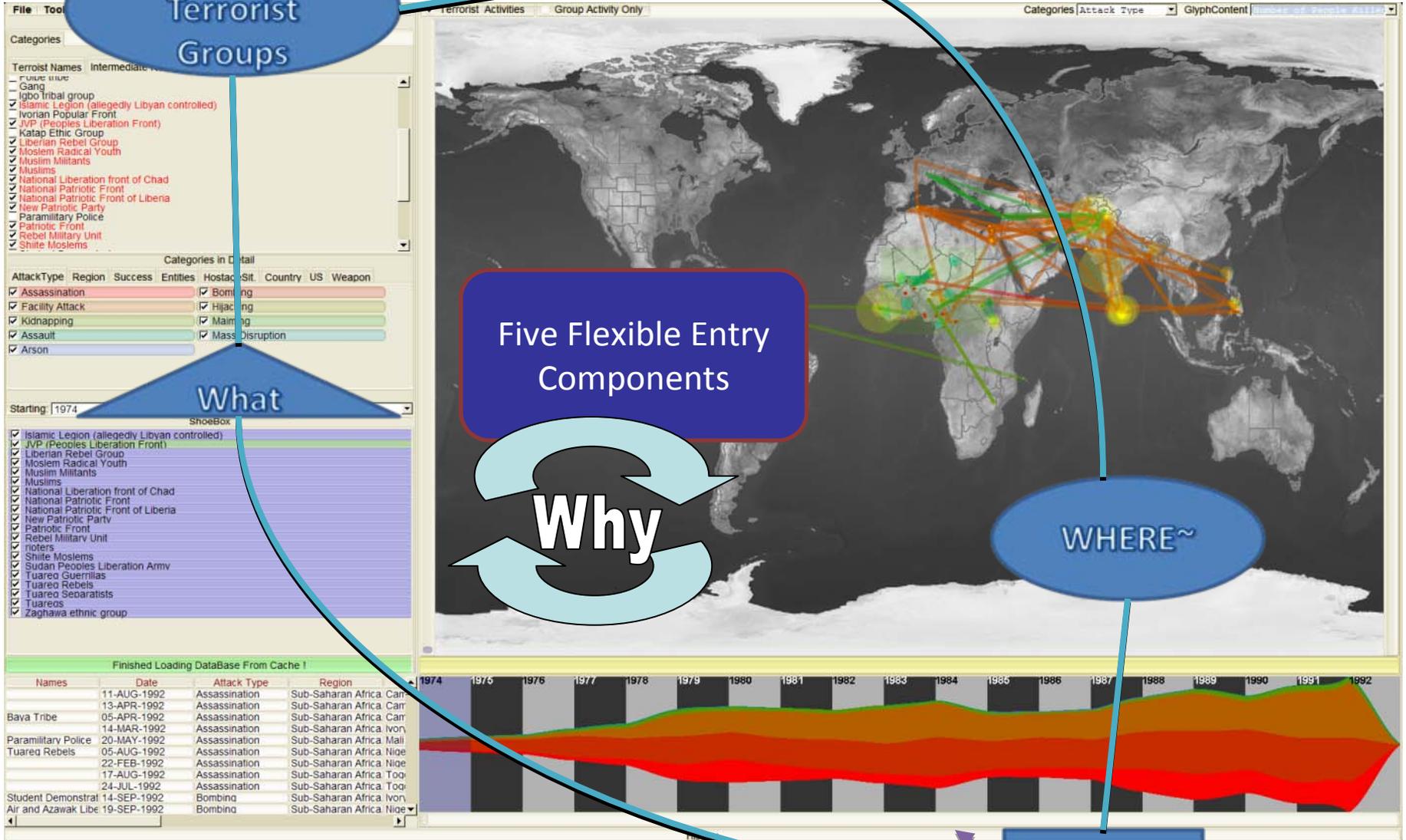
WHO - Terrorist Groups

Five Flexible Entry Components

Why

WHERE~

WHEN



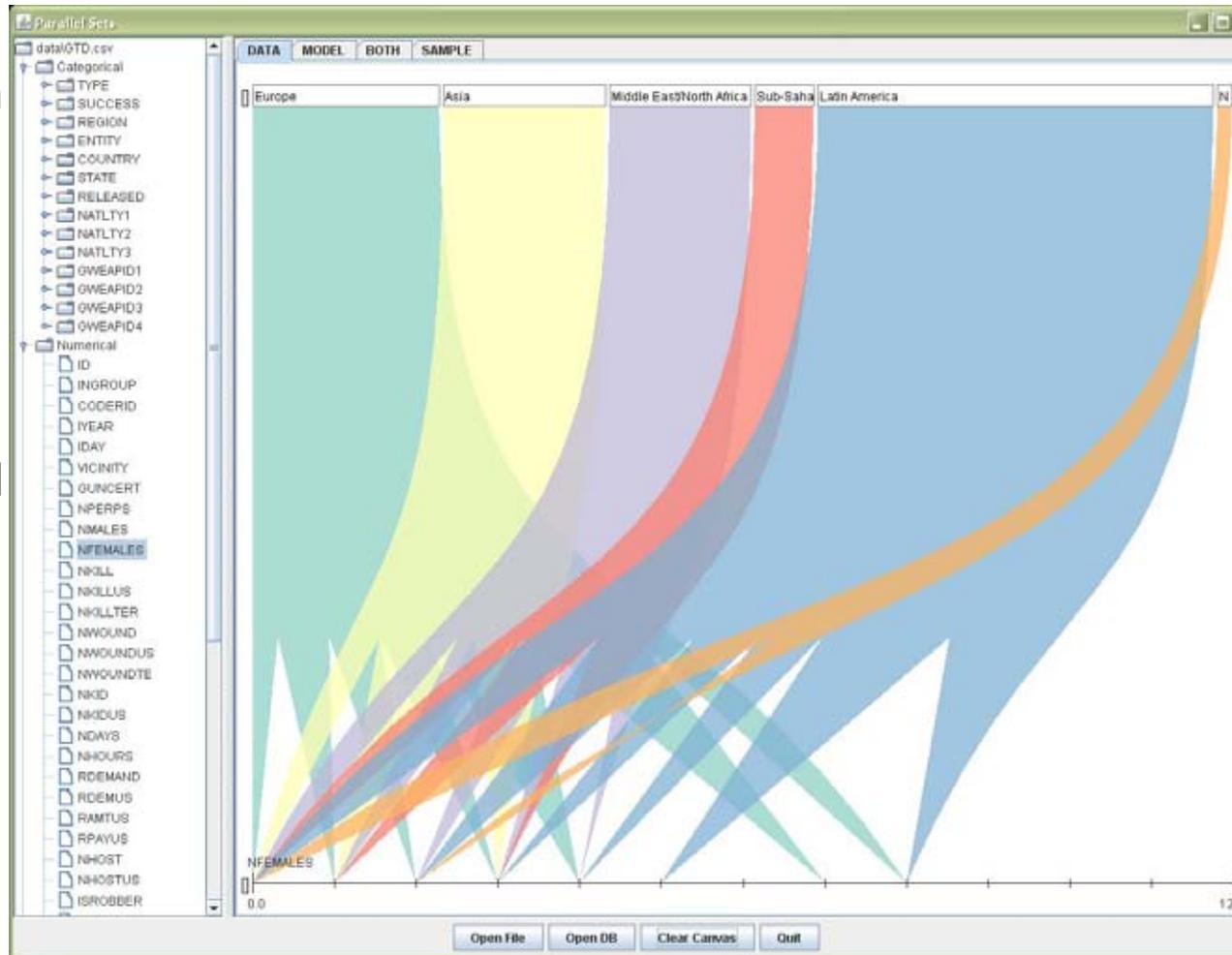
Terrorism Data Analysis

Number of female terrorists depends on the region:

- Female terrorists in Latin America and Europe
- hardly any female terrorists in Asia, Middle East, and throughout Africa

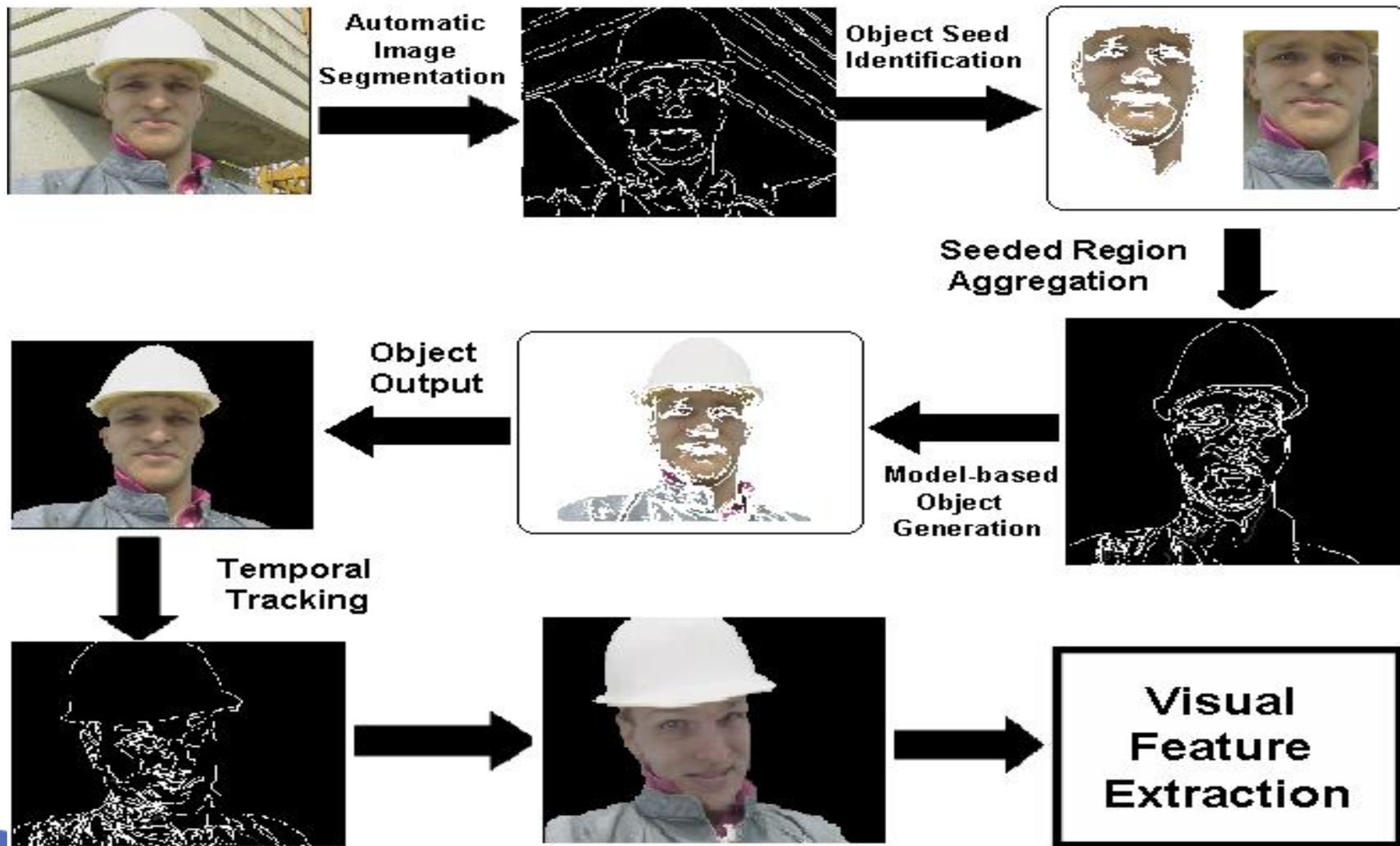
Future plans for curved/forked ribbons:

- Full interaction with these ribbons: reordering, highlighting
- Histograms on numerical axes
- Filtering by categorical or numerical axes (including time)





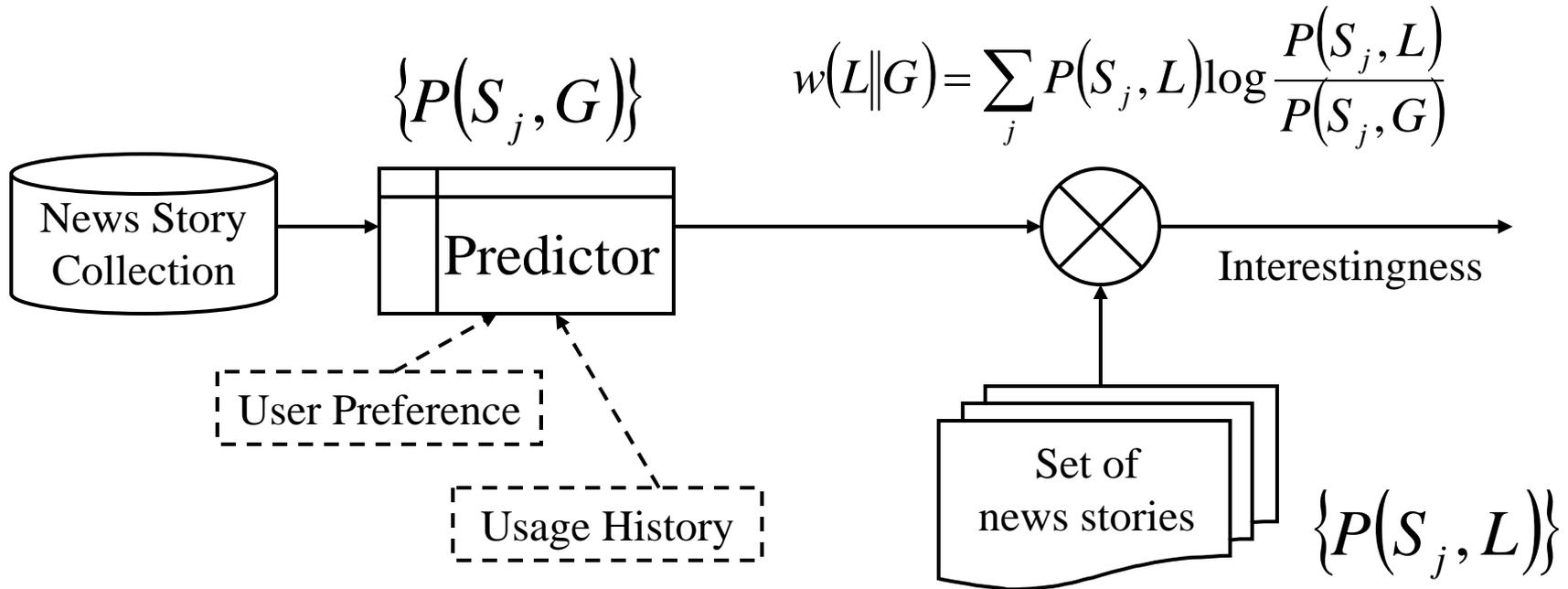
Multimedia: Automated Video Content Analysis





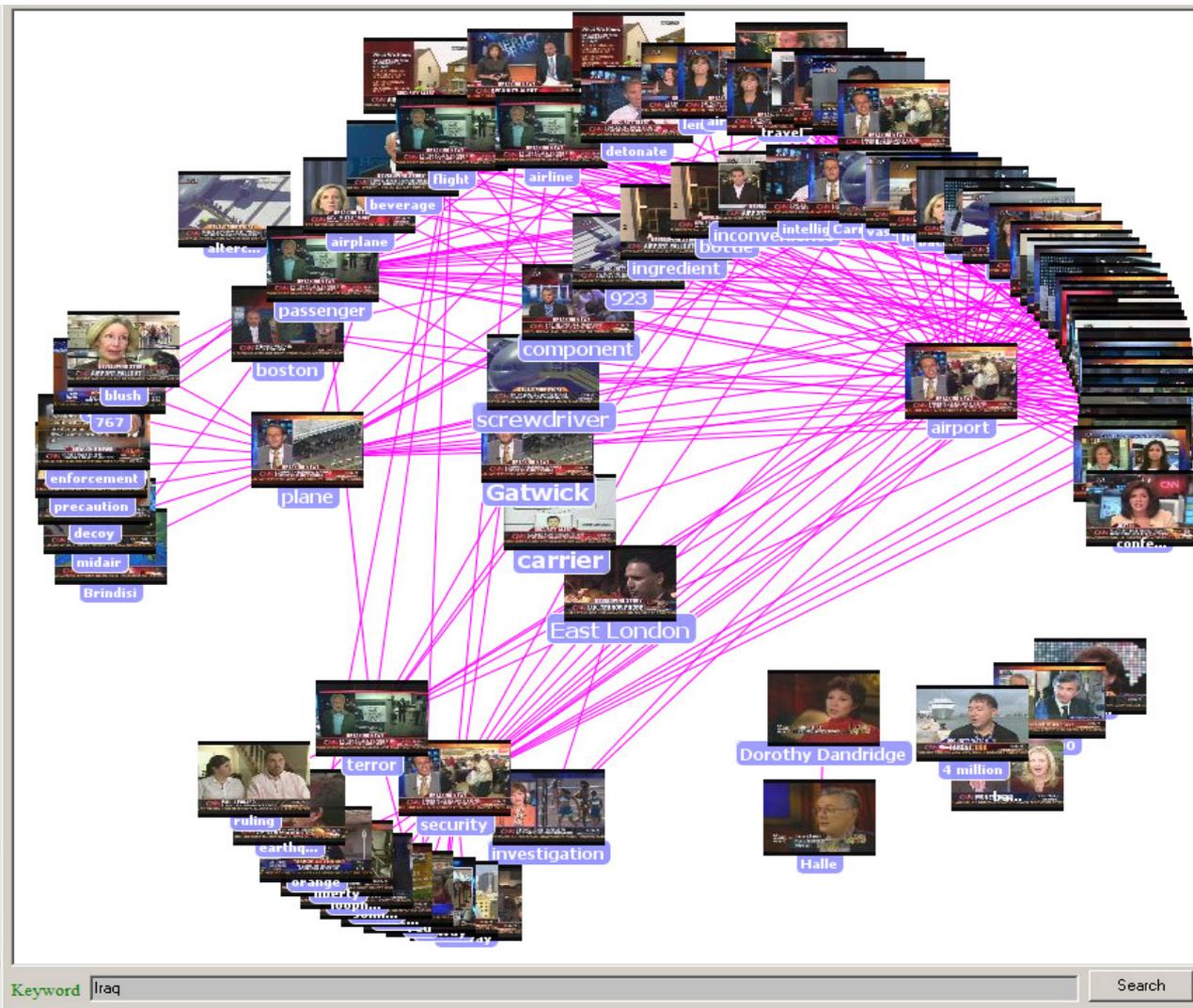
Multimedia: Automated Video Semantic Analysis

- News Interestingness Prediction



Multimedia: Video Semantic Analysis

- News Theme Network Visualization

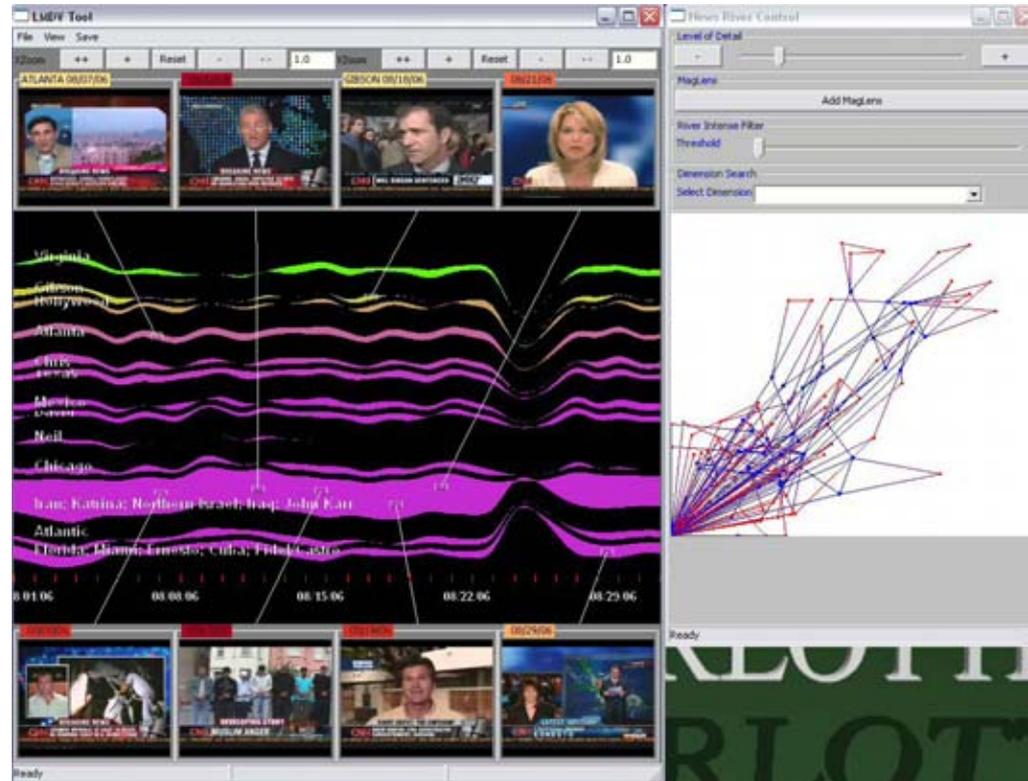


Multimedia: News Broadcast Analysis

Problem – How should we handle the stream of thousands of stories and themes from many sources over time?

“Ultimately, you gotta read (view) the stories” – John Stanko

1. Develop LensRiver and EventRiver capabilities.
2. Develop highly interactive ways to explore themes and sub-themes, their interlinkages, and stories over time.

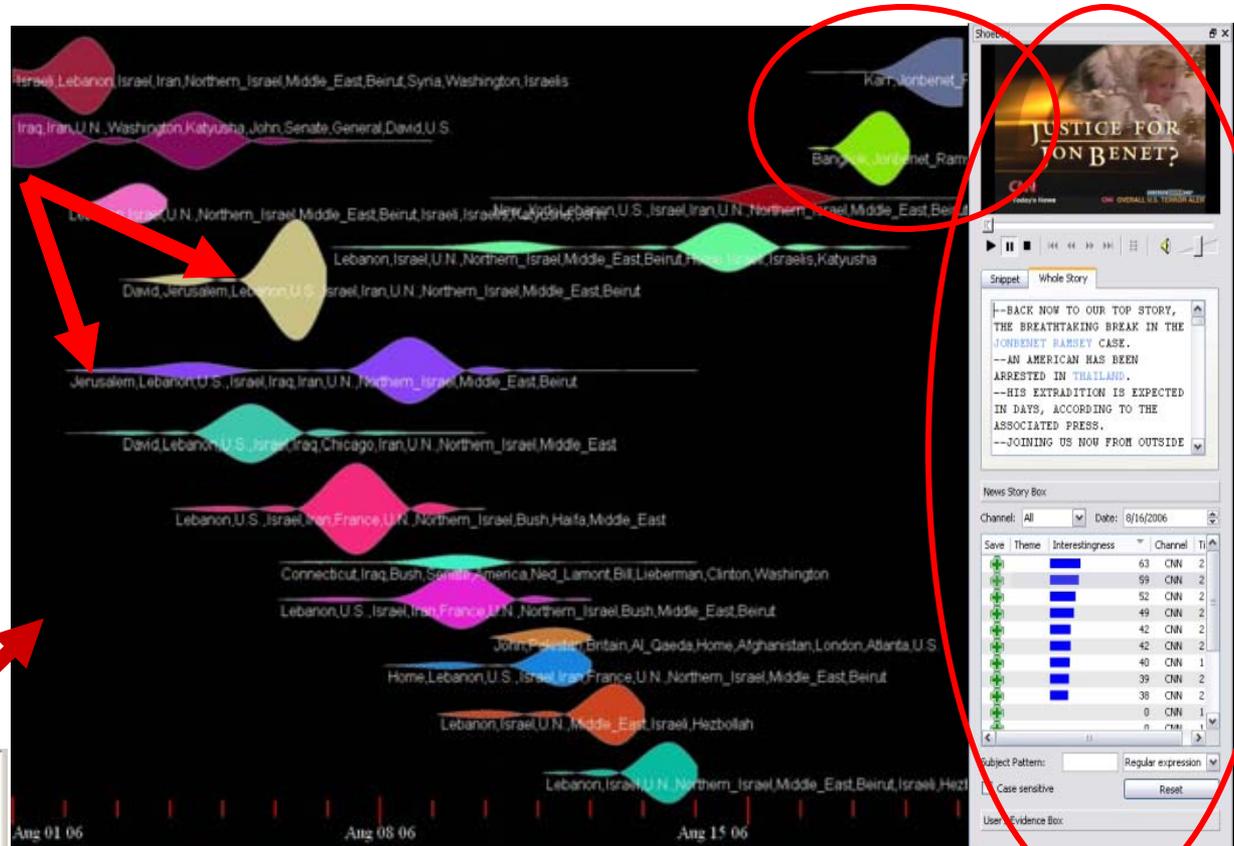


LensRiver hierarchical display

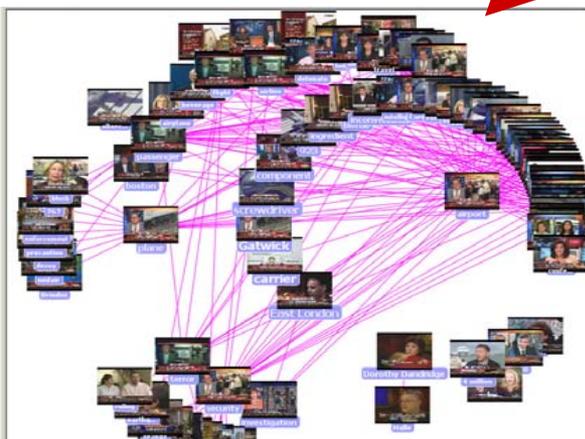
Multimedia: News Broadcast Analysis

Deep Exploration & Reasoning Capabilities

- Hierarchical exploration
- Filter by theme (also, broaden/narrow)
- Shoebox
- Search by Example

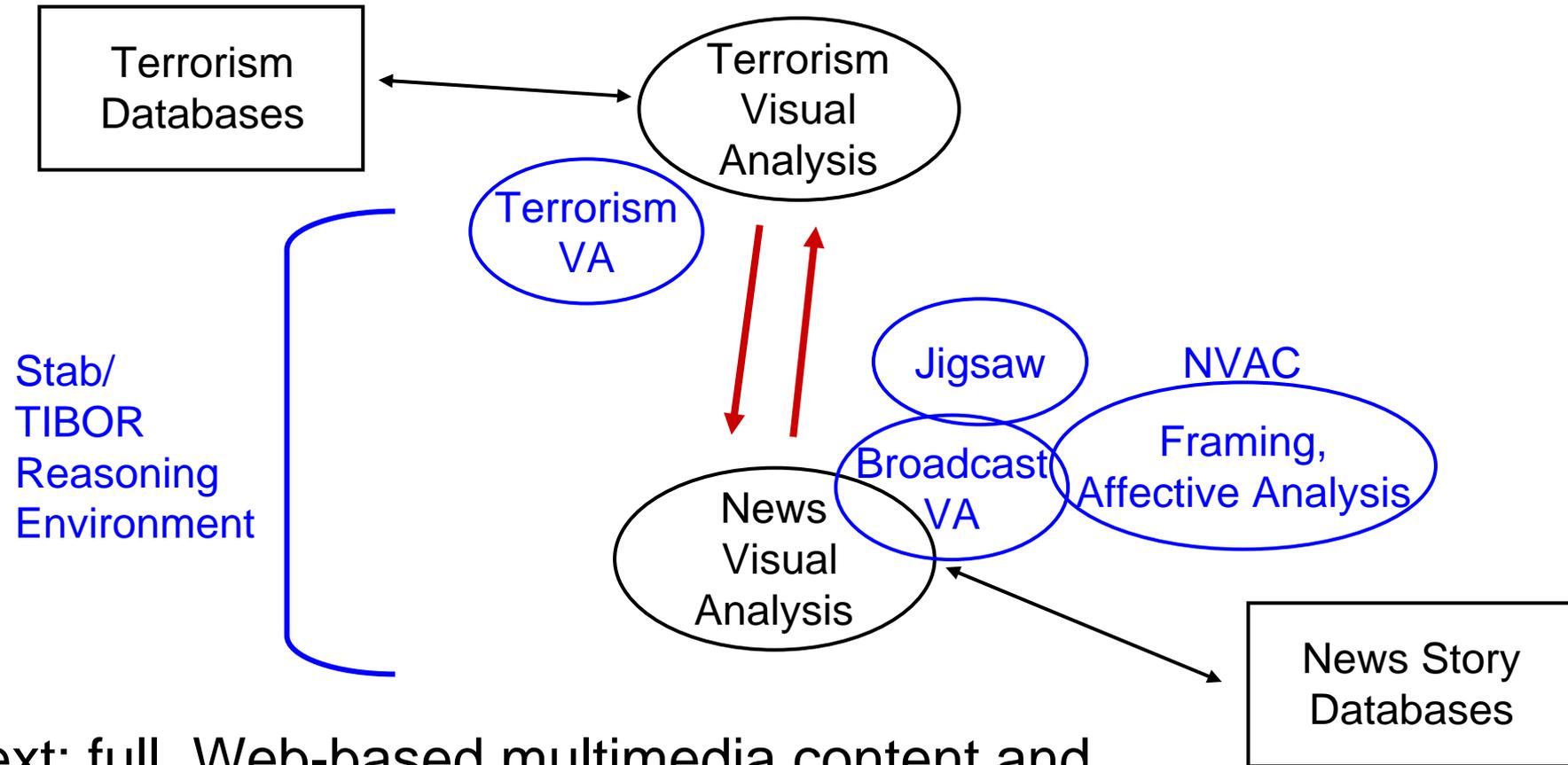


EventRiver



Integrating Terrorism Data Analysis and News Analysis

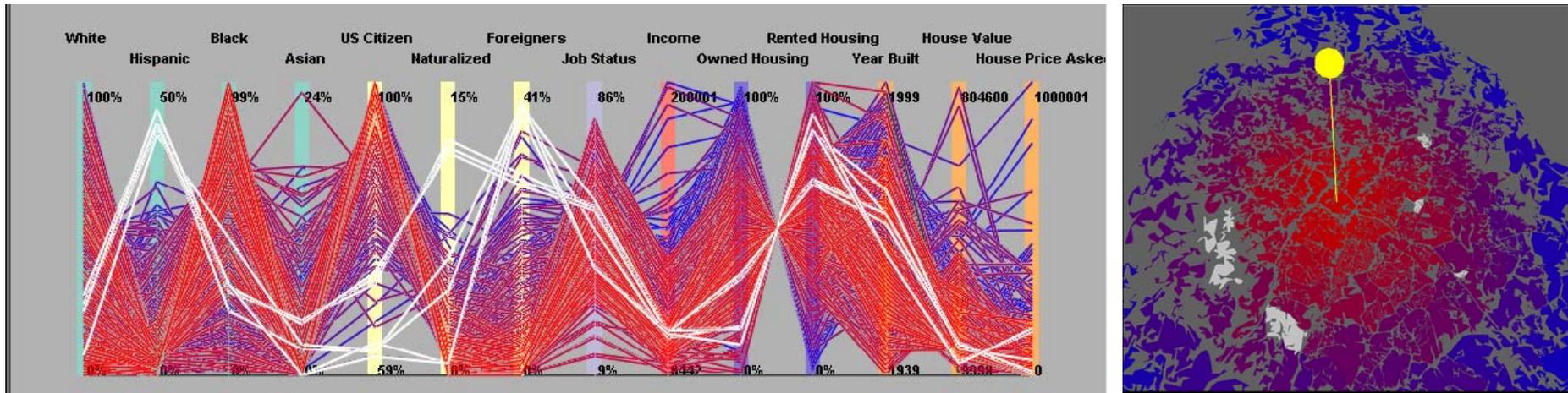
START



Next: full, Web-based multimedia content and the Dark Web



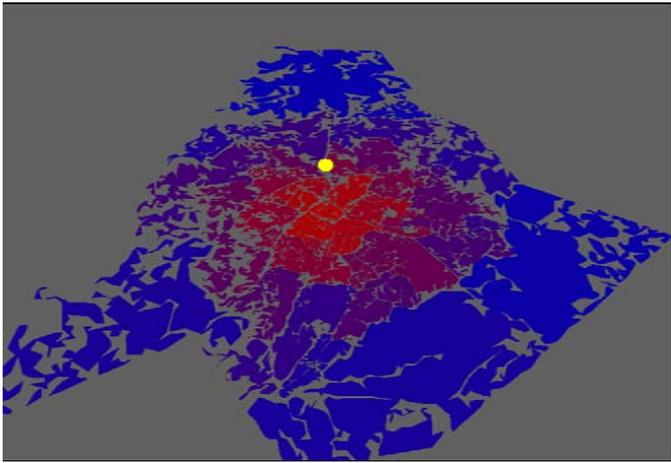
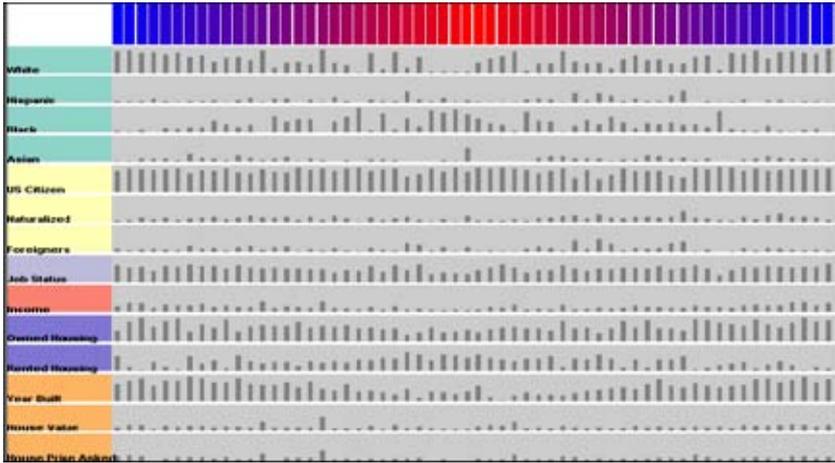
UrbanVis



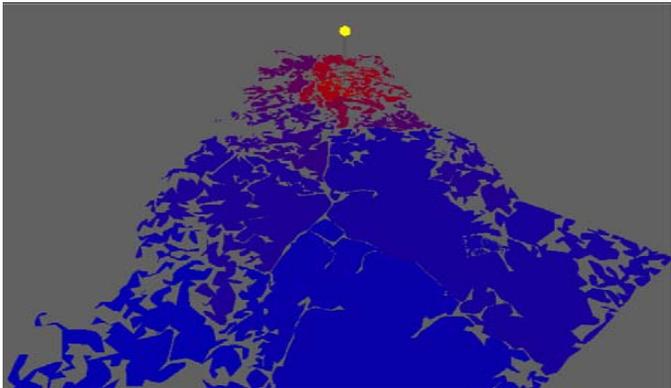
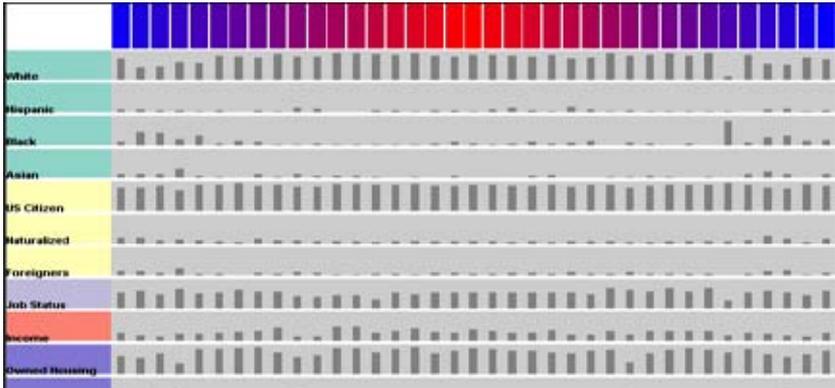
Finding the Hispanic neighborhoods around downtown Charlotte. Note that the positive correlation between Hispanic population, the number of foreigners, low level of income, and the high tendency towards rented housing.

UrbanVis

Downtown
Charlotte

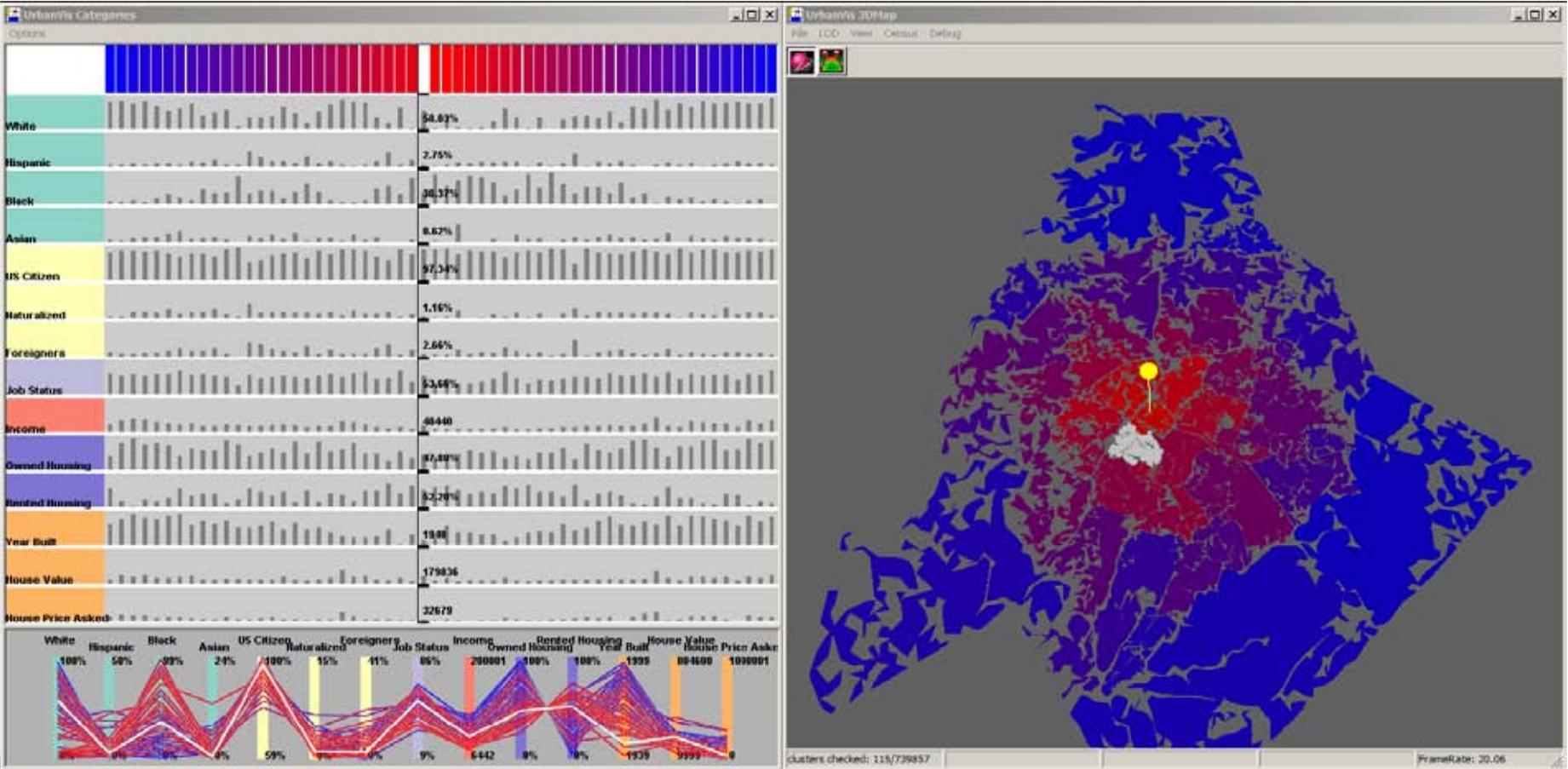


Davidson



Showing the homogeneity of a neighborhood. Downtown Charlotte is heterogeneous in demographics (high mixture of ethnic group); whereas Davidson area is heterogeneous (predominately white population). The arrows denote the rows depicting the black population.

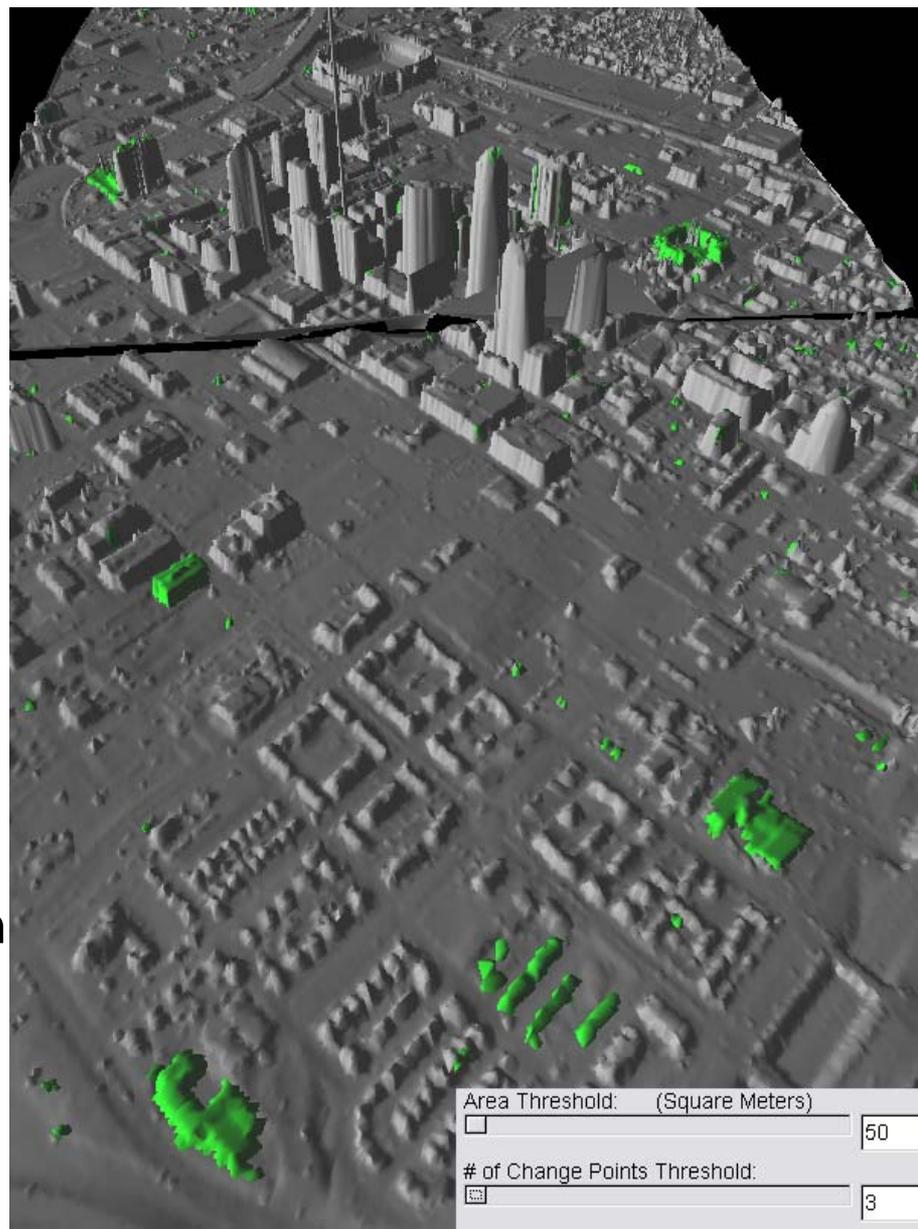
UrbanVis



Urban LIDAR Change Detection

- Use raw point clouds
- Error modeling / awareness
- Extract models of changes
- Automate change analysis

- Applications
 - Situational awareness
 - UAV mounted LIDAR
 - Live battlefield updates
 - Models sent to soldiers' maps
 - Tax/Permit enforcement
 - Compare against tax database
 - Flood plain development evaluation
 - Urban change for infrastructure analysis



Urban LIDAR Change Detection

Area Threshold:

of Change Points Threshold:

None 2002 2003

Draw Interstates 3D Mode

Draw Thoroughfares Map Mode

Draw Streets

Draw County Boundary

Plot 2002 Building Permits

Plot 2003 Building Permits

Plot 2004 Building Footprints



9288 Barnhardt Ln



Changes on the UNCC campus

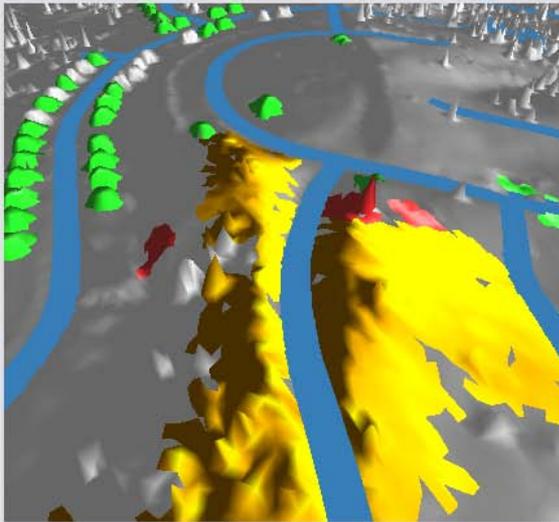
Urban LIDAR Change Detection

Area Threshold:

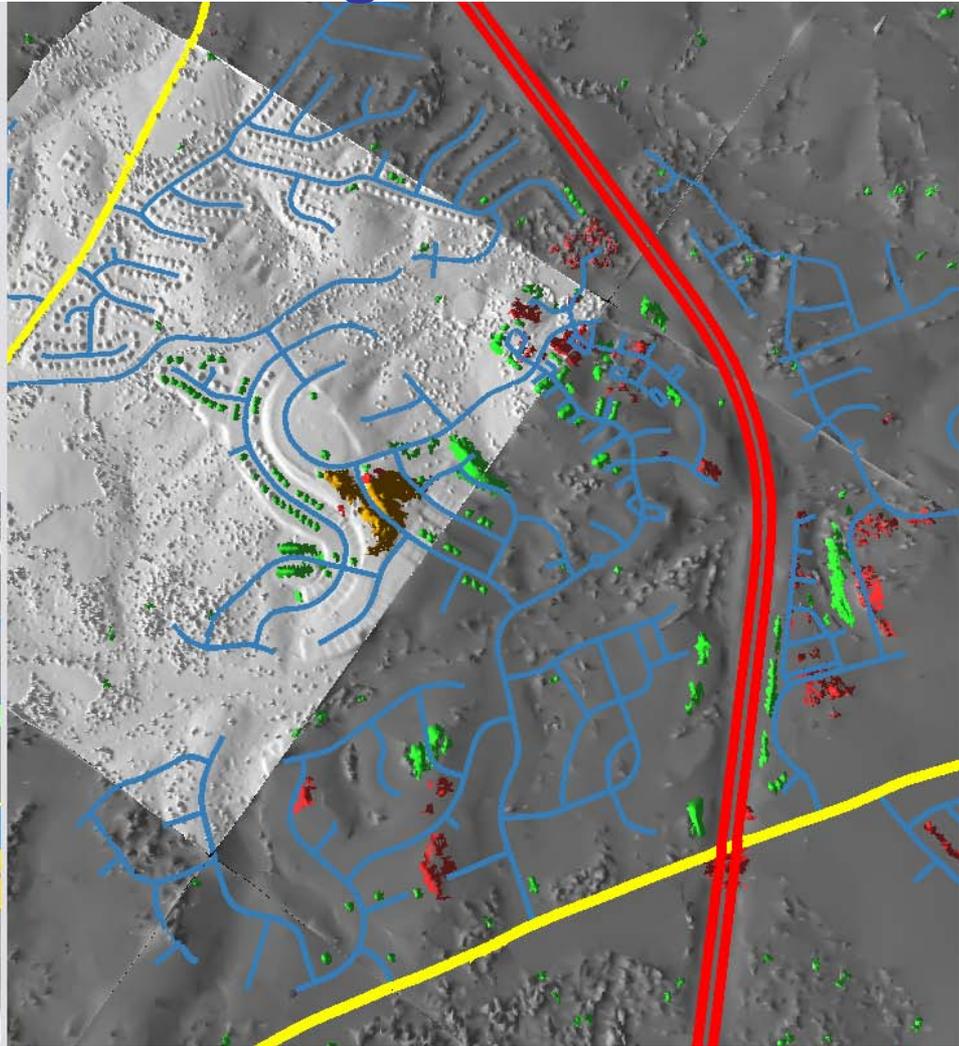
of Change Points Threshold:

None 2002 2003

Draw Interstates 3D Mode
 Draw Thoroughfares Map Mode
 Draw Streets
 Draw County Boundary
 Plot 2002 Building Permits
 Plot 2003 Building Permits
 Plot 2004 Building Footprints



3345 Daniel Place Dr



Home development and regrading

Visual Analytics Digital Library

- Goal: Provide visual analytics educational resource material to teachers and students
- Easy-to-access digital library
 - Info organized into VA Taxonomy
 - Browse via Taxonomy
 - Or text search
- See <http://vadi.cc.gatech.edu/>

The screenshot shows the homepage of the Visual Analytics Digital Library. At the top, the title "VISUAL ANALYTICS DIGITAL LIBRARY" is displayed in a blue serif font. Below the title, there are links for "faq", "email us", and "share materials" on the left, and a search bar with a "Search" button and a link to "advanced search" on the right. A "Home" link is located below the search bar. The main content area features a paragraph describing the library's purpose: "This library and web portal contains materials useful in Visual Analytics (higher) education. Visual Analytics is an evolving field that we have attempted to capture through a prototype taxonomy, into which we organize our library contents. The VADL includes videos, PowerPoint and recorded lectures, sample tests and exams and other documents useful to educators and students in the field." To the left of this paragraph is a vertical navigation menu titled "Overview / Courses" with various categories like "Analytical Reasoning and Processes" and "Data and Knowledge". To the right of the main text is a "SEARCH..." section with a search input field and a "Search" button, followed by a "BROWSE..." section with a link to "VA Topic Taxonomy". Below that is a "SHARE..." section with a link to "Contribute Your Class Materials Online". On the far right, there are three sections: "Editor's choice" with a table of recommended items, "Most downloaded" with a table of popular items, and "Recent additions" with a table of new items. Each table has columns for "Title" and "Author".

EDITOR'S CHOICE

Title	Author
Perceptual Principles and Graphs	M Hearst
Professors Toolkit	J Heer
Semantic Video Classification	J Fan
Information Visualization	J Stasko
Representations and Information Visualization	S Greenberg

MOST DOWNLOADED

Title	Author
Integration, Multi-Dimensional Visualization	J Yang
Introduction to Information Visualization	M Hearst
The Role of Cognitive Abilities	M Hearst
Perceptual Principles and Graphs	M Hearst
Cognitive Issues and Human Trade	J Stasko

RECENT ADDITIONS

Title	Author
Intelligence Essential for Everyone	L Kiran
Analytic Culture in the US Intelligence Community: An	R Johnson



www.srvac.uncc.edu





Jigsaw

- Problem - Helping analysts and investigators explore and understand large collections of reports and data
- Solution - Integrated, interactive views of report entities that highlight connections between items of interest and permits exploration to discover new connections
- Impact – Effective system as shown evaluations and trial use by actual analysts





Jigsaw won the university portion of the IEEE VAST 2007 Contest.

Jigsaw

A sample of Jigsaw's document and entity views. In the upper left is the Document View that displays the text and entities of a selected document. The List View to its right shows lists of the different entities, organized by entity type. Orange-shaded entities indicate connections to the selected (yellow) items. Below, the Calendar View shows temporal patterns across the documents. The Graph View to the left provides a semantic graph representation of documents (white circles) and the entities contained within them (colored circles).

