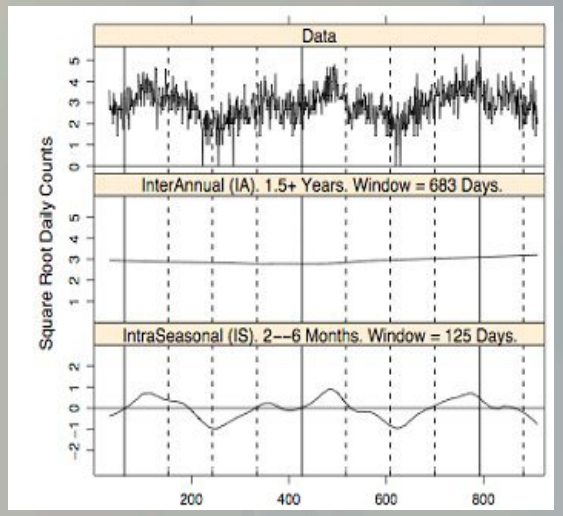
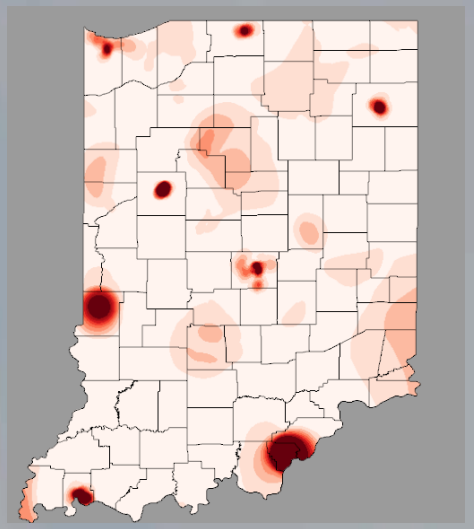
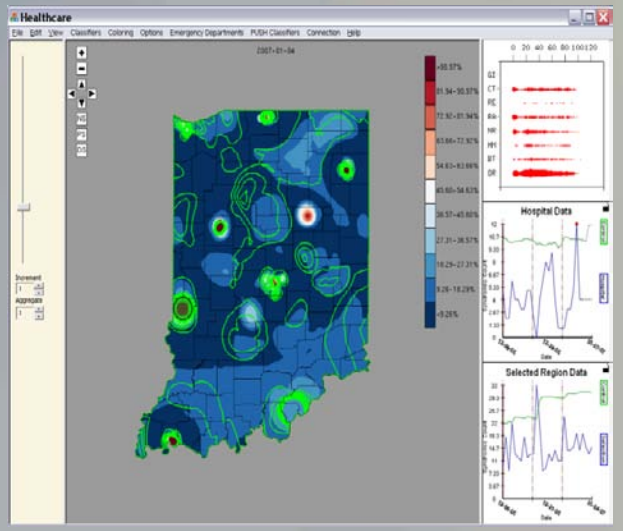
PURVAC

Purdue University Regional Visualization and Analytics Center

Visual Analytics for Zoonotic Diseases and Syndromic Surveillance







David S. Ebert

www.purvac.org

RVAC Regional Visualization and Analytics Centers

FAZD CENTER
National Center for Foreign Animal and Zoonotic Disease Defense

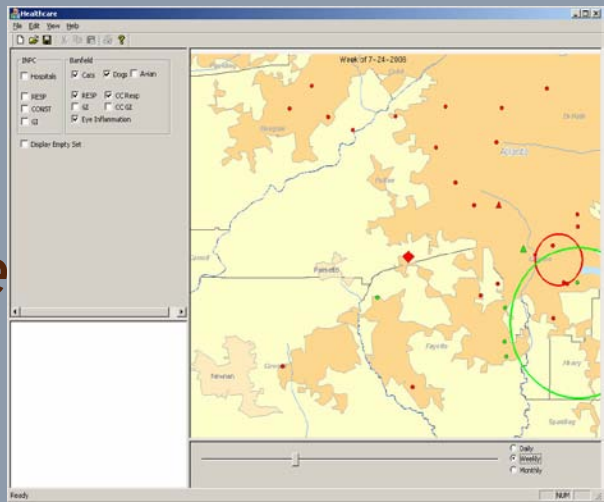
Foreign Animal and Zoonotic Disease and Human Health Visual Analytics

Overview

- Develop visual analytic environments to facilitate effective prediction, planning, evaluation, mitigation, response, and recovery for zoonoses and animal health issues

Areas of work

- *Linked Animal Human health Visual Analytics (LAHVA)*
- *Disease visual analytics*
- *Animal disease health surveillance and investigation*



Foreign Animal and Zoonotic Disease Visual Analytics

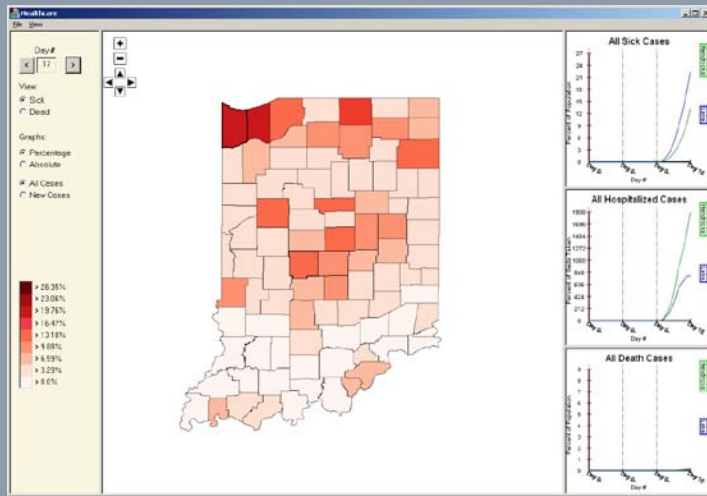
Projects

- Provide visual analytic environment for all IBOAH data (herd movements, reportable diseases, spread factors)
- Integrate FAZD data into a visual analytic environment linking multiple models (e.g., disease spread, economic impact)

Foreign Animal and Zoonotic Disease Visual Analytics

Projects

- Rift Valley Fever and other FAZD projects
  - *Animal, human, and economic impact*
- Comparative studies of sparse livestock data (Texas) vs. Indiana for policy studies
- Create visually effective mobile environment



Main Components

Integrated models, collected data, simulations

Interactive, integrated environment with visualization, simulation, and analysis

Enables

- Factor analysis (spread, economic impact, interdiction strategies
- Hypothesis and consequence testing

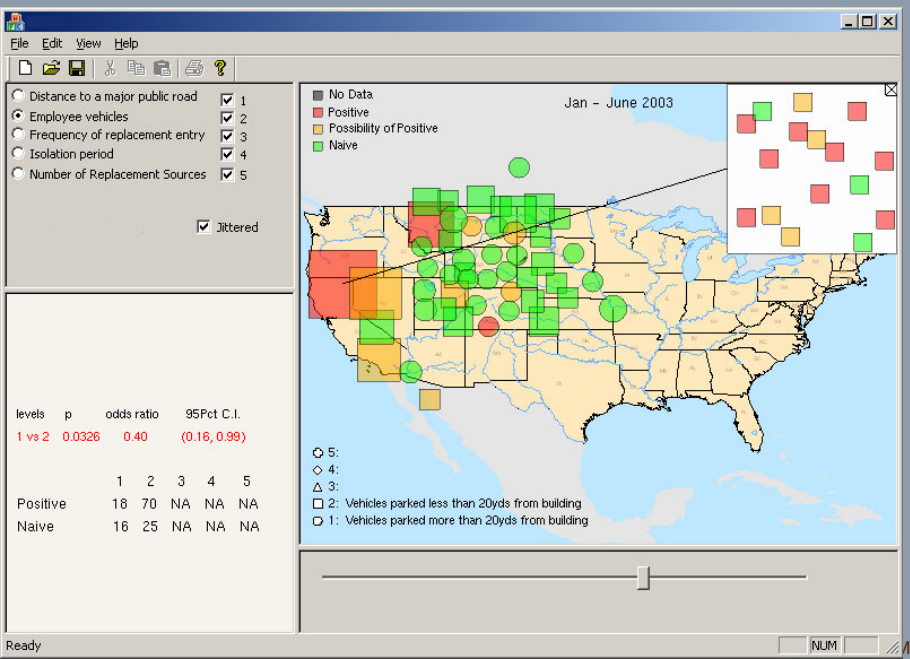
Outcomes

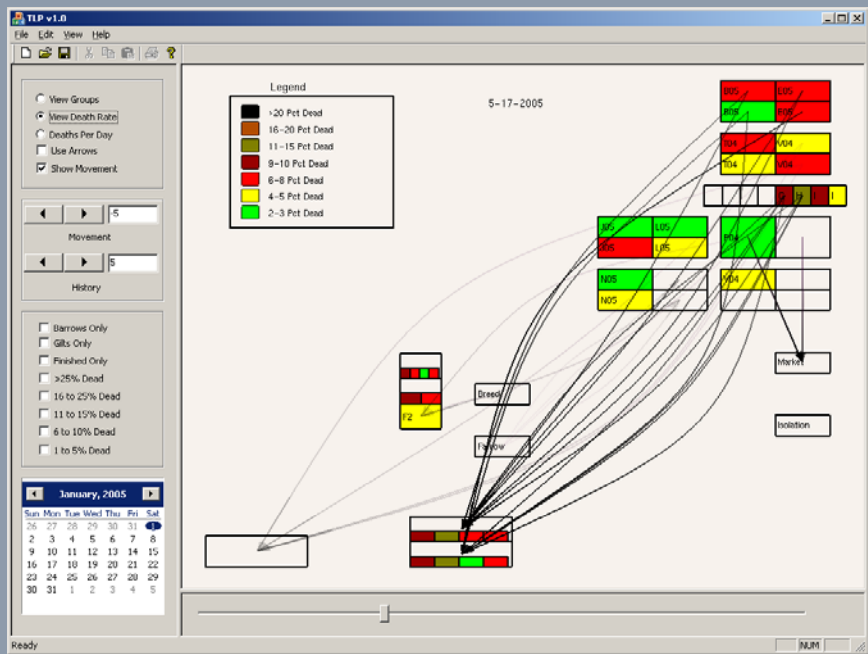
- New biosecurity environment for preparing, surveillance, mitigation, management, response and recovery
- New integrated model and sensed data decision making environment
- Improved linked-model decision making for important and emerging biological and economic threats
- Scalable visual analytic technology from desktop to mobile device

Animal and Zoonotic Disease Visual Analytics

Initial results

- Analyzed syndromic spread factors for national veterinary association to reduce production losses and disease spread

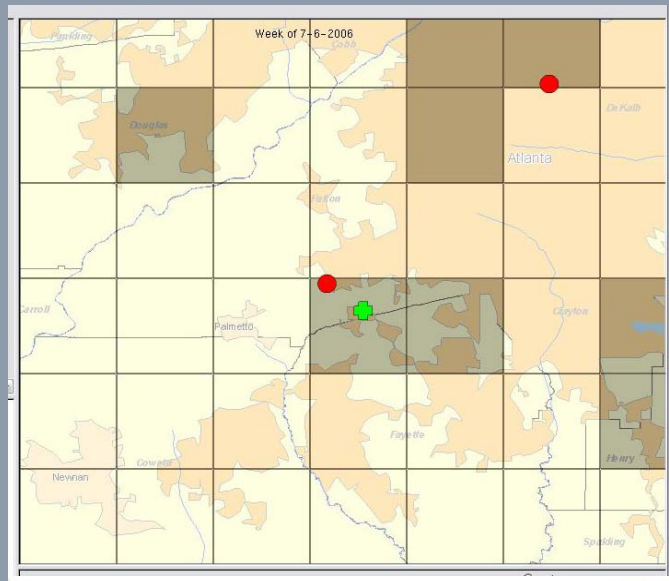


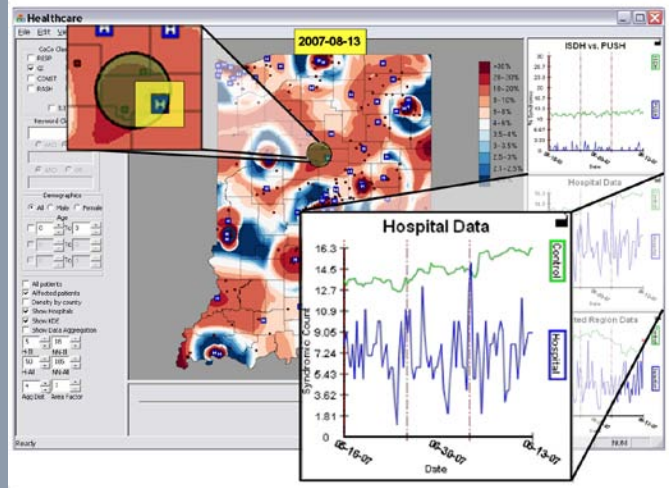


Animal and Zoonotic Disease Visual Analytics

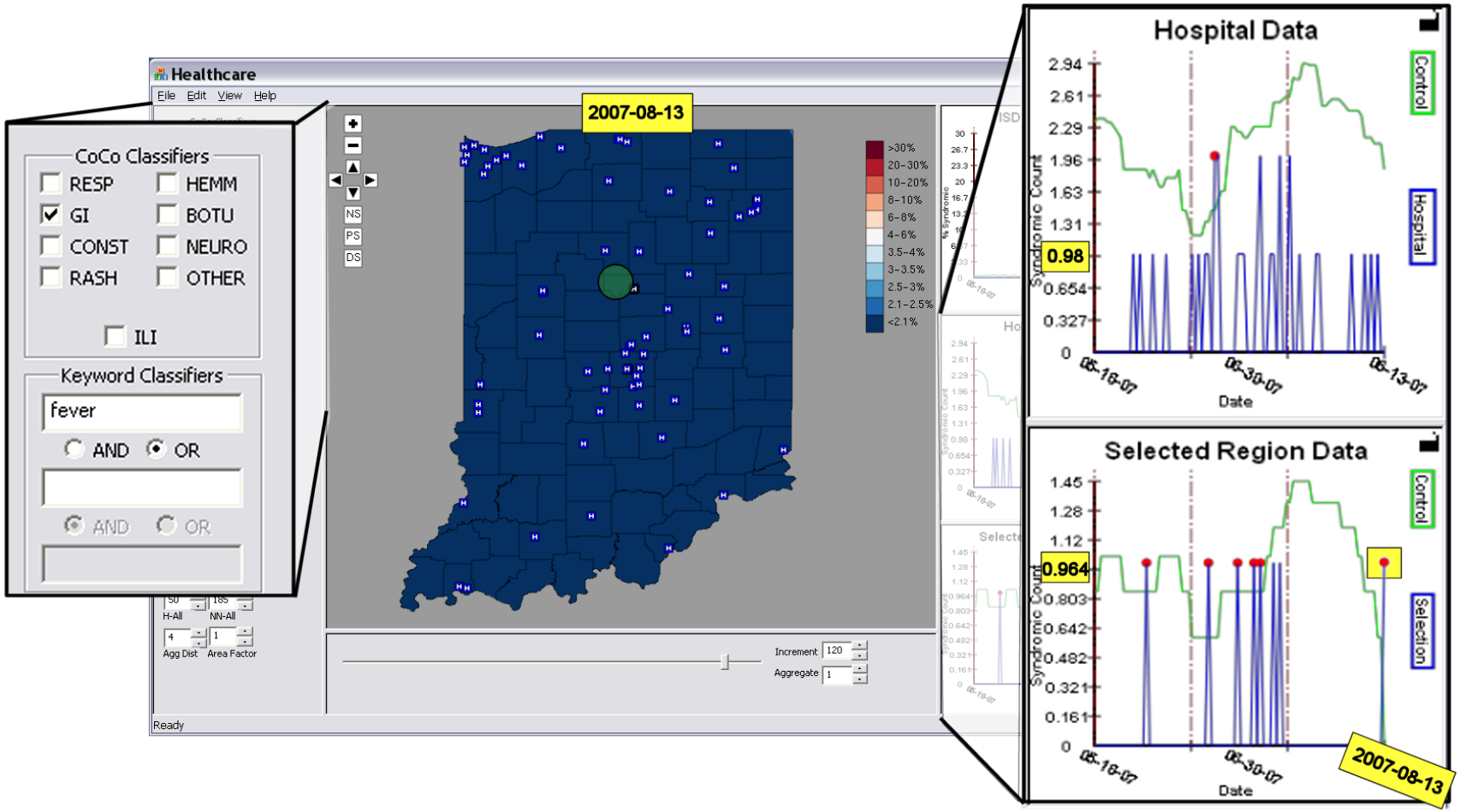
Initial results

- Analyzed public health effects from chemical spill in Fairburn, Georgia.
- Developed linked animal-human health surveillance system for more timely and accurate health monitoring and response.
- Investigated correlation of influenza symptoms in pets and humans for improved planning and response.
- Evaluated use of ProMed and VIN data sources for outbreak/event detection and monitoring.

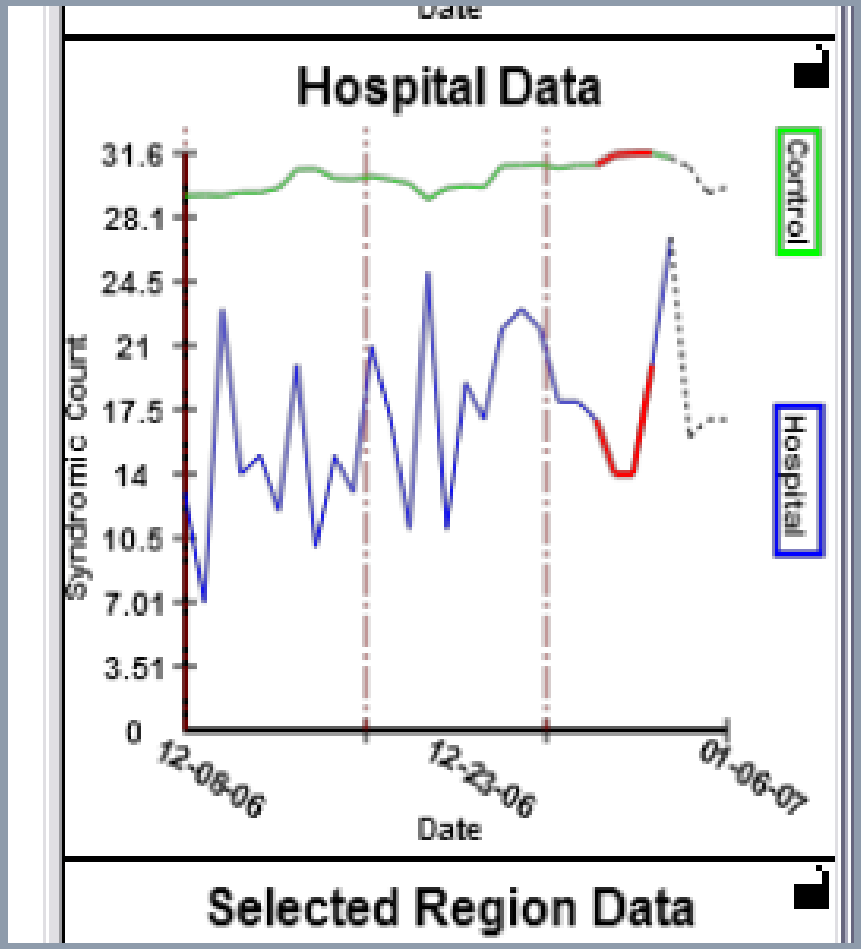




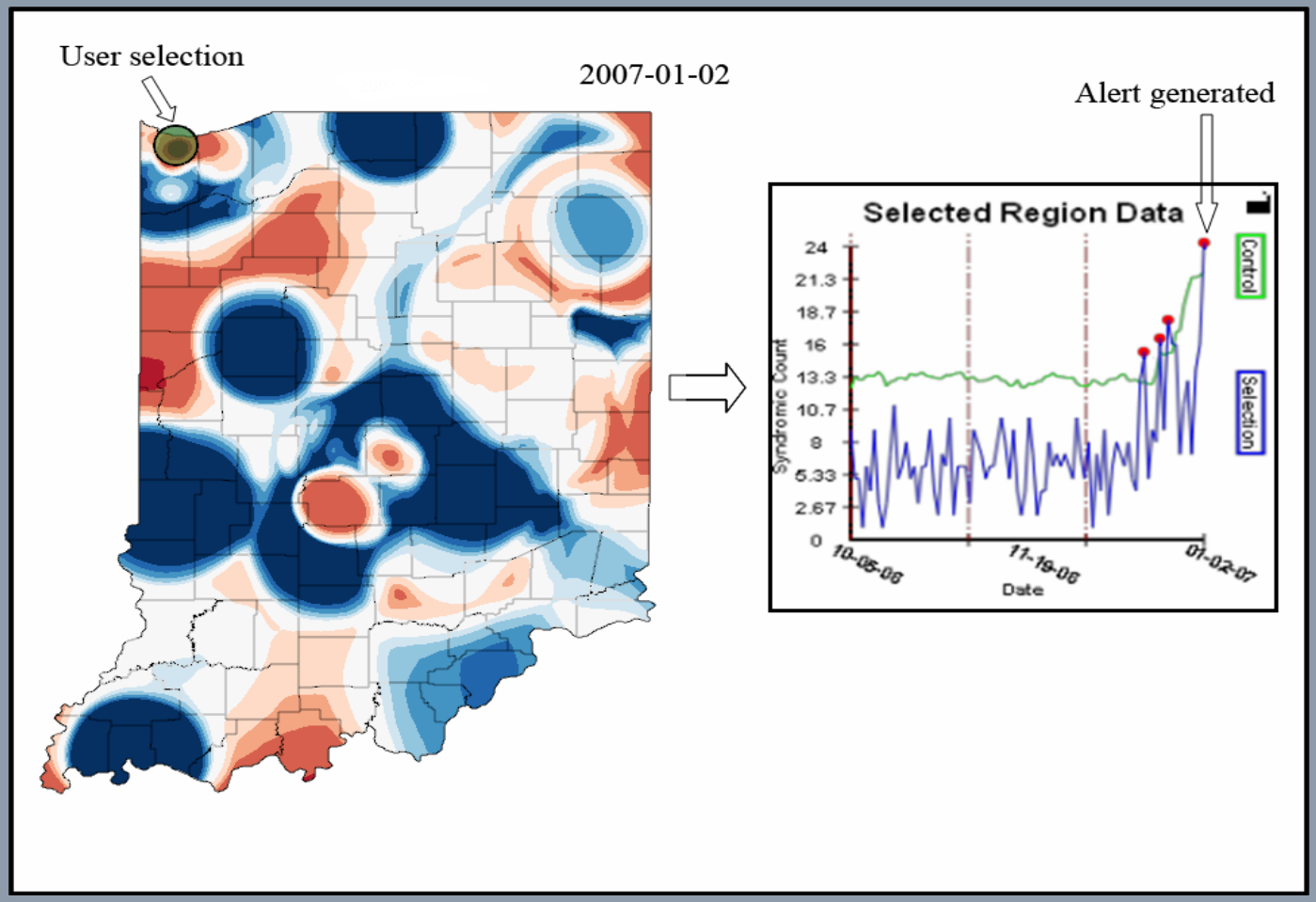
Integrated Interactive Environment: Hypothesis Testing



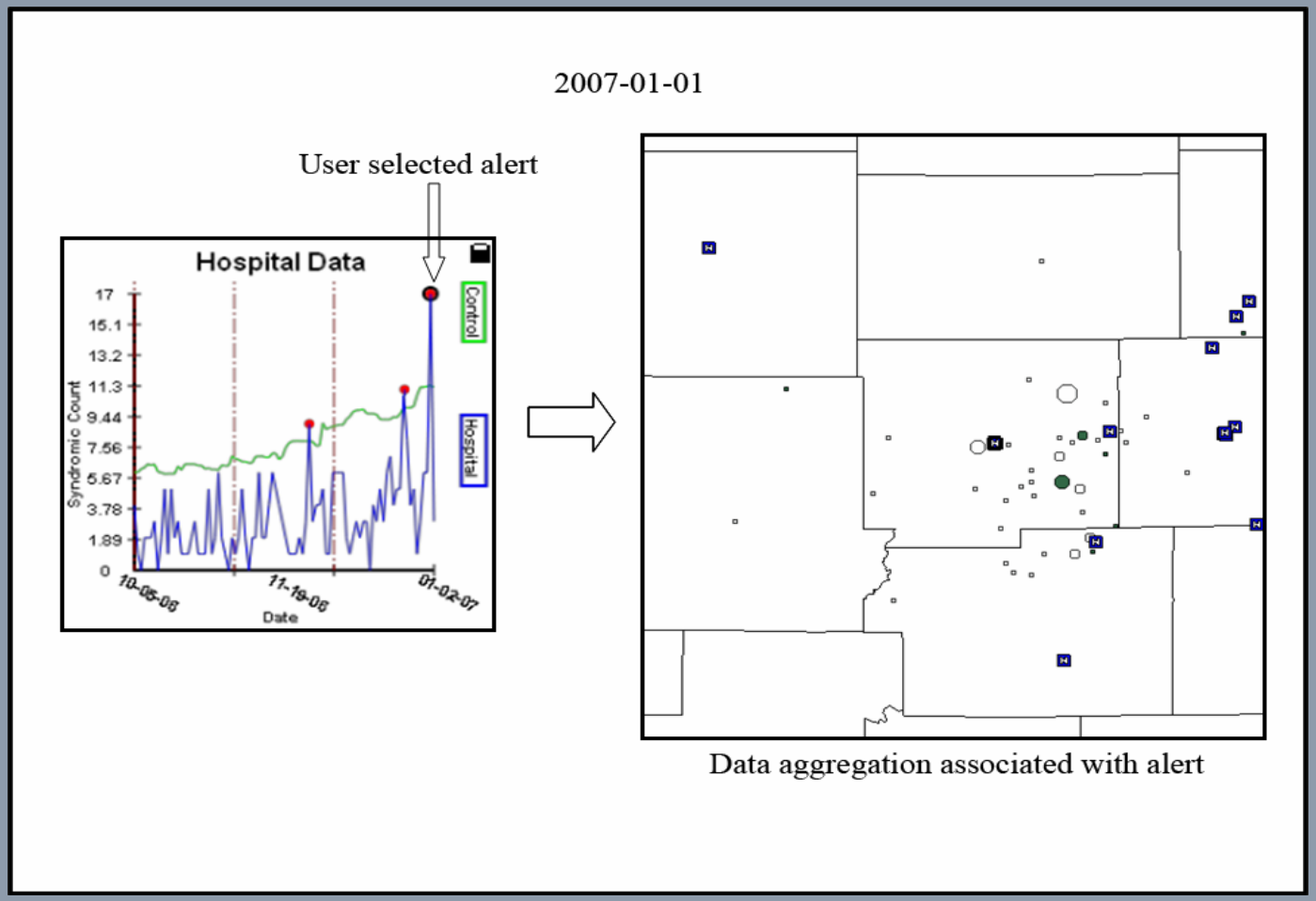
Interactive Time Series Brushing and Prediction



Integrated Interactive Environment: Linked Views



Integrated Interactive Environment: Linked Views



Healthcare

File Edit View Help

CoCo Classifiers
- [x] RESP
- [ ] HEMM
- [ ] GI
- [ ] BOTU
- [ ] CONST
- [ ] NEURO
- [ ] RASH
- [ ] OTHER
- [ ] ILI

Keyword Classifiers
- ( ) AND (•) OR
- (•) AND ( ) OR

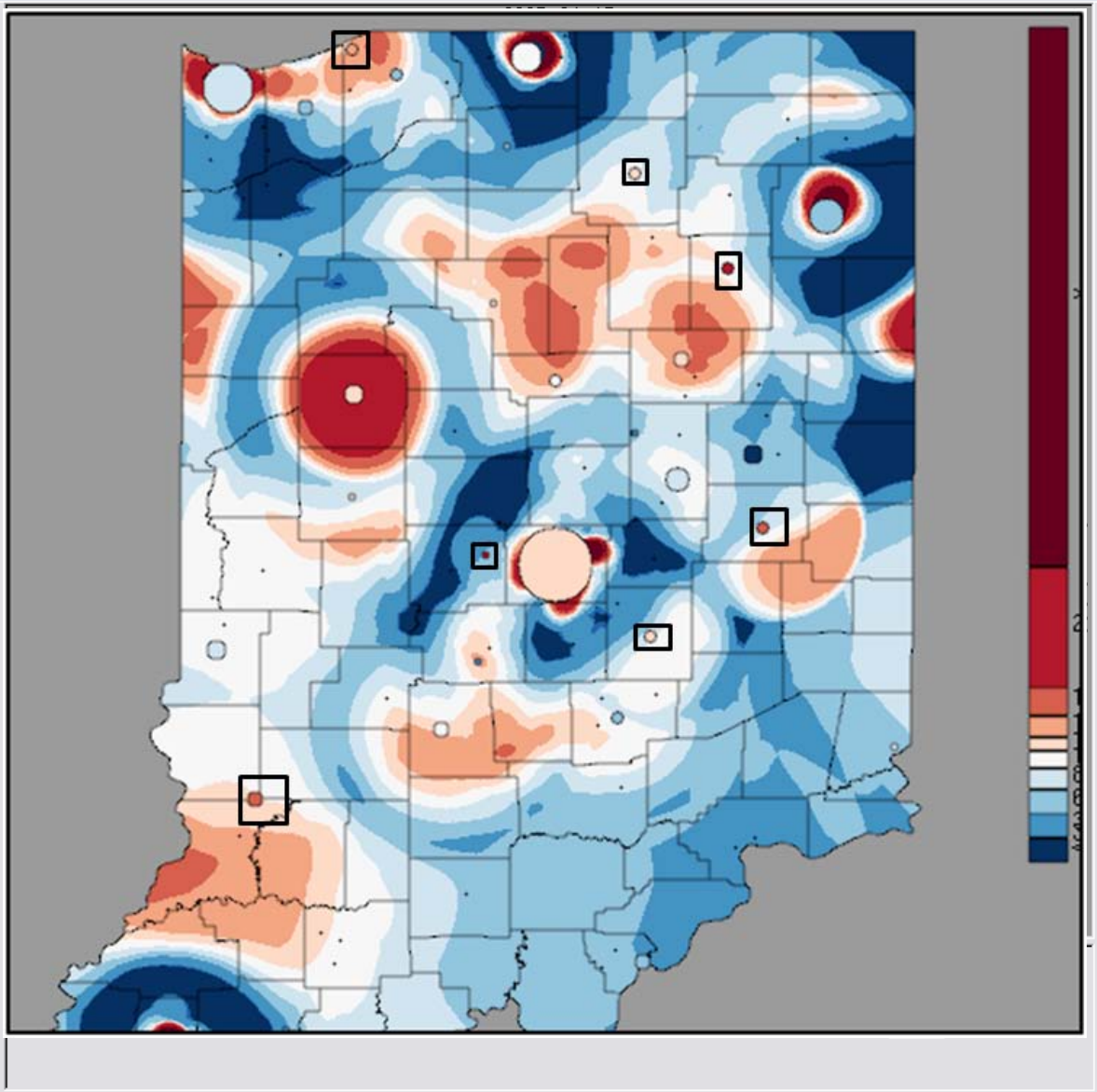
Demographics
- (•) All ( ) Male ( ) Female

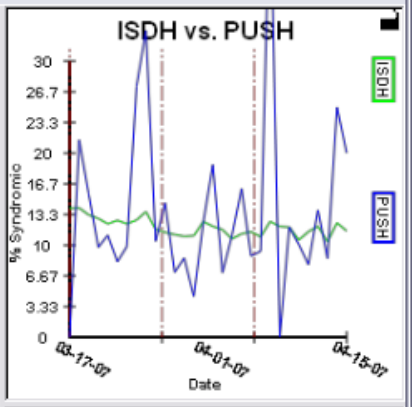
Age
- [ ] 0 To 0
- [ ] 0 To 0
- [ ] 0 To 0

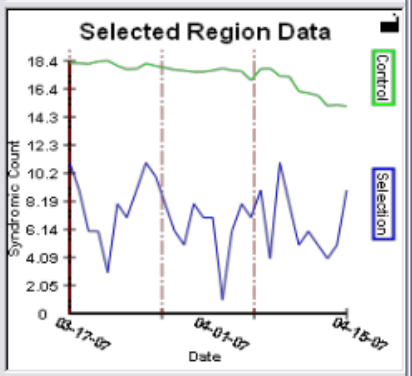
- [ ] All patients
- [ ] Affected patients
- [ ] Density by county
- [ ] Show Hospitals
- [x] Show KDE
- [x] Show Data Aggregation

5 H-Ill | 18 NN-Ill
50 H-All | 185 NN-All
4 Agg Dist | 1 Area Factor

( ) Lin ( ) Ramp ( ) Exp
(•) Log ( ) Gaus ( ) Int

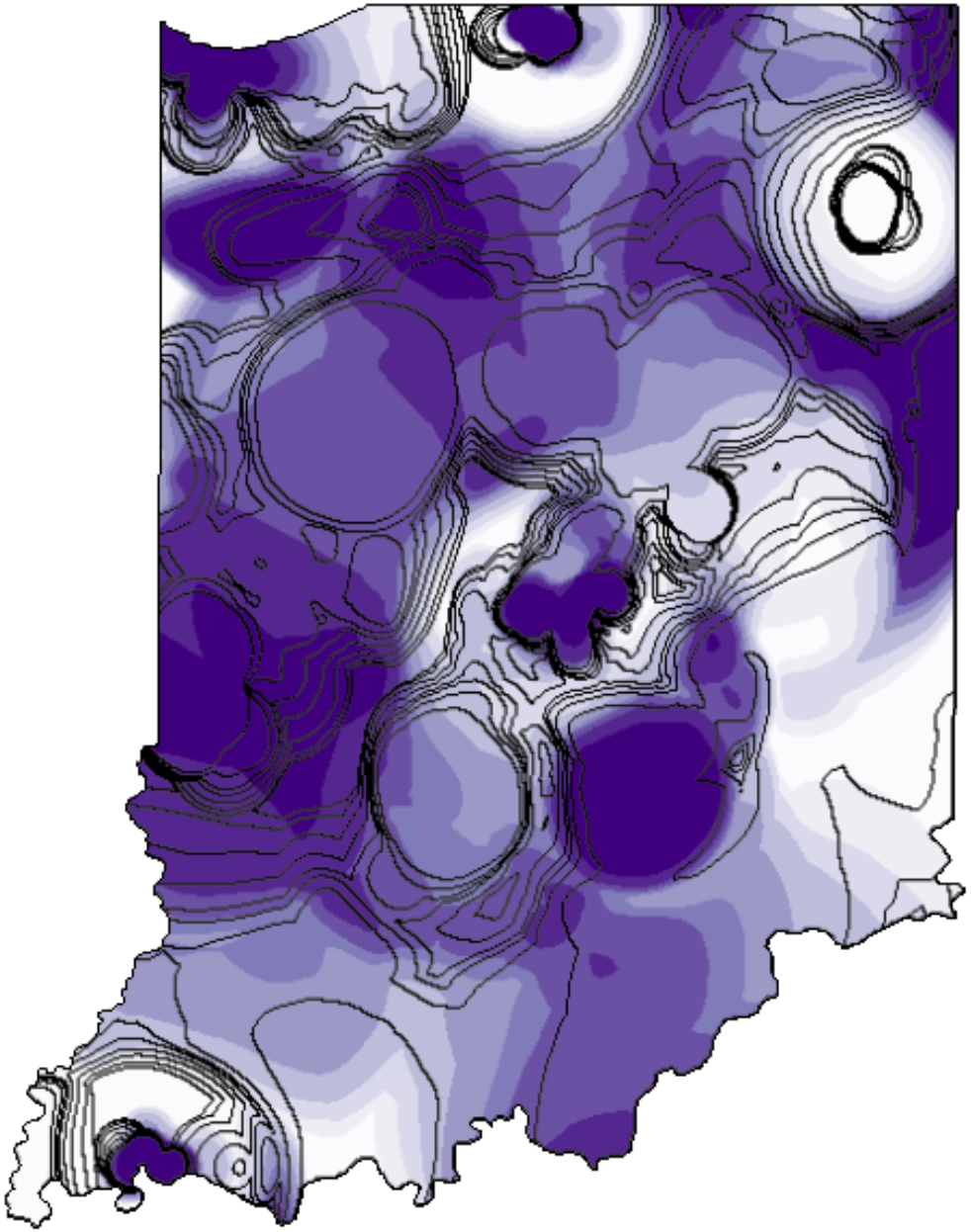


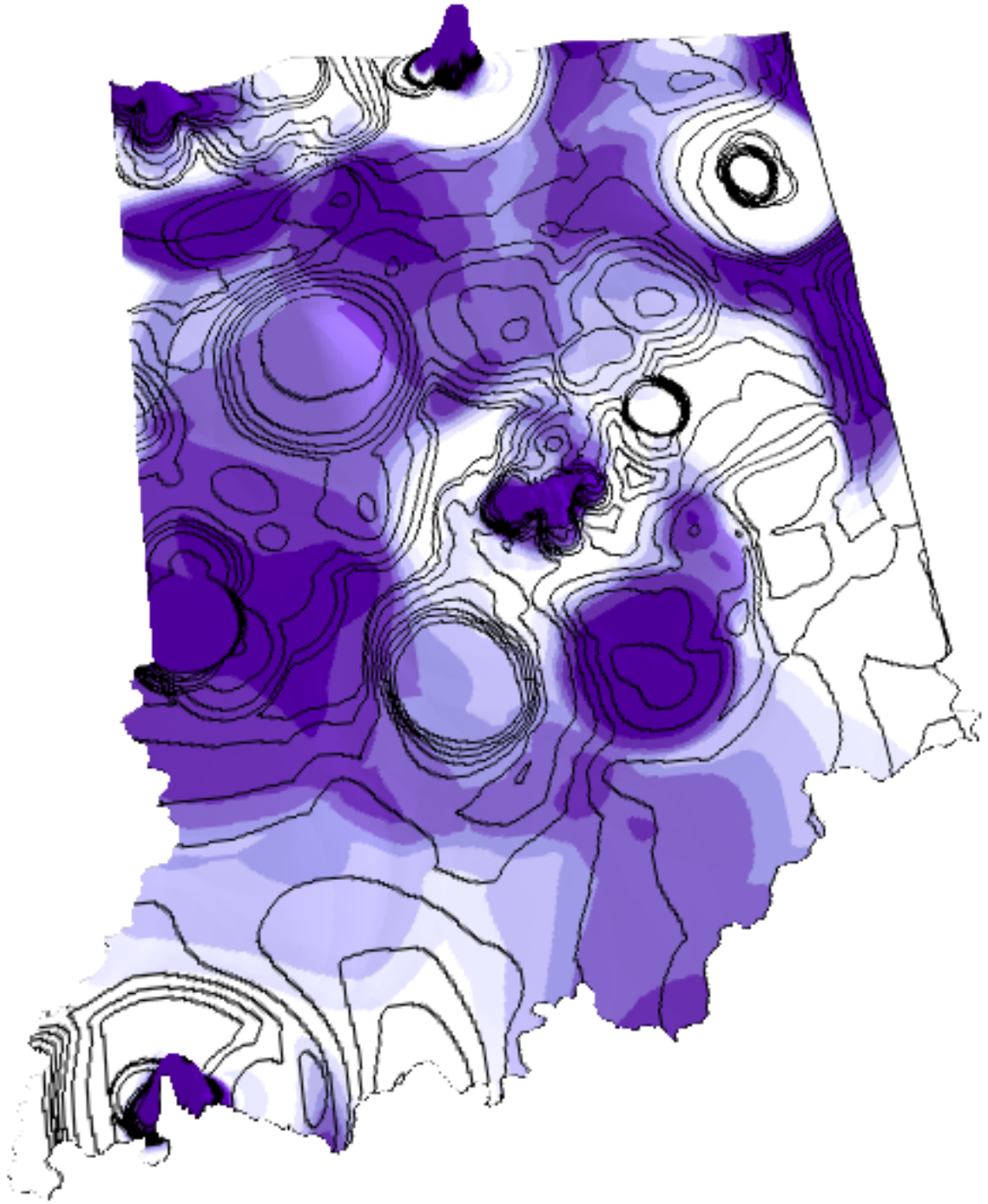




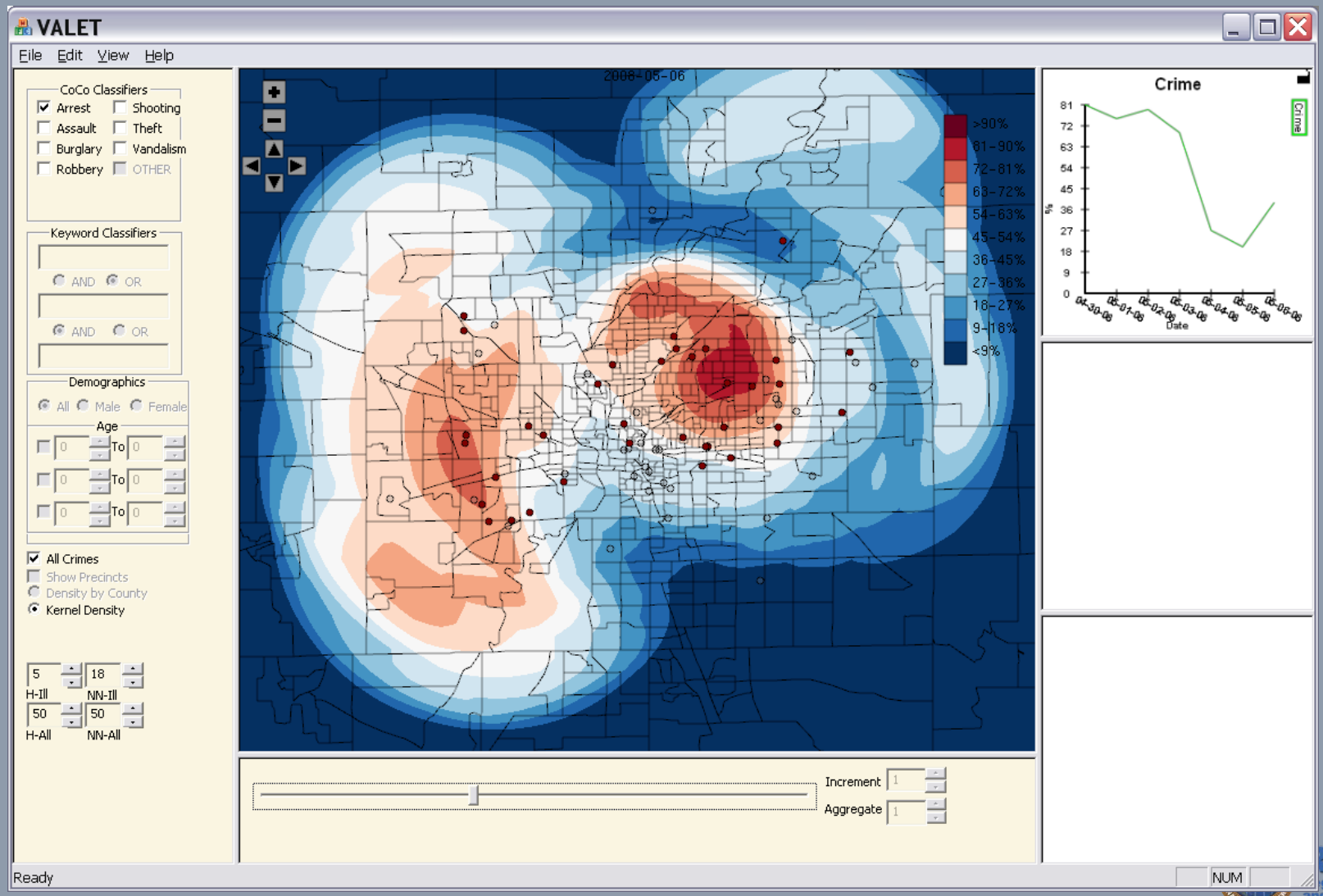
Ready

NUM





Other Applications - VALET: Visual Analytics Law Enforcement Technology



More information

www.purvac.org

ebertd@purdue.edu

Collaborators:

- FAZD Center
- Ceratops (U. Utah)
- Indiana University School of Medicine
- Indiana Board of Animal Health
- Indiana State Department of Health
- Regenstrief Institute