Visualization of space-time patterns of West Nile virus

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West Nile Virus
- Introduced in North America in 1999
- Transmitted by mosquitoes
  - These mosquito species are highly ornithophilic
- Corvids (crows, jays) are primary reservoir
  - High mortality
- Amplification cycle as mosquitoes feed on infected birds
- Humans infected by mosquitoes as a side-effect
- Theorized spillover effect as birds die off and mosquitoes switch to feeding on humans
  - Would result in observable lag between bird deaths and human infections

DYCAST Results
Visualization of space-time patterns of West Nile virus

DYCAST Animation

Scientific Visualization vs Information Visualization
- The visual representation is given (x, y and t)
- However, animation or 3D visualization is difficult to use
- Similarities may not be adjacent in space or time
  - Other forms of juxtaposition are necessary
- Use a derived variable, or in this case, a time-series
  - Human case "risk histories"
  - Sequence of daily risk values for the cell in which a human occurs

Analysis problems
- What is the relationship between WNV activity in birds and human cases of WNV?
- What patterns of WNV activity are predictors of human cases?
- Do different areas have different relationship between WNV activity and human cases?
  - Lag between dead birds and human onset may vary according to climate, population density, etc

Risk Histories
X dimension: time
Y dimension: individual human cases
Red: risk
Black: no risk
Blue: date of human onset

Sorted according to number of lit cells
Sorted according to date of human onset
Sorted according to date of first risk

Extracting Meaning: What Good Is It?
- Are similar risk histories spatially correlated?
  - If so, what underlying circumstances do they have in common?
- Phase one: use linked views to explore spatial relationships
- Phase two: use automated clustering to discover similarities in risk histories
Project Progress Summary

- **Completed goals:**
  - Command-line utilities to extract risk histories
  - Implement sorting

- **In progress:**
  - Select visualization toolkit, assemble layout

- **To do:**
  - Develop interface between toolkit and command-line
  - Create linkages between views
  - Clustering of risk histories