

The ArcView/XGobi/XploRe Environment: Spatial Data Analysis in a Linked Software Environment

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Current ArcView/XGobi/XploRe: Collaborators

- Nicholas Lewin-Koh, Di Cook: Iowa State University, Ames, IA
- Fabian Noetzel: Humboldt University, Berlin, Germany
- Mike Mungiole, National Center for Health Statistics, Hyattsville, MD

ArcView/XGobi/XploRe: Main Idea

- Link three kinds of software packages:
 - ArcView: Geographic Information System (GIS)
 - XGobi: dynamic statistical graphics program
 - XploRe: statistical computing environment
- Available for UNIX platforms
- Interactive (dynamic) environment
- Close coupling through RPC's

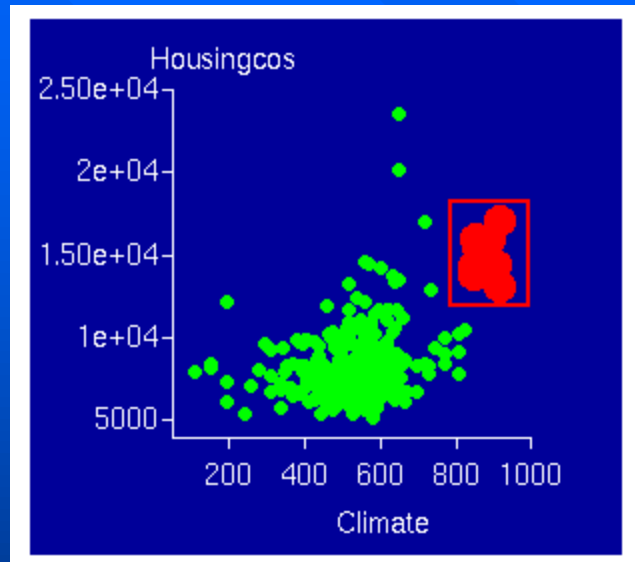
Support of Main GIS Themes

- Point themes
- Polygon themes
- Linear themes

Features of ArcView/XGobi Part

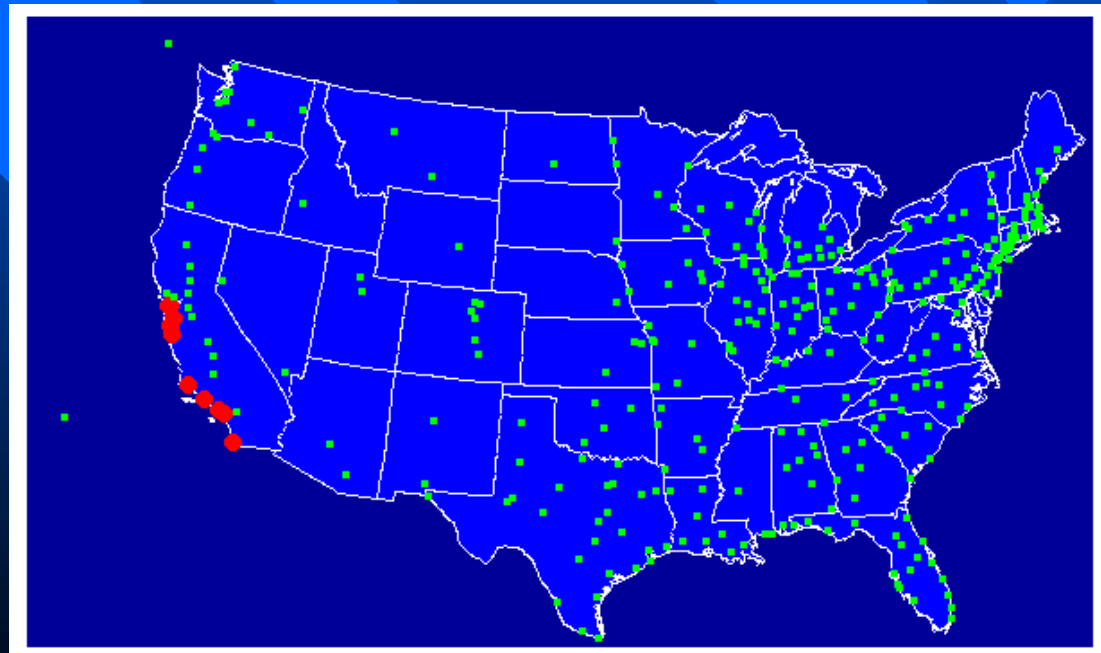
- Multivariate Link
- CDF Link
- Variogram-cloud Link
- Spatially Lagged Scatterplot Link
- Multivariate Variogram-Cloud Link

Multivariate Link

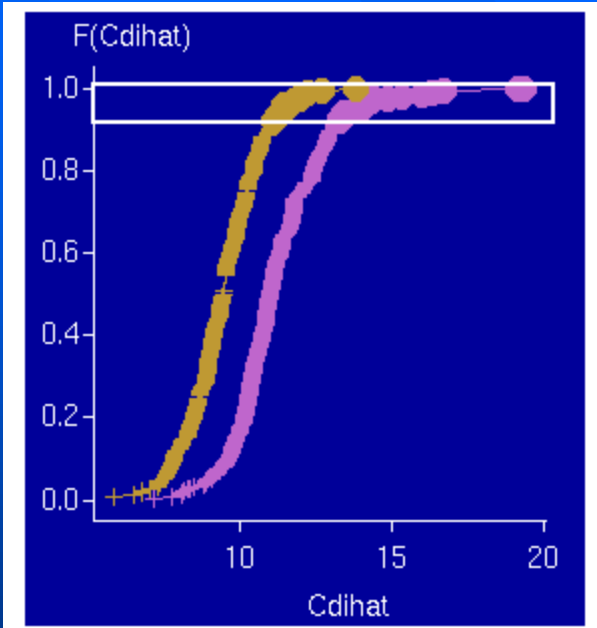


XGobi

ArcView

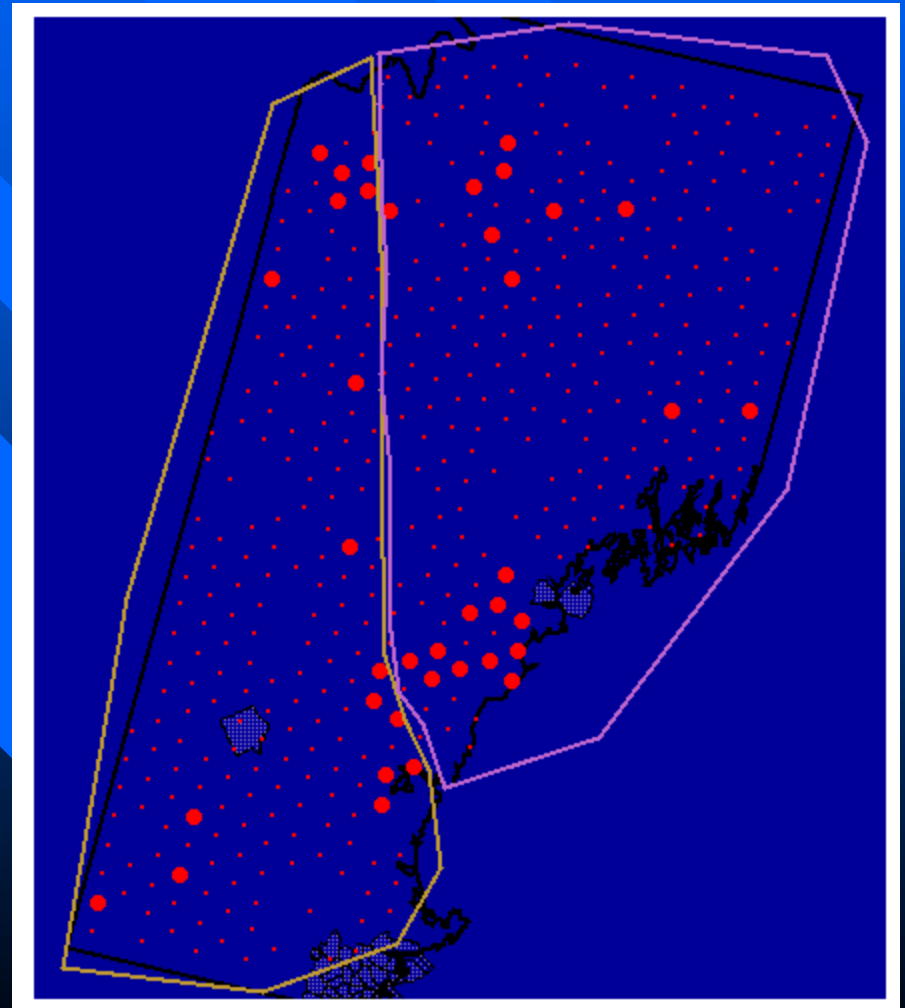


CDF Link



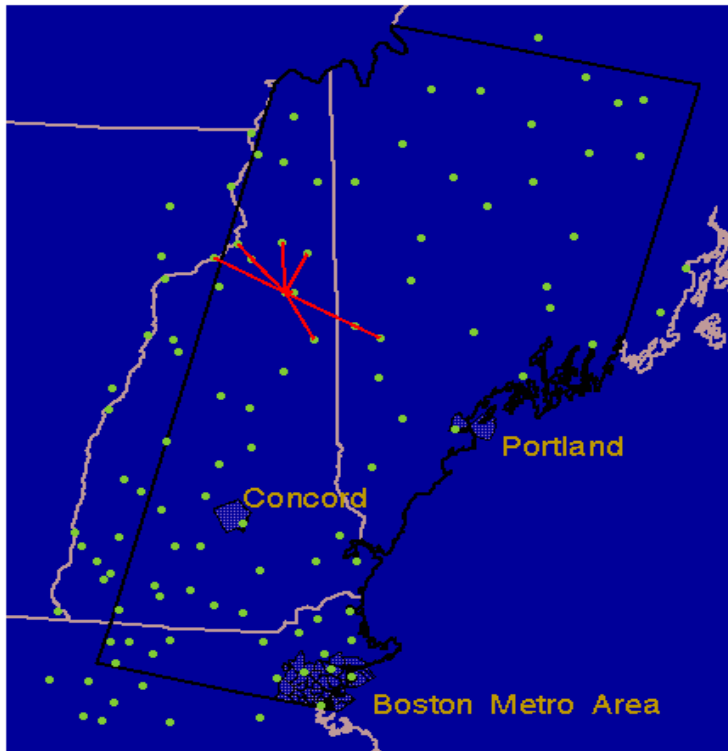
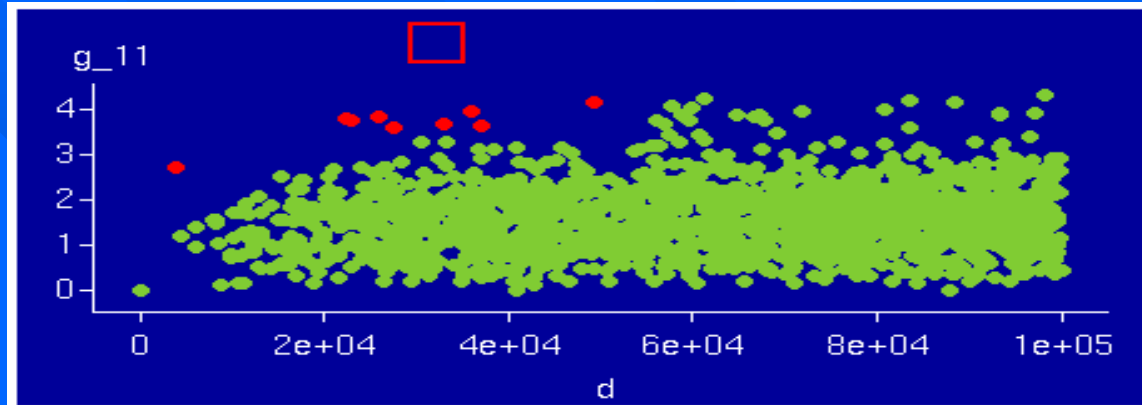
XGobi

ArcView

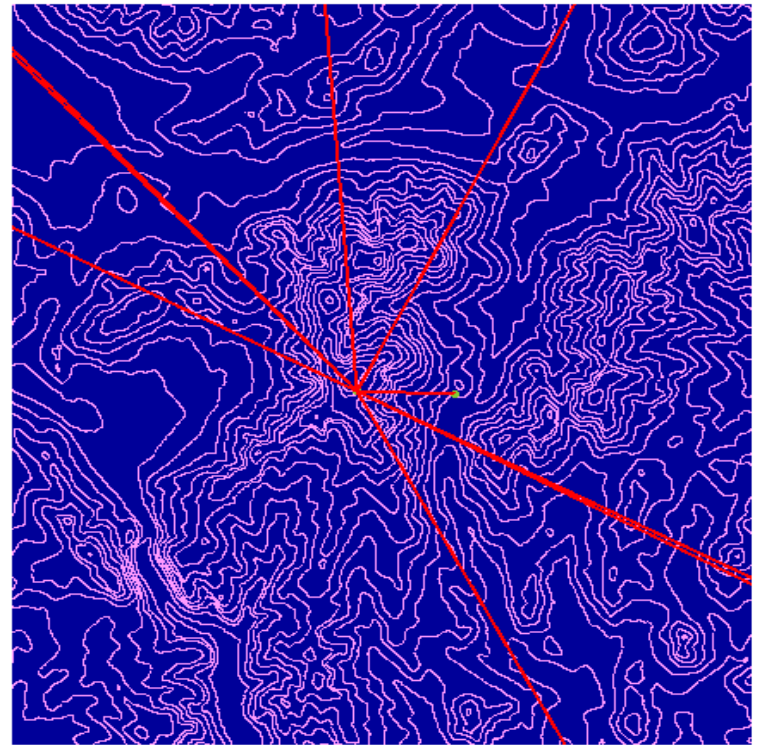


Variogram-Cloud Link

XGobi

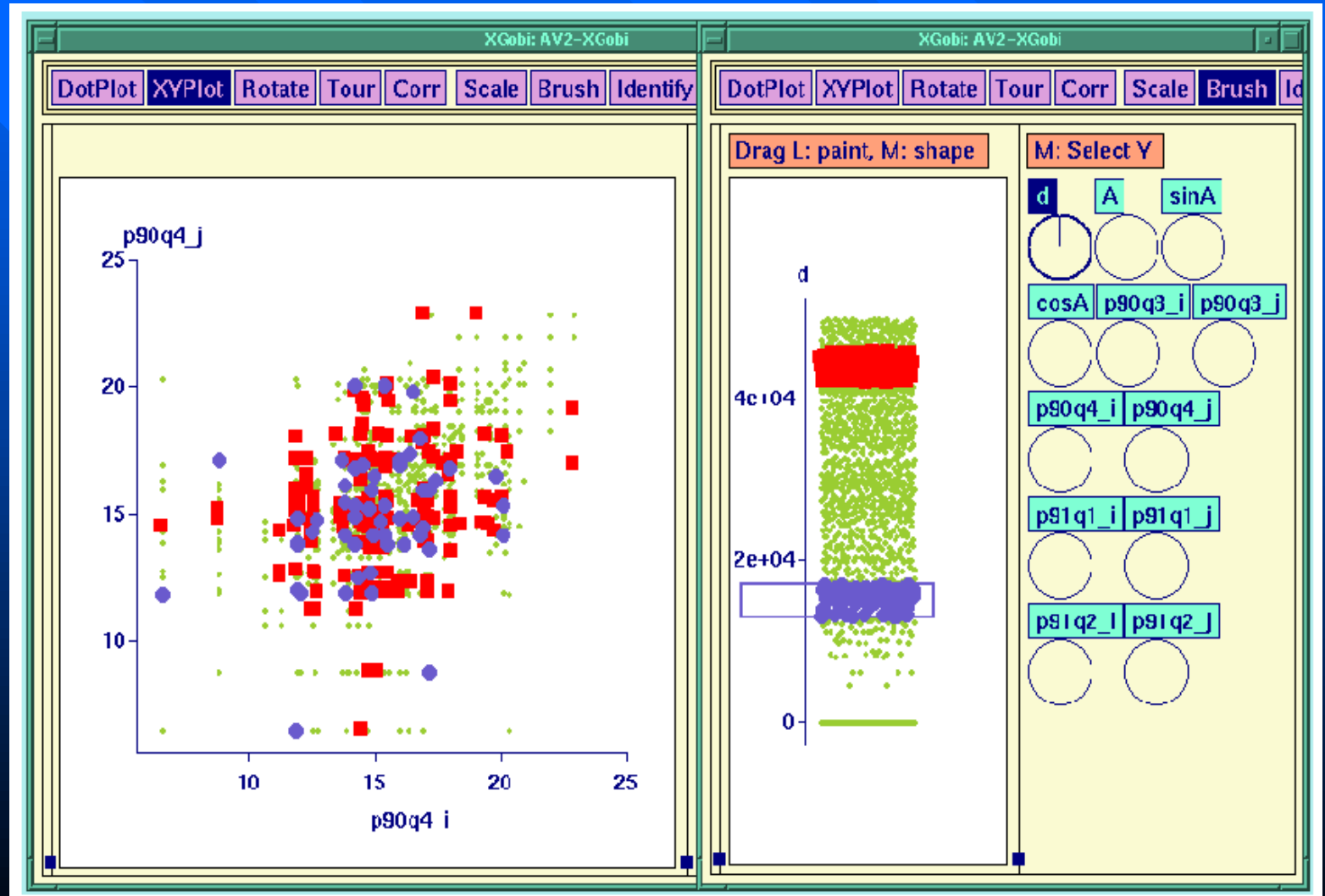


ArcView

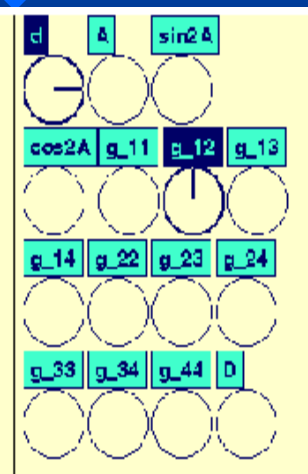
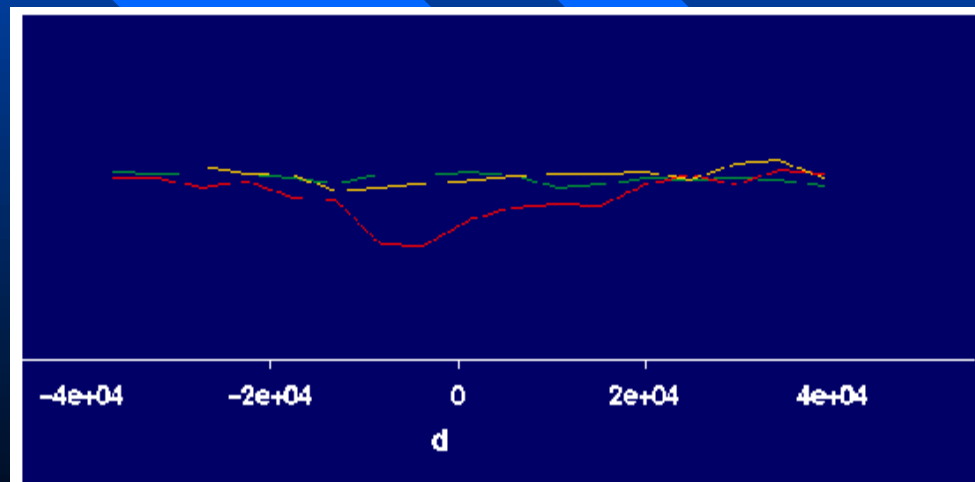
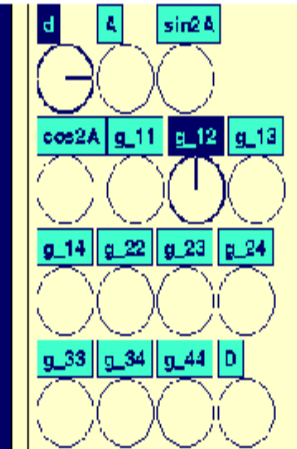
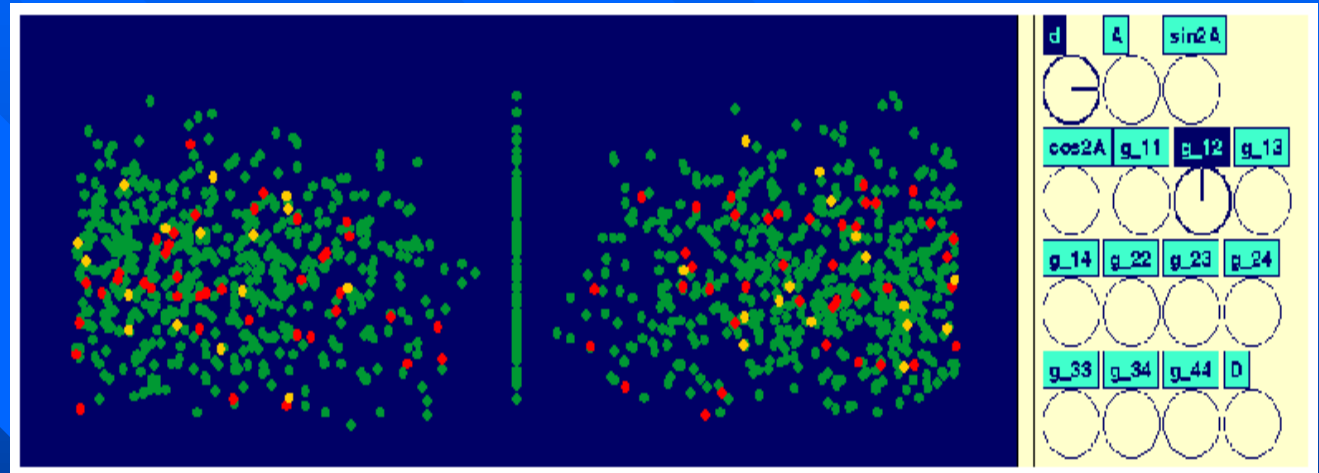
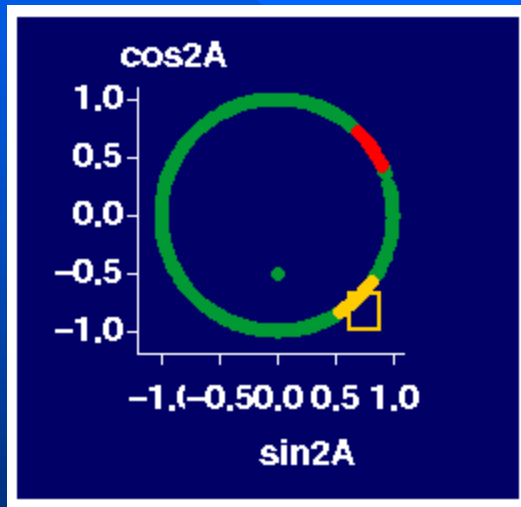


Spatially Lagged Scatterplot Link

XGobi



Multivariate Variogram-Cloud Link



XGobi

Features of XGobi/XploRe Part

- Exchange of data and commands
- External smoother
- Dynamic linked brushing

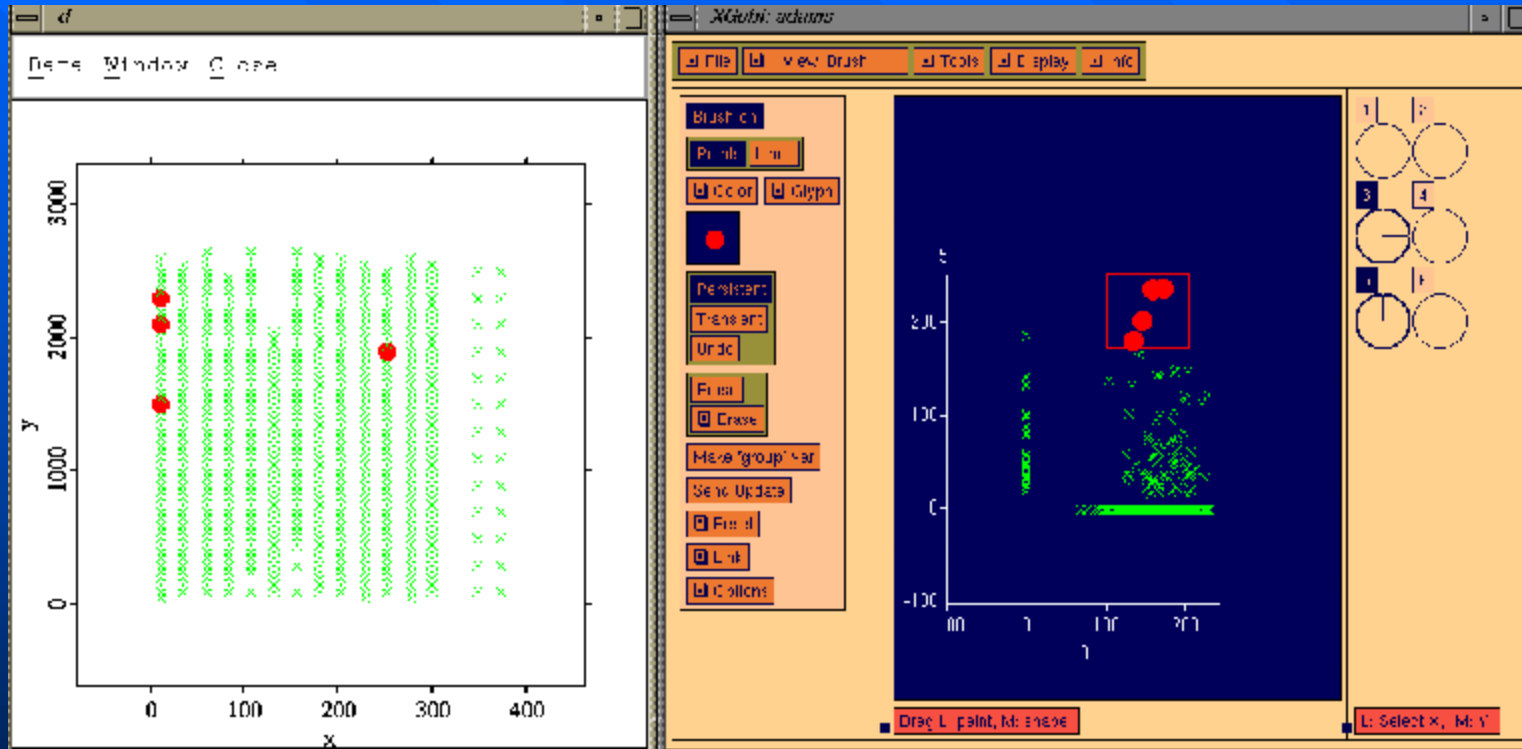
Clone XGobi
Smooth ...
Subset Data ...
Jitter ...
Parallel Coord Plot ...
Variable List ...
Case List ...
Start XploRe ...
Stop XploRe ...
Launch Missing Data XGobi ...
Impute Missing Values ...

Read ...
Save (extend current file set) ...
Save (create new file set) ...
Print ...
XploRe (pass variables) ...
XploRe (pass projection) ...
Quit (Q)

⊕ Mean
Median
Nadaraya-Watson
Spline
LINEAR
SYMMETRIZED KNN
KNN
LOWESS
LOCAL POLYNOMIAL
NEURAL NETWORK
ISOTONIC

XGobi Menus

Dynamic Linked Brushing



XploRe

XGobi

Features of ArcView/XploRe Part

- Capabilities for spatial data analysis
- Weighted head-banging algorithm for the smoothing of maps

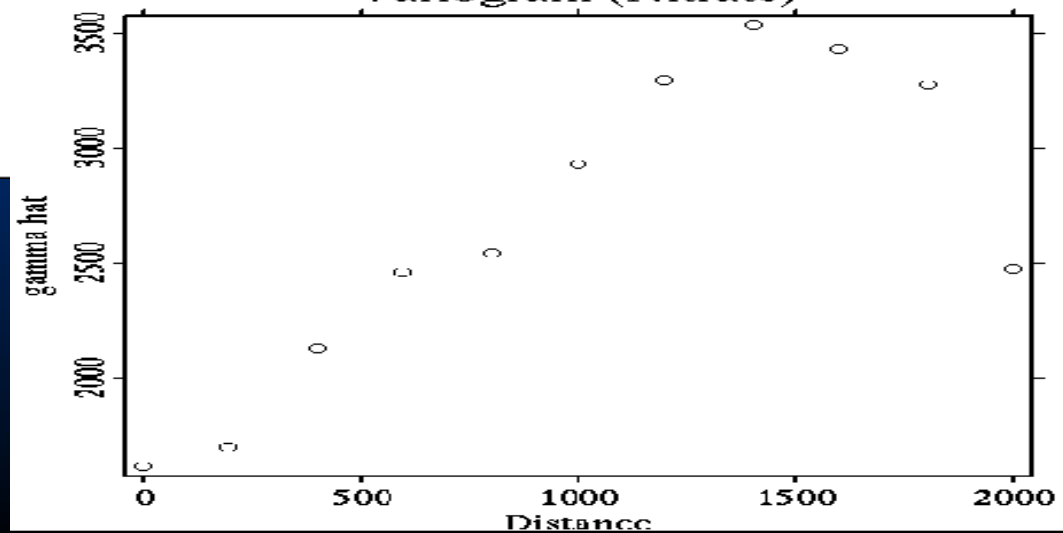
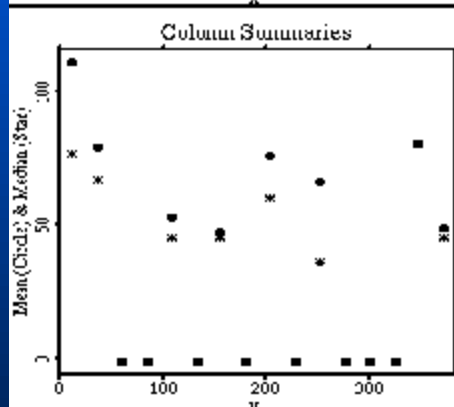
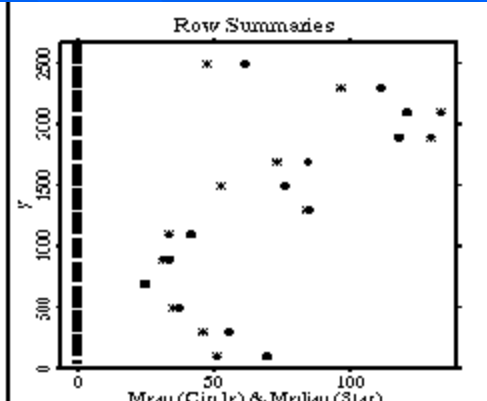
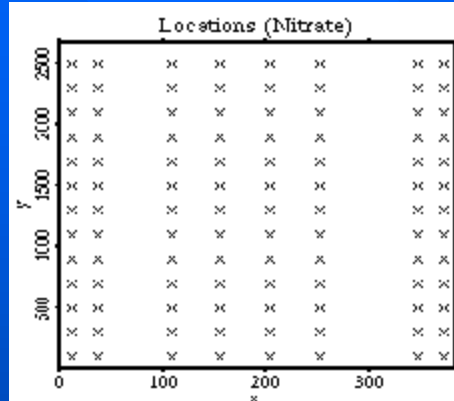
Spatial Data Analysis in XploRe

Mean and Median
Summaries

Variogram

XploRe

Variogram (Nitrate)



Full Scenario

The image displays the ArcView GIS 3.0 interface with several windows open:

- ArcView GIS Version 3.0**: The main application window with a menu bar (File, Edit, View, Theme, Graphics, Window, Color, Glyph, Size, Help, ISU) and a toolbar.
- XploRe**: A script window showing the following code:

```
d = createdisplay(1, 1)
e = createdisplay(1, 1)
;
show (d, 1, 1, XGobiData)
setgopt (d, 1, 1, "brushsize", 10 | 10)
setmode (d, 1, 1, 1)
rpclink (d, 1, 1, 0, "0x42000000")
;
```

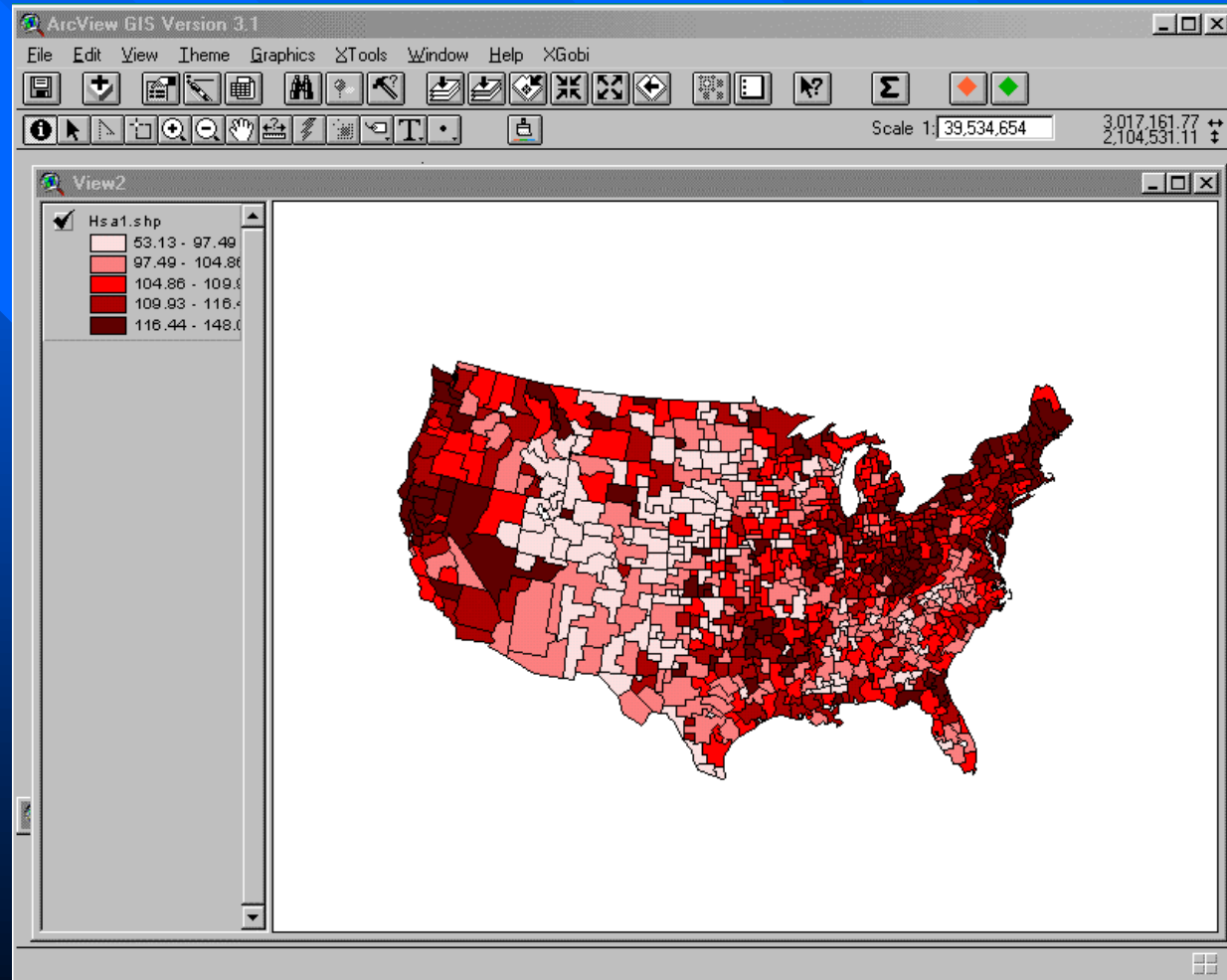
A prompt "Please enter command:" is visible below the code.
- d**: A data window showing a small, zoomed-in view of the point cloud data.
- e**: A data window showing a larger view of the point cloud data, with axes labeled from -5 to 5 and a scale of $1000 * x$.
- XGobi: AV2-XGobi**: A 3D visualization window with a menu bar (File, View: GrTour, Tools, Display, Info) and a control panel. The control panel includes buttons for Pause, Reinit, Link, Unlink, Send Tour Update, Manip, Radial, Path Len, Step, Go, Local Scan, Backtrck, 22, F, Hist On, Store, I/O, Interp, PC Basis, PC Axes, ProjPrst, Section, PP Indx, 2.26e-03, Optimz, Bitmap, TermsinExp: 1, and PP Index. A vertical column of buttons labeled PC1 through PC6 is on the right, and a red button labeled "L/M: Toggle (see" is at the bottom right.

Example: NCHS Mortality Data

- Data for 798 health service areas (HSA's) in the contiguous US
- Variables:
 - Proportion of the hispanic population
 - Per capita income
 - Proportion of female heads of households
 - Proportion of unemployed
 - Cancer Mortality Rate (in deaths per 100,000)

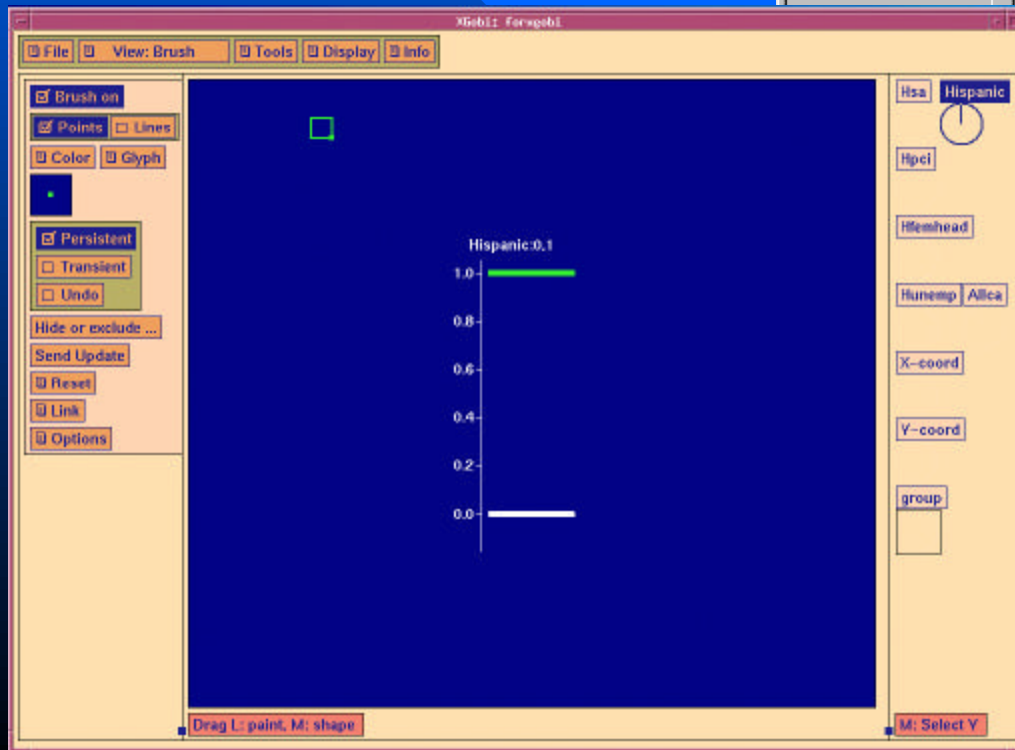
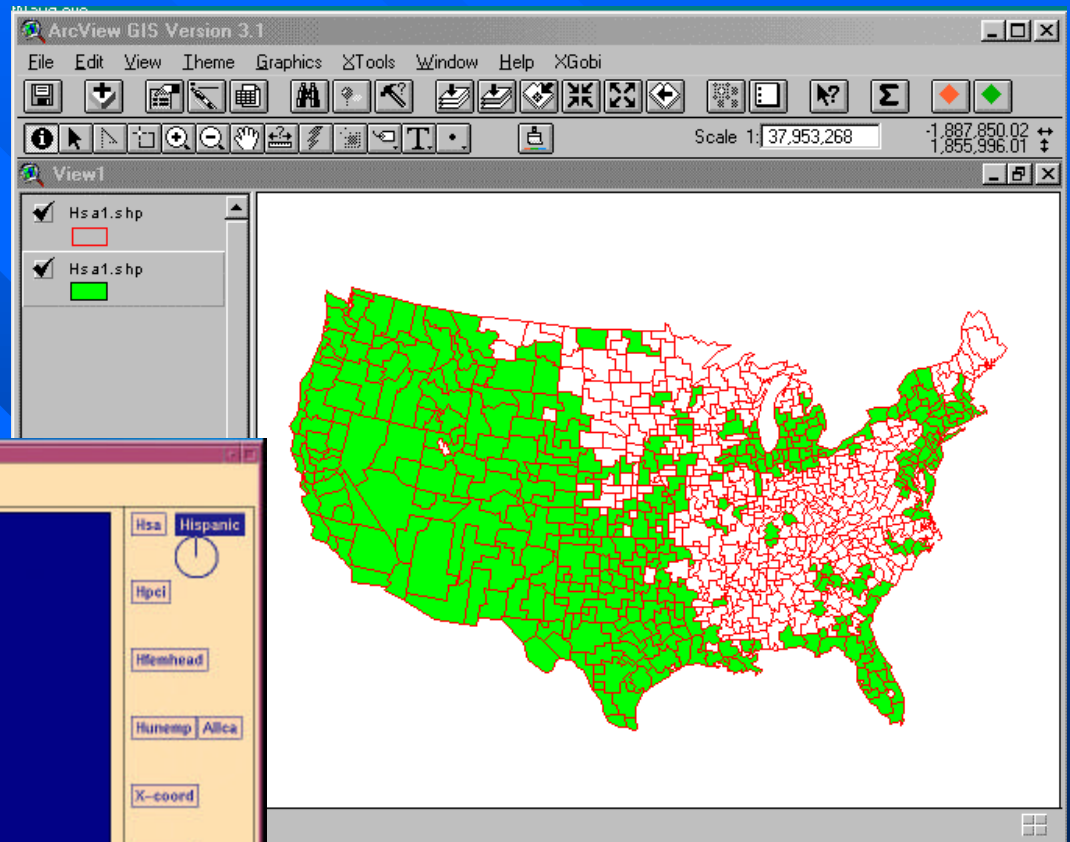
Initial Choropleth Map of Cancer Mortality

ArcView



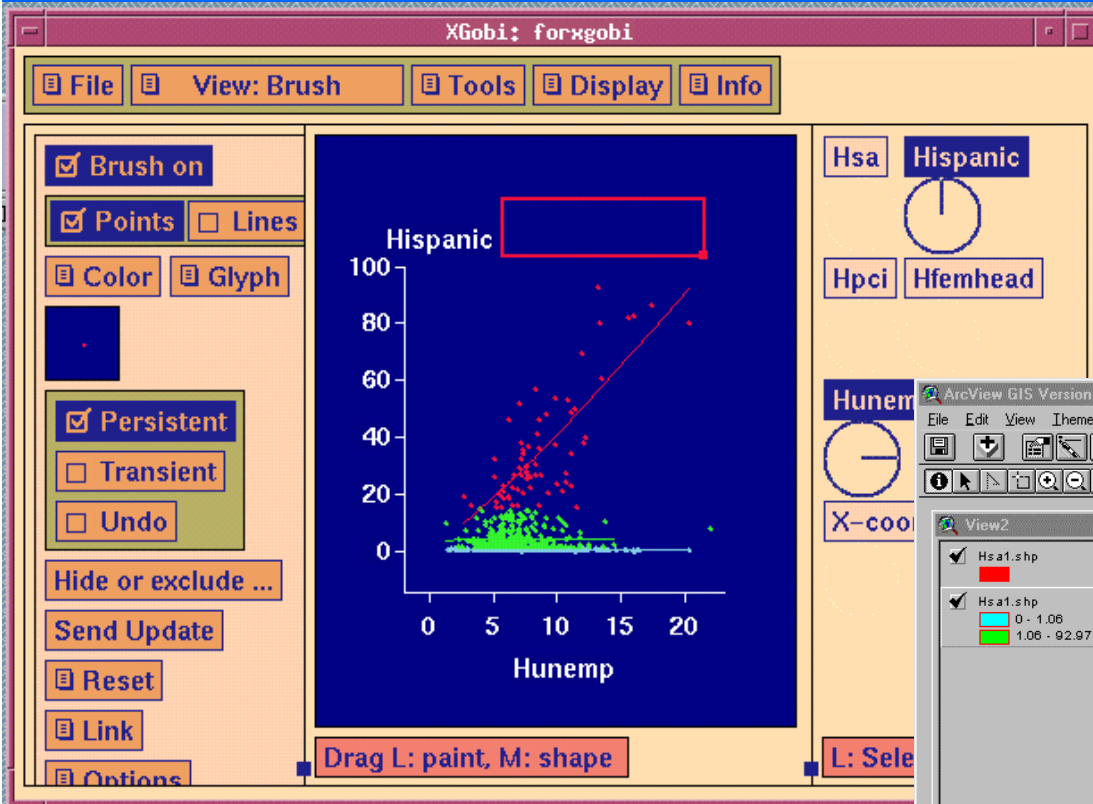
After Brushing in XGobi

XGobi



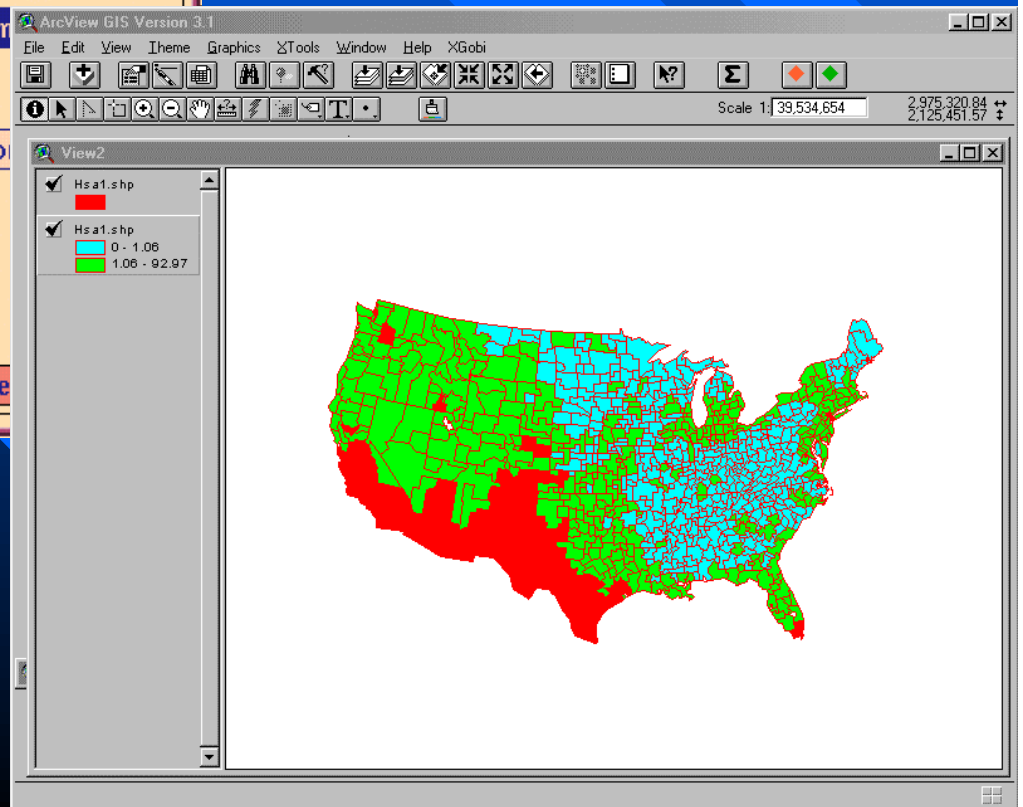
ArcView

Further Data Exploration



XGobi

ArcView



Other Applications

- Forest health data
- Precipitation data
- Remote sensing data

Current Research

- Continuation ArcView <-> XploRe part
- Spatial statistics in XploRe
- Development of a PC version of XGobi

Additional Information

- Articles on ArcView/XGobi/XploRe
 - <http://www.math.usu.edu/~symanzik>
- Main Web page
 - <http://www.public.iastate.edu/~arcview-xgobi/homepage.html>
- Mailing list