

# Database Management

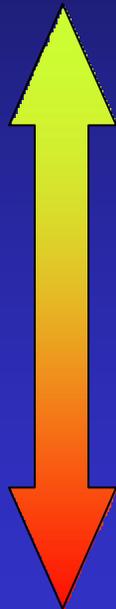
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- **Critical component for GIS**
- **GIS can link to most databases**
- **Need geographic location fields**

# Database Management

## *Geographic Location Fields*

More accurate



Less accurate

- x-y coordinates
- Highway intersections
- Census boundaries
- Landmark features
- Zip codes
- Cities
- Counties
- States
- Countries

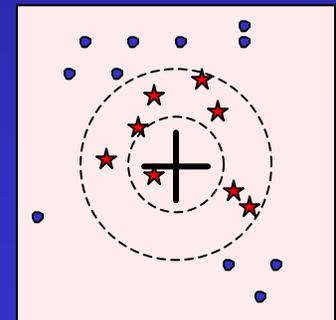
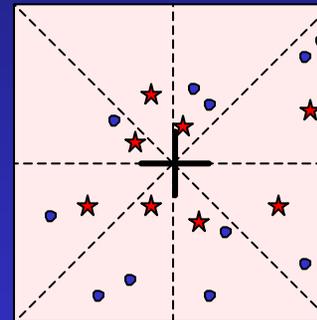
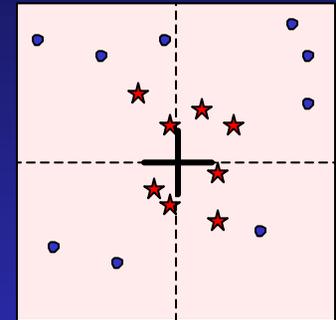
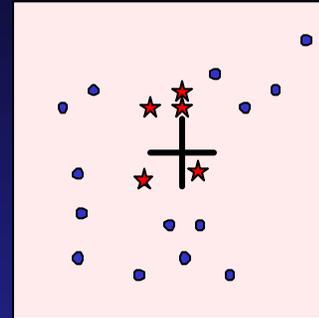
# Neighborhood Analysis

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- **Find and query operations**
  - Boolean operators
  - Query scripts - search database, make one or repeated calculations, then make a report
- **Select locations that are within a specified distance**
- **Weighting factors**
  - distance
  - risk factors used as weights with distance

# Neighborhood Analysis

- Nearest neighbor search
- Quadrant search (4 partitions)
- Octant search (8 partitions)
- Radial search



# Buffer Generation

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- **Creates zones around or along certain features**
- **Distances are variable**
- **May represent quarantine zones or regions of interest**
- **Can be used to select and analyze spatial features within the buffered area**

# Grid Generation

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- **Surveillance: Sampling for detection of disease agents and vectors**
- **Control operations: Flight lines**
  - Control and surveillance operations
  - Air video for surveillance
- **Analysis applications**
  - Randomized sampling
  - Lattice statistical methods

# Overlay Analysis of Thematic Data

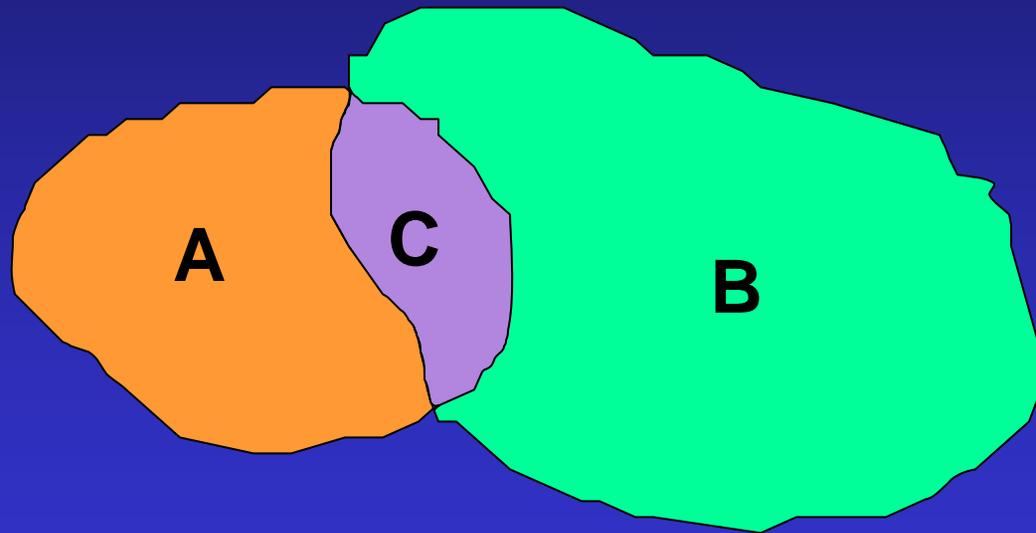
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- **Two or more thematic layers are superimposed**
  - roads
  - streams
  - elevations
  - animal populations
  - disease case sites
- **Shows proximity relationships**
- **Vertical analysis of features**
- **Temporal analysis**
- **Qualitative and quantitative analyses**

# Spatial Intersection

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*Area of overlap between the spatial features of two or more themes*

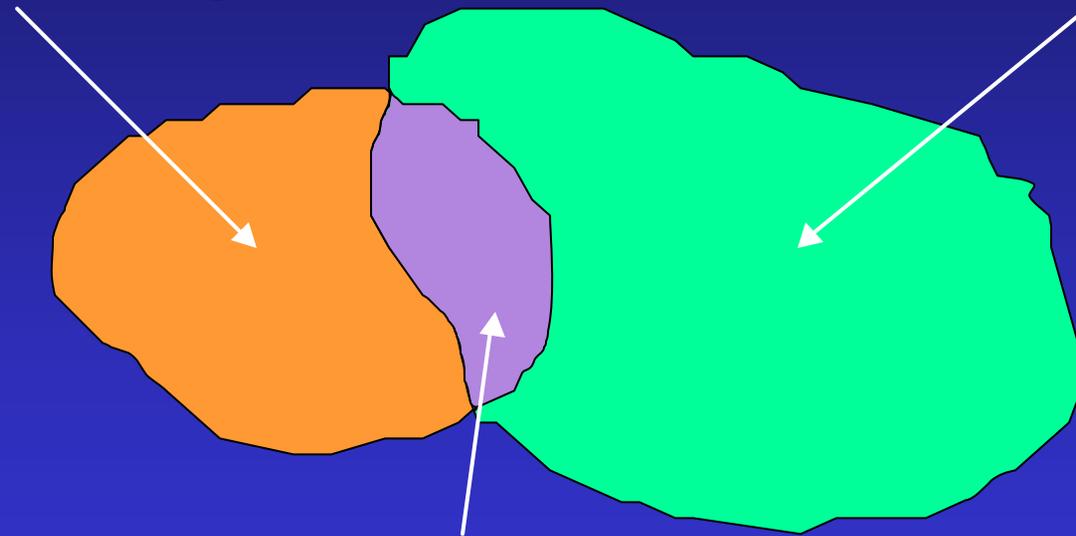


# Spatial Intersection

*Example: Brucellosis in Yellowstone National Park*

Bison home range

Cattle rangeland



Region-of-Interest

# Network Analysis

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- **To define the shortest distance between two locations, as measured in actual highway distances**
- **Useful for tracing movements of animals or animal products from infected sites to other destinations**
- **To examine the spread of infectious agents along transportation routes, or along ground water drainage systems.**
- **To determine capacity and re-routing**

# Surface Modeling

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- **Raster grids: Each cell has a value**
- **Used to create a continuous surface over an area**
- **Interpolation of discrete data from known to unknown areas**
- **Used to develop forecasts of disease spread**

# 3D Surface Modeling

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## *Digital Elevation Models*

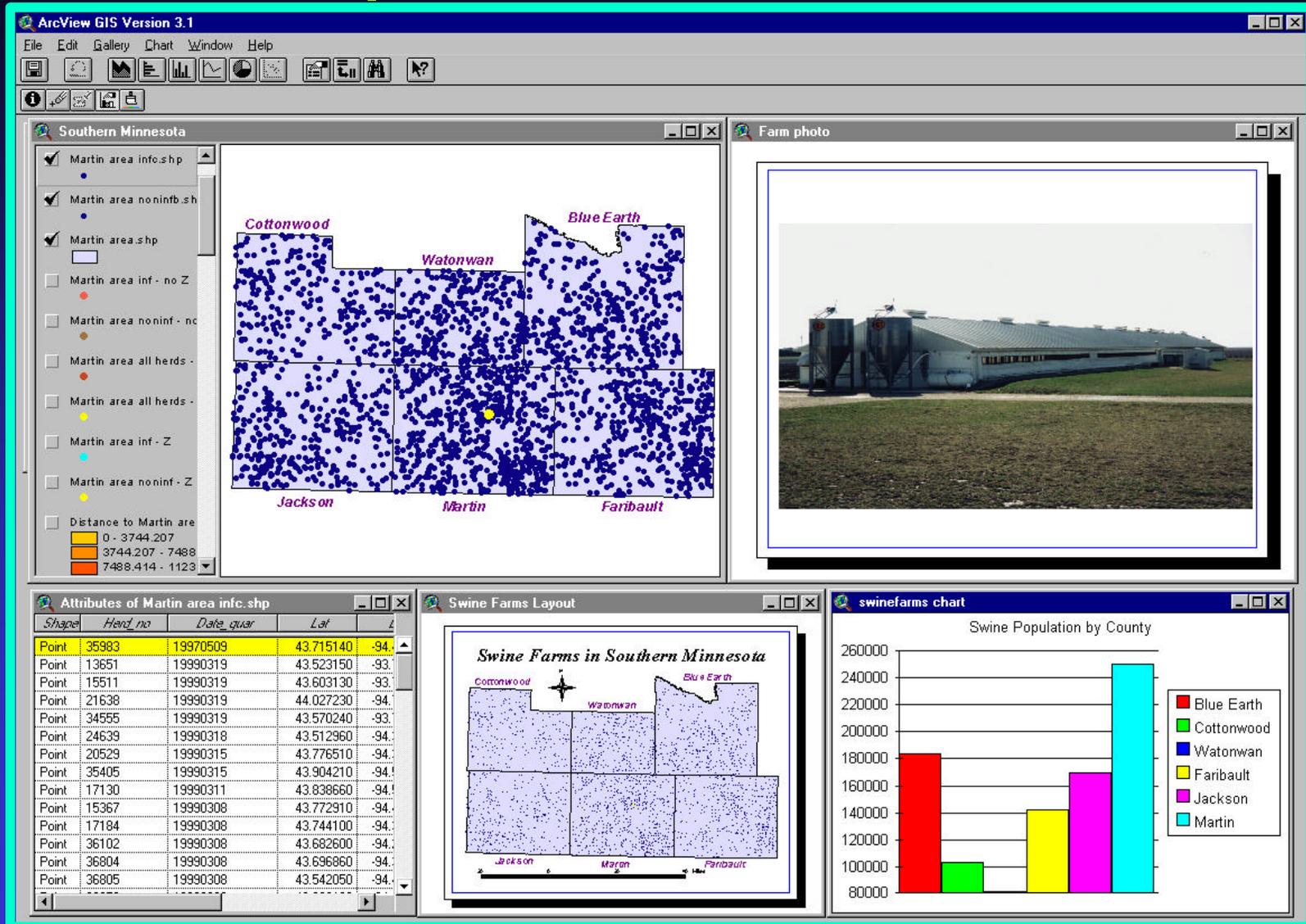
- Elevation
- Slope
- Aspect
- Hillshading (terrain relief)
- Model-building with other thematic data layers
- Viewsheds
- Watersheds
- Fly-bys

# Cartography

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- **Orientation of spatial features**
- **Maps vs. views**
- **Maps are fixed in time, scale, and thematic content**
- **Views are interactive**
- **Map layouts are labor intensive to create**

# Examples of Available GIS Data



# READEO Roster (Veterinary Services)

## *Administrative Support*

- 🌐 Personnel
- 🌐 Property, Procurement, & Supply
- 🌐 Vehicles
- 🌐 Finance
- 🌐 ITc

## *Field Operations*

- 🌐 Surveillance
- 🌐 Diagnosis & Inspection
- 🌐 Safety
- 🌐 Appraisal
- 🌐 Disposal
- 🌐 Euthanasia
- 🌐 Cleaning & Disinfection
- 🌐 Vector Control
- 🌐 Disease Prevention & Security
- 🌐 Vaccination
- 🌐 Regulatory Enforcement
- 🌐 Epidemiology

## *Technical Support*

- 🌐 Disease Specialist
- 🌐 Disease Reporting
- 🌐 Database Management
- 🌐 Economics
- 🌐 Environmental Impact
- 🌐 Vaccination Evaluation
- 🌐 Orientation & Training
- 🌐 Animal Welfare
- 🌐 Risk Assessment
- 🌐 Wildlife

# Spatial Data for Emergency Applications

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## *Organized Datasets*

- U.S. Atlas of Animal Disease Information
- Middle America Atlas of Animal Disease Information

# Spatial Data for Emergency Applications

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## *Spatial Data Library*

- Detailed base map data for the U.S.
- Satellite imagery
- Aerial photography
- Weather and climate data
- Terrain data
- Hydrologic models
- Livestock and poultry populations
- Geographic distribution of arthropod vectors
- Wildlife distributions and population densities