Spatial Analysis of Louisiana Interstate Data

By

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Background

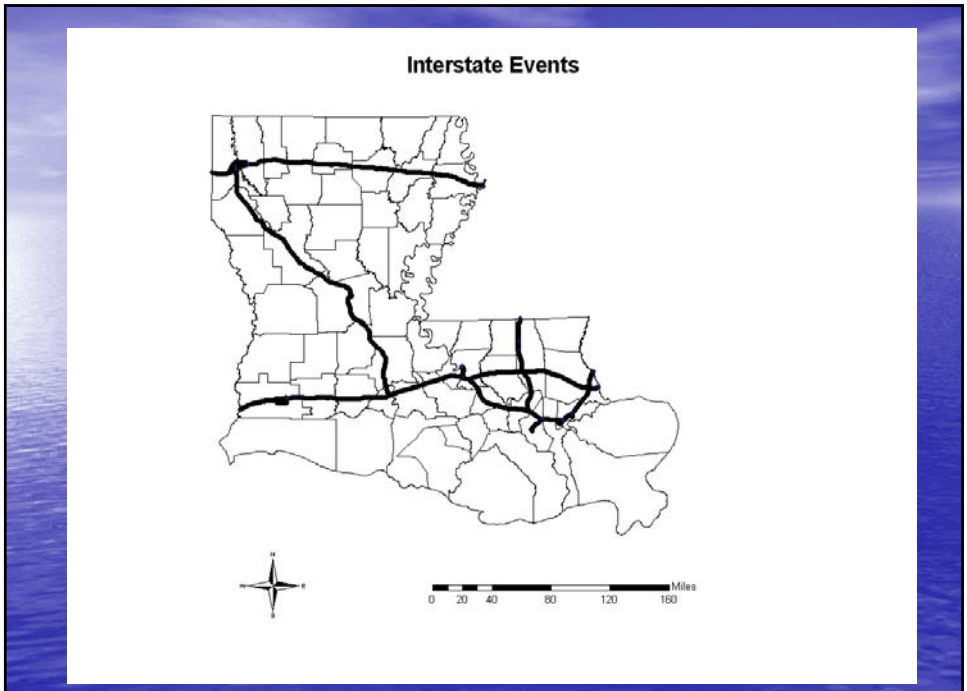
- This study was created to show the usefulness of ESRI products in analyzing transportation networking system needs and aiding in existing processes at Castle Rock Consultants (CRC) www.crc-corp.com
- The purpose was to create a demonstration for one of my bosses at work to show the president of the company that we need to purchase ArcGIS to assist with various projects.
- Louisiana was chosen as the study area because of a current work project in that state.

System Information

- A system was developed previously at CRC called CARS (Condition and Reporting System) that uses the coordinate pairs in conjunction with other road information in comma separated (.csv) files with a Java program to generate state road maps with reported road conditions.

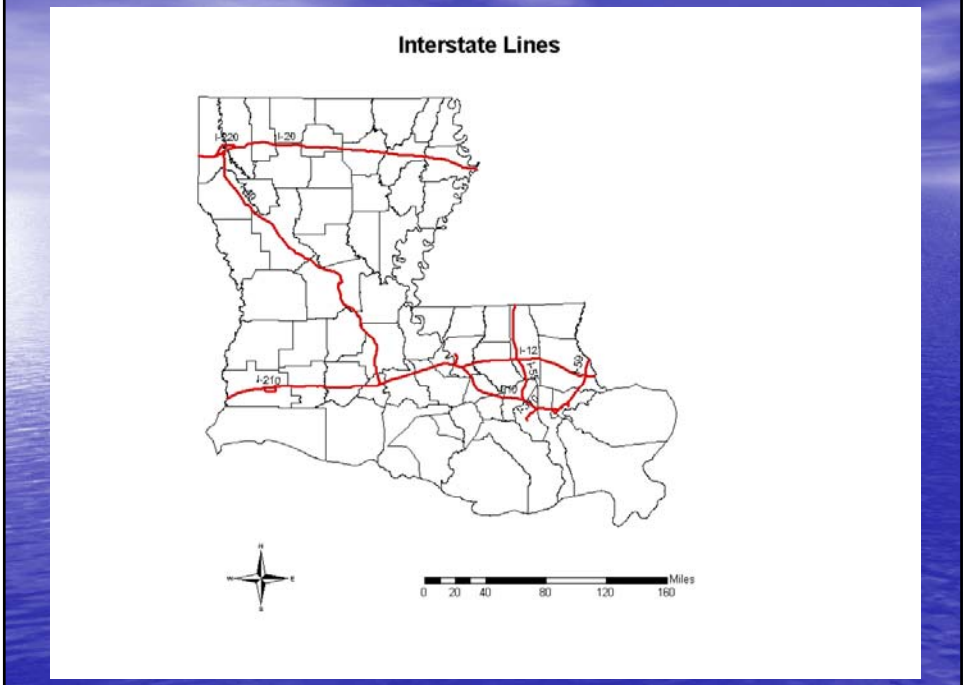
Data Information

- The original data was latitude and longitude pairs (NAD 1983, Transverse Mercator Projection, Zone 15N) for interstate road points across the state obtained from the LA DOT.



Methods

- First, the latitude and longitude interstate point data was put into ArcInfo, and turned into lines representing each interstate using the Generate and Build commands.
- This was done to convert the point road data into line road data for some of the spatial analyses.



Methods To My Madness

- A join operation was run to associate an interstate name with each road arc.
- The identity tool was used to add the county to which arcs were associated.
- This could greatly reduce the time needed to determine the county for each road point needed to make the CARS system run.

Madness To My Methods

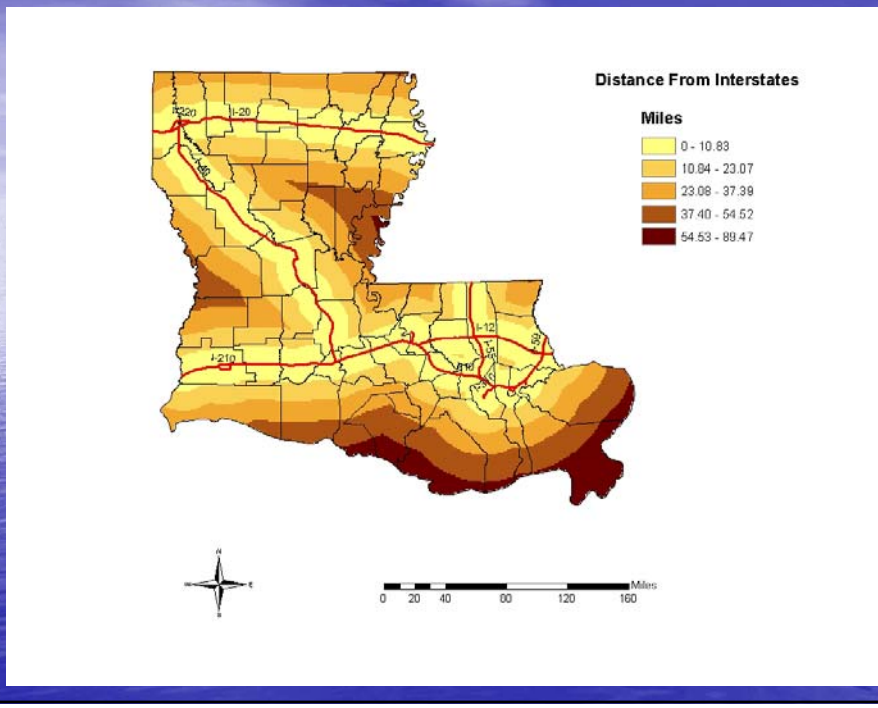
- These were merged together to create one line segment for each interstate using the dissolve tool.
- This allowed for identification and labeling of single highway elements on the map.

Analysis

- Several tools in Spatial Analyst were used to demonstrate the usefulness of ArcGIS for transportation networking analysis.

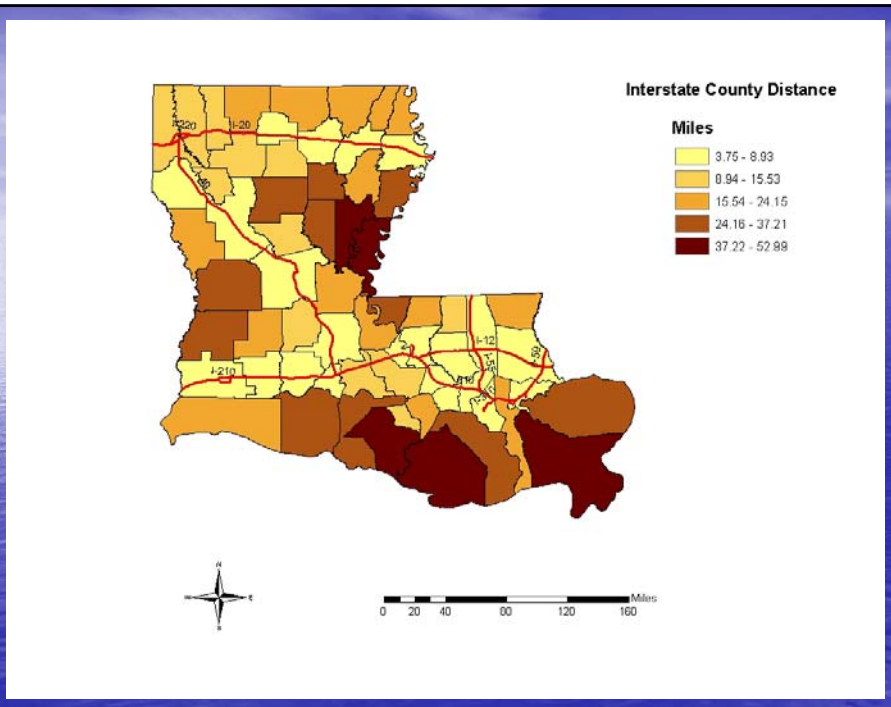
Distance From Interstates

- The Straight Line Distance tool was used to generate the distance to the nearest interstate for all of Louisiana.
- The purpose of this was to demonstrate that distance can be determined using ArcGIS, which is an important input to the CARS system.



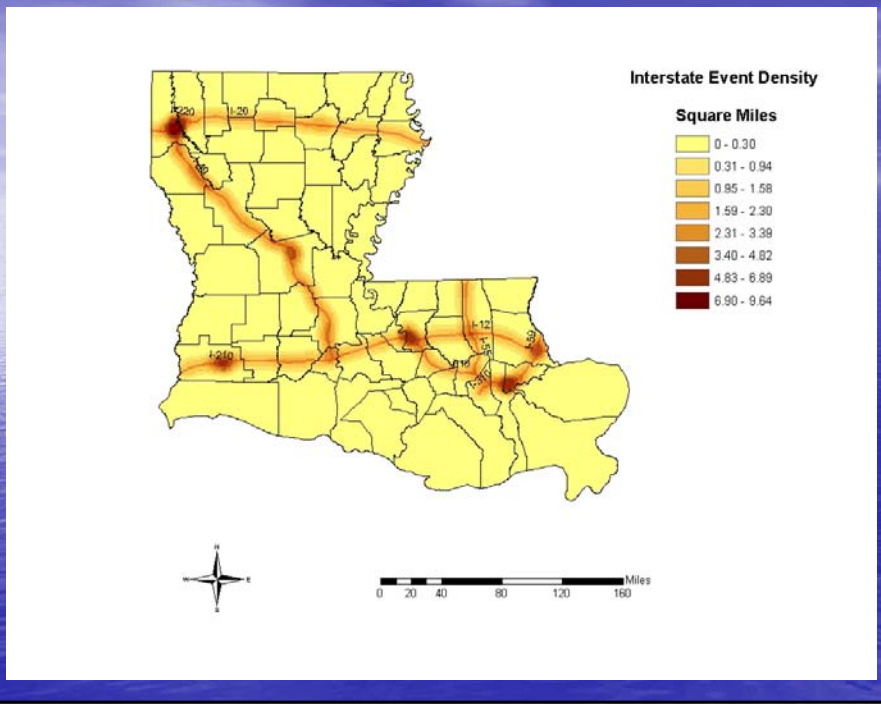
Distance From Interstates By County

- Next, Zonal Statistics were used to determine the average distance to interstates by county.
- This was done to demonstrate highway accessibility by county.



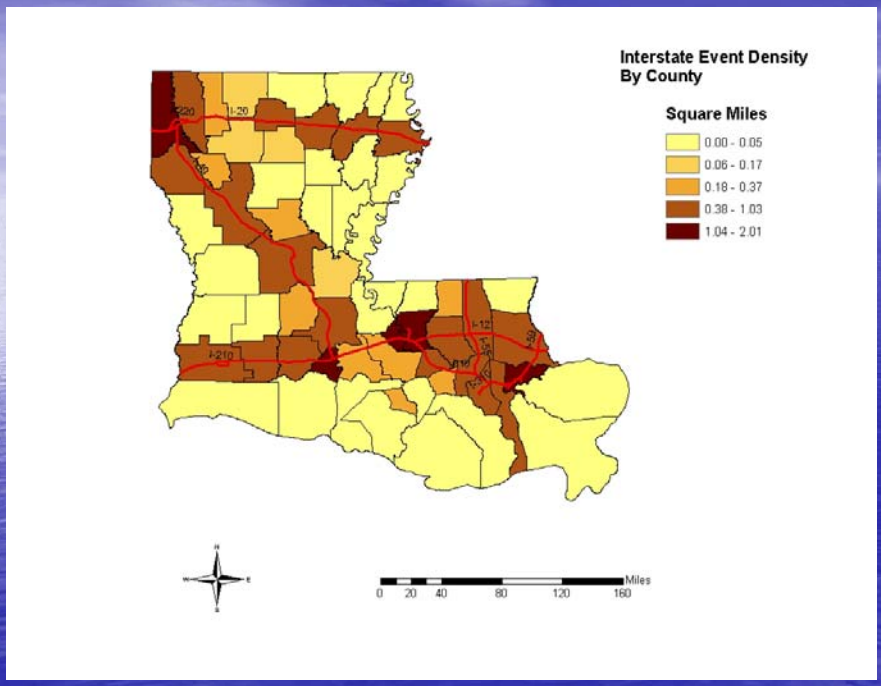
Interstate Event Density

- Then, Density was calculated for the original data points to determine the most dense data point areas.
- The purpose of this exercise was to determine the most dense road event areas.
- Some metro areas cold be too congested with road points, slowing the system down when zooming in.



Interstate County Density

- Finally, point density was calculated as an average by county, again using Zonal Statistics.
- This was to show which counties had the greatest road event congestion.
- Metro areas or counties with too many road points could be moved to a local metro map version of CARS.



Conclusion

- This project was just a small sampling of the spatial analyses and computations that could be run using ArcGIS to help with decision making regarding transportation network.
- In addition, a new extension used for transportation networking called Network Analyst has just been released with ArcGIS 9.1.
- For more details, go to: http://www.esri.com/software/arcgis/extensions/networkanalyst/index.html

Network Analyst

- ArcGIS Network Analyst allows you to create and manage sophisticated network data sets and generate routing solutions.
- ArcGIS Network Analyst also provides a new framework for network-based spatial analysis.
- This extension allows ArcGIS Desktop users to model realistic network conditions and scenarios.

More About Network Analyst

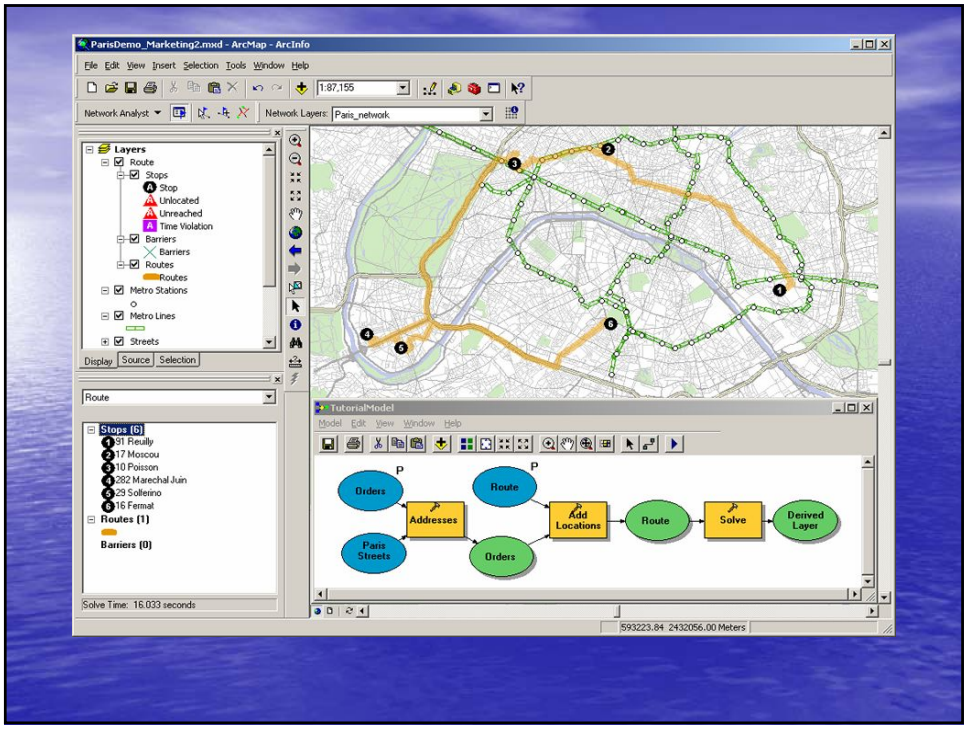
The following tasks are greatly simplified:

- Finding the most efficient travel route
- Generating travel directions
- Finding the closest facility
- Defining service areas based on travel time

You Know You Want Network Analyst...

With ArcGIS Network Analyst you can conduct:

- Drive-Time Analysis
- Point-to-Point Routing
- Route Directions
- Service Area Definition
- Shortest Path
- Optimum Route
- Closest Facility
- Origin Destination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Network Analyst
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