Web-Based Spatio-Temporal Display of NC DETECT Surveillance Data

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OBJECTIVE

Managers of the NC DETECT[1] surveillance system wanted to augment standard tabular Web-based access with a Web-based spatial-temporal interface to allow users to see spatial and temporal characteristics of the surveillance data. Users need to see spatial and temporal patterns in the data to help make decisions about events that require further investigation. The innovative solution using Adobe® Flash® and Web services to integrate the mapping component with the backend database will be described in this paper.

BACKGROUND

NC DETECT is the Web-based early event detection and timely public health surveillance system in the North Carolina Public Health Information Network. The reporting system also provides broader public health surveillance reports for emergency department visits related to hurricanes, injuries, asthma, vaccine-preventable diseases, environmental health and others. NC DETECT receives data on at least a daily basis from four data sources: emergency departments, the statewide poison center, the statewide EMS data collection system, a regional wildlife center and laboratory data from the NC State College of Veterinary Medicine. Data from select urgent care centers are in pilot testing.

METHODS

The functional requirements for the spatio-temporal mapping component included the need to: dynamically connect to the NC DETECT backend database; work within a Web browser; be simple to use; display up-to-date locational data and temporal data; provide visual clues to potential events that should be investigated; filter, sort, and select data to be displayed; allow for dynamic manipulation of the timeline; and display both the source of surveillance reports as well as syndromes contained in reports.

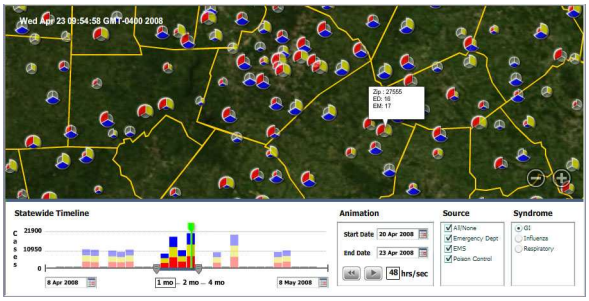
RESULTS

These requirements resulted in the development of a Flash-based mapping interface that dynamically connects to the backend database and builds a map that users can interact with in both temporal and spatial dimensions. Flash provides the necessary Web-based components and animation control needed. The Flash application communicates with industry standard SOAP based Web services via asynchronous ActionScript™ calls. The Web services components were developed to allow the mapping site to connect to and retrieve data from the backend database dynamically without requiring hard-coded links and queries to the database. In addition, the Web services, as implemented, provide an interface to the data that other applications can use immediately.

The interface builds both a dynamic map and a dynamic bar chart to allow users to examine the data using different visualizations. The surveillance data are aggregated and displayed at the ZIP code of residence of each patient. Pie charts displayed on each ZIP code are used to portray both the magnitude of the event and the sources of the reports (hospital emergency department, poison control center, or EMS). An external file defines the binding between visual parameters such as color, transparency, and scale with select data sources and variations. The dynamic mapping system required no additional investment in GIS Server or other IT technology in NC DETECT.

CONCLUSIONS

The visualization of spatio-temporal surveillance data is valuable in supporting decisions about events that may require public health response. By building an easy-to-use, integrated, Web-based interface that displays both the spatial and temporal aspects of NC DETECT surveillance data, users will be able to make better decisions regarding where to target their investigations and will also have a much more efficient at-a-glance view of syndromic data trends statewide.



REFERENCES

[1] NC DETECT. http://www.ncdetect.org .

[2] Adobe Flash. http://www.adobe.com/products/flash/.