ABSTRACT

Bringing GIS to the field has many limitations to the end user due to currently available mobile computing and connectivity shortcomings. Of major concern is the lack of spatial analysis and querying abilities currently available in commercial off-the-shelf (COTS) software for mobile applications. Current mobile GIS offer mapping and visualization capabilities, while providing no analytical means to discover the data spatially. Adding spatially based analysis tools will enable emergency responders to more accurately record the state of a particular area and better understand their surroundings while collecting important field assessments. This allows for more timely and accurate assessments by emergency planners, to better allocate resources in the field.

BACKGROUND

• Background
  • US Military is tasked to aid nations in disaster response and management
  • Preplanned Emergency Action and Response (PREACT)
  • Enterprise GIS Application (ArcGIS Server)
  • Web, Mobile Interfaces
  • Mobile GIS – Data Collection and Visualization

• Problem
  • Limited problem solving capabilities for field collection
  • Dynamic Map, Data Collection capabilities already exist

• Goals
  • Develop spatial analytical capabilities
  • Mobile platform
  • Connected (services driven)
  • Disconnected (geometry driven)

PROJECT FINDINGS

This project focused on incorporating geoprocessing-based services for use with mobile devices. These tools offer strong advancements in the current state of the typical mapping capabilities within the ArcGIS mobile SDK. From the research and development done within this project the possibilities of including these server-based geoprocessing tools offers insight into the ability of the field user to have tools that were once only available to desktop and web users. These geoprocessing services also allow the mobile user access to data and extensions within the desktop environment, such as Network Analyst, which was used in the pre-prototype implementation.

• Primary focus on server-based tools
• Web services oriented
• Requires connectivity
• Requires communication protocol
• Technology not ready for the field
• Difficult to implement
• Requires heavy customization
• Advancements seen in field analysis capabilities

The existing PREACT mobile application was extended with an analytical capability to calculate population estimates. The user can access the population count analysis tools from the main toolbar. The tool triggers a zonal population summary estimate based on an input polygon.

The field user then inputs an area of interest: which is defined as a polygon once the user specifies four corners. The polygon is passed to the web services as a coordinate collection with the appropriate attributes for the input feature of the population model.

A key component of the system architecture is a web service that handles communication between the mobile device and geoprocessing services on ArcGIS Server. The web service takes the coordinate collection from the mobile device and constructs a polygon feature to be passed to the geoprocessing service.

The geoprocessing service accesses a population count model residing on the server. This model uses a population grid (LANDSCAN) dataset and the input polygon to calculate a zonal population estimate for a given area.

The model output is then sent back through the geoprocessing service as a statistical summary table. The custom web service parses out the needed information and then sends the summary to the mobile device.

The mobile device receives the output table from the custom web service. The user is then prompted through a message box of the population estimation for their input area. The disaster responder now has the ability to make decisions based on the estimated population for the area such as defining new shelters or emergency facilities.

STUDY AREA

Mobile Analysis Study Area: San Bernardino County, California

ArcGIS Mobile

Network Connectivity

Web Services

Custom Web Service

Geoprocessing Service

Mobile Data Service

ArcGIS Server

File GDB

SDE GDB

PROJECT APPLICATION

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