Abstract

College-level students of Christian scripture face the challenge of critically reading the text while separating it from the familiar theological context. This can be addressed by requiring students to create maps, but it raises challenges in cartography, temporal representation and analysis. Students tend to habitually hand draw maps or attempt to use web-based tools without regard to time or spatial analysis. A Geographic Information System (GIS) can help. But learning software is often not worth the effort. The Spatially Interactive Literature Analysis System (SILAS) is a GIS-based study tool designed to allow students to integrate historical data, edit spatial content, and create print maps. Computer-based GIS technologies, manual techniques, usability issues and integrating text with geography are examined. Initially focused on the four gospels in the New Testament, SILAS can serve as a template for incorporating other texts, Christian and otherwise.

Initial Proof of Concept: Acetate Layers

To simulate the concept of map layers, places mentioned in the gospels were formatted in ArcMap and printed on acetate media. This allowed the student to "layer" the data in a manner similar to a GIS, add annotations, and create a map using multiple sources without a computer. This simple solution allowed students to learn GIS concepts such as scale and layers, annotate text citations on the map while reading and develop sophisticated insights without the need to learn complex GIS software.

Pre-Prototype System: ArcMap 9.2

The Pre-Prototype version of SILAS uses ArcMap 9.2 and was called ArcMap Implementation of the Initial Proof of Concept. The system consisted of MXD map files, a geodatabase, layers for the background hillshade, Roman political boundaries and hydrography, a folder to store map services, an ArcMap application and a custom database. Although the system was not as robust as the final SILAS, it was able to create, print and store maps for a limited number of student users.

Final System Architecture

The final SILAS employs ArcGIS Server and ASP.NET technology to create a web mapping application with text search. Components include:

- **Map Background**: an SRTM hillshade, Roman political boundaries and hydrography form a background base layer for the SILAS maps.
- **Map Server**: creates map services for the map layers, including one editable service for each student to store their citations and notes. The ESRI Virtual Studio development framework was used to create a web application containing the map services to represent places mentioned in the gospels and scripture citations and notes provided by the student. Custom tools were added to hyperlink to the text search, edit notes and citations and print the map.
- **Web Application**: the web application provides access to the SILAS application as well as the ASP.NET scripture search application that searches the New Revised Standard Version of the Bible. The text search is provided an ASP.NET web application. It uses ArcGIS services to construct a URL that contains a database query and returns the results via a web page.

Future Work

SILAS demonstrates that a modern GIS can help students, but additional work adding more data, providing analysis tools and exploring temporal visualizations is needed. Performing spatial and temporal analyses on historical data and on the places mentioned in scripture holds many possibilities. There is an example of a proportional symbol representation of places mentioned in the Pauline Letters. This hints at the possible GIS analyses that SILAS could provide if the appropriate tools were added.

Learning and Teaching with SILAS

1. **First uses the Web Application tools** to locate places mentioned in the text as they read.
2. **Map layers** (roads, symbols, citations, notes) can be turned on and off to meet the requirements of the final map.
3. **The Editor Palette** has tools to select a place and edit notes and scripture citations in ArcMap. This allows the student to create and print a map of scripture locations in less than one hour.
4. **F. Scripture Search** application displays place matches in the bible text. This feature can be disabled if desired.
5. **Student Data** appears on the map when the ed it is saved. The symbol changes to indicate the gospels where the place is mentioned and notes and citations appear. Students can share their maps and insights as the instructor encourages a discussion of the text.

Conclusions

The SILAS project showed that undergraduate religious studies students could use a GIS:
- Understand GIS concepts such as map scale and layers
- Construct their own maps using data layers of their choosing
- Annotate a map with scripture citations while reading from either prepared excerpts or the Bible
- Develop sophisticated insights about the text that might not be achieved at the undergraduate level without the use of spatial maps

The complexity of developing SILAS has exposed many strengths and weaknesses of the underlying ArcGIS Server architecture. If GIS support personnel were available, it is natural to pursue a production SILAS that mimics the prototype architecture. Absent this support, the evolving on-line, freely available GIS and mashup tools may be able to be molded into a SILAS-like application that does not have the development and support burden of the ESRI architecture.

Acknowledgements

Client: Dr. Lillian Larsen, PhD, Assistant Professor, Religious Studies Department, University of Redlands
Advisor: Dr. Diana Stuart Sinton, PhD, Director of Spatial Curriculum and Research, University of Redlands

Stephan Benzek
MS GIS Program
University of Redlands
Redlands, California
2008

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