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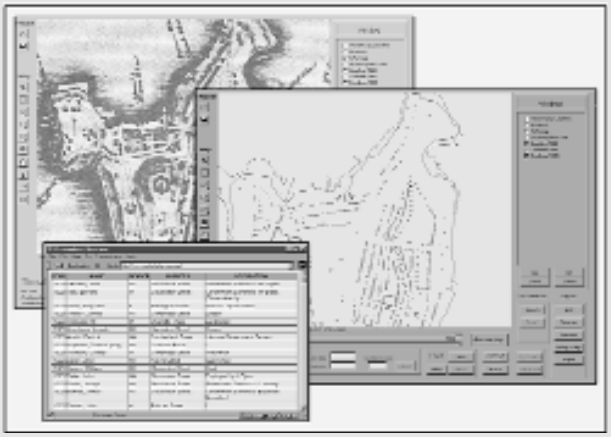
Interactive Time-Aware Interpretive Maps of Cultural Features

Adequate interpretation of historical sites or phenomena often requires the presentation of maps with a time component. This is often handled through sequences of maps showing, for example, an evolving landscape or the features of a site at particular periods. Alternative methods of showing time include symbols, color coding, or arrows. In some cases, one-off video animations or interactive computer applications are generated at considerable cost.

Developments in programmable mapping toolkits and delivery of information over the World Wide Web open up new possibilities for routine recording of cultural and natural features in time-aware databases and the display of interactive time-based maps using standard software. The TimeMap™ project of the Sydney University Archaeological Computing Laboratory aims to develop methods for recording and displaying cultural and natural map features which are dated and/or change through time. These include landscapes, cityscapes, historic sites, settlement distributions, site registers, and museum collections. The methods under development will be relevant to research, cultural resource management, and the development of interpretive materials.

The TimeMap™ project has several components:

- Development of simple recording protocols for collecting time-stamped data in conventional databases and desktop mapping systems such as MapInfo® or ArcView®. By defining a metadata standard, which interprets the content of the database to software wishing to access it, individual databases can follow their own standards while using a variety of software packages. Databases can be accessed without modification by creating an appropriate metadata table.
- Development of a time-aware desktop mapping interface, which allows a user to set specific time limits and see a map of features as they existed at that period. The software also allows the creation of subsets of data for public display from a wider research database. A later phase of the project will see development of a simplified public-access interface.
- Development of methods for temporal interpolation between observations, allowing morphing between known historical data using whatever is known about the intervening period to guide the morphing process. Interpolation of features not only allows creation of maps for points in time between known data, but also allows the generation of animation sequences to show a dynamic picture of temporal change, i.e. the building sequence of a historic site or the progress of a battle. These animations can be generated on-the-fly by end-users directly from the database.
- No serious interpretive application today can ignore the potential offered by the Internet. TimeMap™ uses the Internet in two ways: first, our software can be configured as a plug-in for a Web browser and downloaded across the Internet; and, second, and more importantly, the TimeMap™ application can access and superimpose data from multiple databases located on different servers around the globe. For example, it may superimpose datasets drawn from a number of museum catalogs onto maps drawn from a mapping agency data server. Maps and/or data can also be held locally on a CD or hard disk, allowing for distribution as stand-alone applications.



The TMView software interface showing a historic map of central Sydney, coastline change and data on early residents in the 1860s. Data for historic Sydney kindly provided by Wayne Mullen. Screen capture by the author.

A problem with many current Web-based mapping implementations is slow response. Large image-based maps are created on the server and then laboriously downloaded to the user's computer. TimeMap™ downloads relevant raw data and creates the map locally, so that zooming, querying, changing symbolism, etc., can be done almost instantaneously. Once the data is downloaded, the computer can be used as a stand-alone workstation.

Current application projects include mapping the rise and decline of Asian empires, "AsiaMap," and "Virtual Historic Sydney." We have developed the methodology and software for data collection, static maps, and local data access; we are working on access to remote datasets and in-line animation. We hope to release a test version for download from the Web and public comment in the first half of 1998.

Information on the project is available at: <www.archaeology.usyd.edu.au/research/time_map/>.

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