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THEME ARTICLE

Multimedia visualization and interactive systems

Drawing board possibilities and server realities – a Cuban Rafter Paradigm Case

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Abstract

Purpose – This paper aims to present the schematic for building a multimedia information visualization system and digital archive which takes advantage of a wider spectrum of media elements (images, sound, datasets) and interactivity with regards to research level historical body of knowledge.

Design/methodology/approach – The methodology for this interactive multimedia visualized system was based on create a digital environment to explore larger bodies of research that expand on simple text-based Information Retrieval Database systems. Through photos, videos, interactive maps, digital audio interviews, primary documents and narrative structures the system presents new methodologies for building digital libraries. The "educational" objective of this project was to present a stylistically elegant yet intellectually robust interactive multimedia information system for academic libraries.

Findings – Building new online digital libraries must involve robust interactivity to take advantage of the computer's intrinsic specificity and the wider set of choices open to the human perceptual apparatus. Instead of text-based navigation systems, a more creative set of visual "tools" should be explored for digital libraries including interactivity and cognitive cartographies. Key here are the terms "visual metaphor" and innovatively structuring visually intuitive "narratives" into non-linear dynamic but humanly usable information systems.

Research limitations/implications – In expanding the range of "allowable" "historical archival media" (audio, video, images, datasets, databases) in digital libraries and keeping research level academic integrity, future questions regard what this means for historiography, information construction, and questions surrounding epistemology and "archives" of the future.

Practical implications – Technically, the successes in building this digital library information system solve the question of how to present a large robust amount of information indifferent rich media formats in an interesting and engaging manner. The project points to methodologies to present a research spectrum depth structure of textual material that can seamlessly be incorporated through wider spectrum of media elements: images, video, audio, music, datasets and interactivity.

Originality/value – This paper provides a methodology for marrying a textual body of academic research with a wider spectrum of media elements (sound, images, datasets, music) and incorporating them into a digital library through an innovative methodology. It will be valuable to anyone needing guidelines and specific algorithmic recipes and suggestions for building new millennia digital libraries which take advantage of a wider spectrum of media elements.

Keywords Visual media, Knowledge management, Digital libraries

Paper type Case study

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Introduction

Between 1959 and 1994, in defiance of Cuban law, more than 63,000 citizens left Cuba by sea in small groups and reached the USA alive. Thousands more washed up in the Bahamas, the Cayman Islands and other Caribbean shores. Over the years, they have been collectively known as balseros (rafters) and their precarious vessels as balsas (rafts) (Plate 1).

Over the summer of 2004, University of Miami Digital Library Initiatives had the opportunity to develop a unique multimedia information visualization system with regards to the corpus of this archive of knowledge. A collaborative environment and synergy was engendered under the content expertise of Dr Holly Ackerman, UM and the conceptual and technical direction of Dr Ray Uzwyshyn, UM DLI initiatives. The result was The Cuban Rafter Phenomenon: A Unique Sea Exodus available permanently on the internet at www.balseros.miami.edu (Plate 2).

Project challenge

The challenge for this interactive multimedia visualized system was to create a digital environment to explore the experience and ongoing histories of the thousands of citizens who left Cuba in small boats, homemade rafts and other unusual craft. The site would focus on those who precipitated and participated in one specific sea exodus – the raft crisis of 1994. Through photos, videos, bibliography, interactive maps, digital audio interviews, primary documents and narratives the site would examine the 1994 crisis and, by extension, begin to investigate the nature of the larger theme of post-1980 Cuban migration.

The "educational" objective of this project was to present a stylistically elegant yet intellectually robust interactive multimedia information system exploring the Cuban Rafter Phenomenon. Because this recent "history" was only beginning to be told and

Plate 1.

Plate 2.

understood, it was important that this site be balanced, wide ranging and (re)present/(re)collect the existing range of academic and bibliographic sources and media types regarding the Rafters and rafter phenomenon. The challenge was not to create a typical academic scrolling text-centric and heavy research site but a new paradigm digital library that would take advantage of multimedia to present the rafters' experience through a wider range of sound, video, datasets, interactivity and images.

More abstractly, the conceptual challenge of this project was to expand epistemological horizons for archival and retrieval possibilities representing an organic history or body of knowledge through narrative by pushing past a strictly linear "long scrolling list" and "text box" typical database retrieval methodology to one that would encompass a wider more organic spectrum of media (images, audio, video, datasets, interactivity, motion graphics and video).

Because a large portion of the audience was "Spanish" speaking and bi-lingual, it was also important that major sections and assets (i.e. audio) within this system be presented and accessible in both English and Spanish versions and that the design be easy to navigate, information rich and balanced.

Technical challenge

Technically, the challenge in building this project involved larger questions as to how to present a large and robust amount of information and different rich media formats in an interesting and engaging manner. The project's content had to be designed in such a way as to present a PhD spectrum and depth structure of textual material that also seamlessly incorporated images, video, audio and music within an interactive presentation (Figure 1).

Macromedia flash was used to provide an elegant information architecture and to create interactive visual horizontal timelines, visual metaphors for navigation and a condensed structure to present large amounts of information in single screen spaces (Figure 2).

Figure 1.
http://balseros.miami.edu

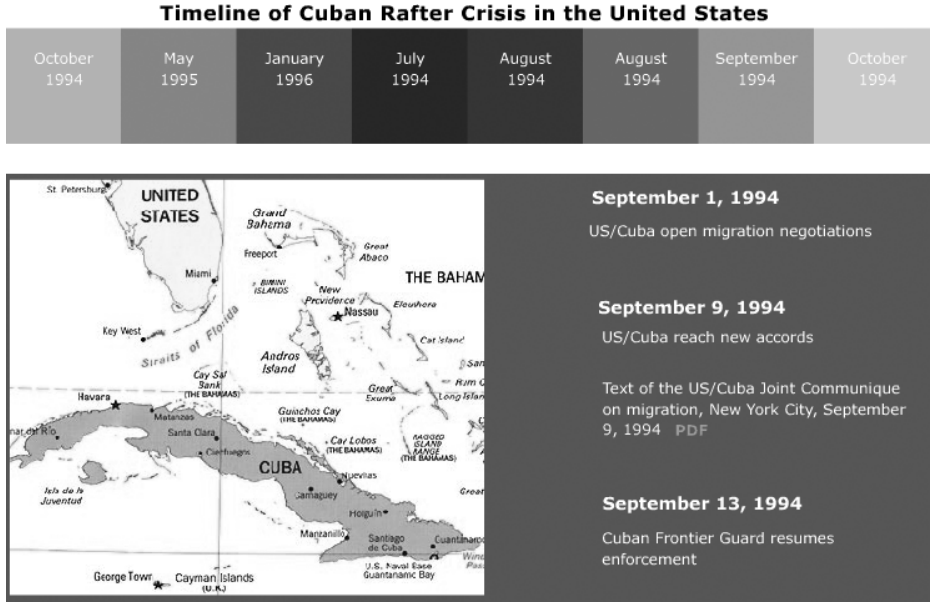

Figure 2.
Timeline of Cuban Rafter Crisis in the USA

Macromedia Dreamweaver was used to quickly build pages and integrate different media types (real video, audio, databases for datasets) effectively and efficiently.

Organizational elements of Dreamweaver were used to keep track of a massive amount of files in an organized manner while translations changed and files were updated. Cascading style sheets (CSS), frames and template capabilities were utilized to build a larger site structure quickly and efficiently and to incorporate changes. Photoshop was used to cut and digitally enhance images that otherwise would be less interesting. Finally, Adobe Acrobat was used to keep the archival integrity and interest of source documents (i.e. press releases, news articles, government documents).

Working with Dr Ackerman, the challenge was also to take advantage of her extensive knowledge of the topic in terms of visual imagery and spectrum of multimedia to build a new millennia digital library that expanded from book-bound monologic scrolling-text to a more polyphonic representation (Figure 3).

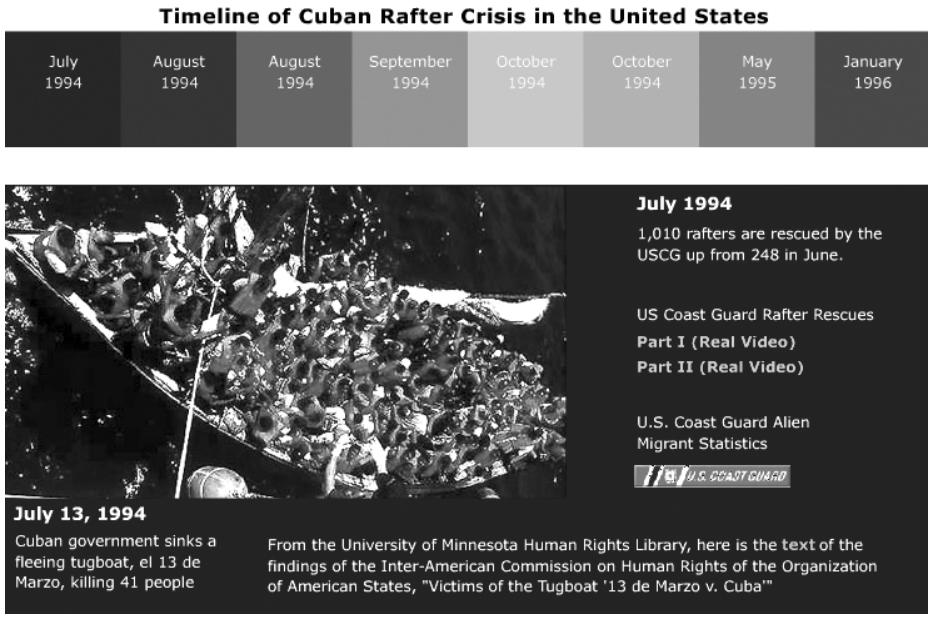

Figure 3.
The visual timeline here contains a spectrum of media types: real video archival footage of the rafters, links to US coast guard statistics and outside links to ancillary databases

New cognitive cartographies

While the site could be navigated through a frame-based navigation system, a more non-linear approach was also developed through a central map metaphor. This methodology took advantage of new imaging technology, "the Zoomifyer" (www.zoomify.com/) (Figures 4 and 5).

Here, a large archival 1,600 MB image of a Cuban map was scanned and imported. This could be zoomed and navigated for cartographic examination. Thumbnail image hotspots using iconic images and captions were "mapped" so that users could navigate to certain "subtopic" areas (i.e. Guantanamo, Cayman Islands) and receive more information. Essentially, the map provided a second route and more intuitive methodology for navigation and robust method to "encapsulate" various views that could be coded to button icons. A top left contextual map also preserved "context" if viewers wished to navigate and zoom to very specific areas while keeping in mind their place on the larger map. This methodology of an intuitive "visual cognitive cartography" could be used for various "information mappings" of bodies of knowledge (i.e. medical informatics, human genome, astronomy, human biology, GIS) and should be explored further.

Benefits

The Balseros site was successfully launched during an international academic conference held in the summer of 2004 between the University of Miami, Florida International University Cuban Research Centre and St Thomas University Centre for Human Rights. As an educational tool, it has continually been well-received by an international spectrum of academics, students, policy-makers and politicians and featured as a large screen/kiosk virtual exhibit in synergy with a physical exhibit done

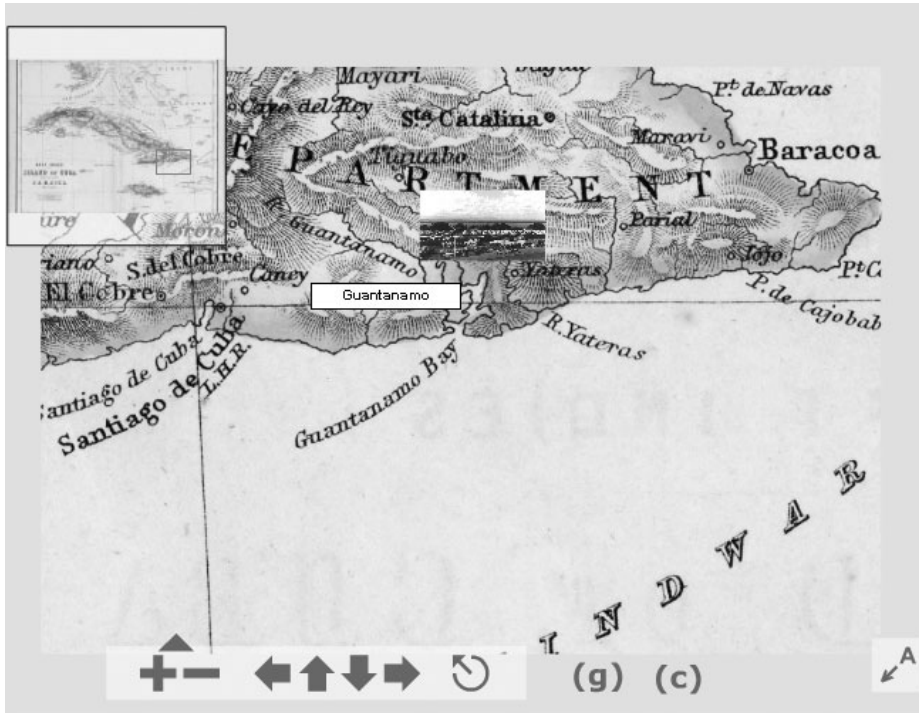

Figure 4.
Zoomable humanly intuitive map

at University of Miami Cuban Heritage Centre. It has also been used as the central information "source" for a number of television documentaries and news stories with regards to information on the trans-atlantic migration phenomenon. It will continue as a permanent part of the University of Miami Digital Library and as a globally available living archive on post 1980 Cuban migration. Digital tools and a tight synergy between content provider/developer allowed this larger project to be completed in a protracted time frame (16 weeks) with various media and content integrated quickly and easily.

Future challenges and speculation

To speculate on future possibilities and investigation, the next stage of building these types of systems involves deeper, more robust interactivity to take advantage of the computer's intrinsic specificity and rich visual metaphor to take advantage of the human perceptual apparatus. Instead of a frame-based navigation system, a more robust set of visual "markers" would be incorporated as interactive "buttons" into an even larger map so that a cognitive cartography also completely becomes a depth structure for drilling down and navigation (Plate 3).

With the expansion of online communities, online "archival" library pages can be been made live (weblog-like and interactive and into a living knowledge community). Comments would be incorporated by "rafter's" and other interested parties on a permanent basis and on a page by page basis to make this a living archive. Further, the level of "visual metaphor" would be deepened. Key here in this project was the terms "visual metaphor" and innovatively structuring visually intuitive "narratives" into

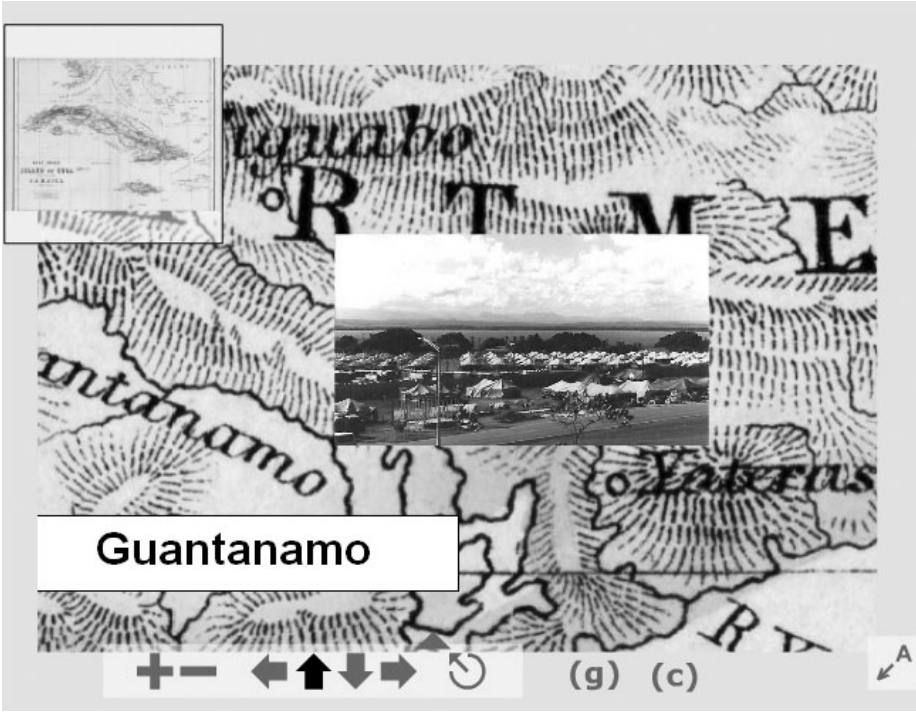

Figure 5.
Image links to navigate

Plate 3.
Sumerian Catalog, 2000 BC

non-linear dynamic but humanly usable frameworks. In expanding the range of "allowable" "historical archival media" (audio, video, images, datasets, databases) and keeping to a PhD level of academic integrity, this site begins to ask questions regarding future historical presentational possibilities, what this means for historiography, historical/information construction, questions surrounding cultural

epistemology and "archives" of the future. Academic possibilities in a networked computer media framework with multimedia and interactivity are largely as yet uncodified and unexplored. In beginning to harness the power of new media possibilities, horizons are vast and largely untraveled.

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Macromedia. www.macromedia.com (click on sites of the month for technical deconstructions) MIT Media Lab, in particular John Maeda's Aesthetics and Computation/Visual Language Groups) http://acg.media.mit.edu/ and http://plw.media.mit.edu

University of Miami Digital Initiatives. http://digital.library.miami.edu

Xerox Parc Research Group www.parc.xerox.com/research

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