Travelpost: Media Access via Geographic and Temporal Information

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1 INTRODUCTION

The versatility with which digital media such as images, sounds, and video clips can be presented, combined with the ease of sharing and accessing digital media through the internet, creates opportunities for displaying media in new and useful ways. Associating meta-data (additional information about the media) with digital media extends these opportunities by enabling the media to organize itself. For example, a collection of media items that "knows" where and when they were recorded can position themselves on a map and a timeline. With these visual tools a person can better understand the location and time of a specific media item, as well as its spatial and temporal relationship to the other items.

This paper presents an internet application that implements these ideas. Travelpost (http://www.dandelion.org/travelpost), is a system for browsing media recorded during a persons travels. A map, a timeline, and a regular web browser window offer three interrelated browsers to the user. This allows the user to investigate the entire data-set, in this case a travelers journey, from a geographic, temporal, or media specific view.

2 MEDIA

As media acquisition devices such as cameras and audio recorders continue to go digital, and media storage continue to go not only digital, but on-line, the volume of accessible online media grows larger. An important characteristic of digital media is the flexibility with which it can re-ordered and presented, and the ease of doing these transformations.

Media presentations such as a picture book, slide show, television show, audio program or website are fundamentally a specific collection of media, presented in a particular order or structure. Presentations are traditionally very time consuming to assemble. However, digital media facilitates their creation. They can be generated automatically with algorithms, and semi-automatically with a combination of algorithm and human input.

The sheer volume of media available on the internet enables a wide possiblity of presentations. Internet search engines with an "Image" or "Media" search option are an example of semi-automatic media presentation systems. Each search result page is a media presentation based on the users input and the system's search and filtering algorithms. Web sites offer other semi-automatic presentations such as a constant audio or even video stream based on the users input.

Most media search and synthesis programs such as web image searches and stock-media searches are based on keywords.

3 GIS + MEDIA

Geographic Information Systems provide a way to organize and interact with any data via location and time metadata. Recorded media is a good candidate for GIS systems because it has inherent location and time metadata: where and when it was recorded.

With a dataset of media with geotemporal metadata, new kinds of automatic searching, synthesis, and presentation are possible: A map can be drawn with icons representing the location of all of the media. A timeline can be drawn with icons representing the media. A map with identifying markers is not revolutionary, what is compelling is the ability to create it instantly and automatically. The ease of creating it makes this presentation tool available to non-trained people, and also makes investigations possible that would ordinarily be too time consuming.

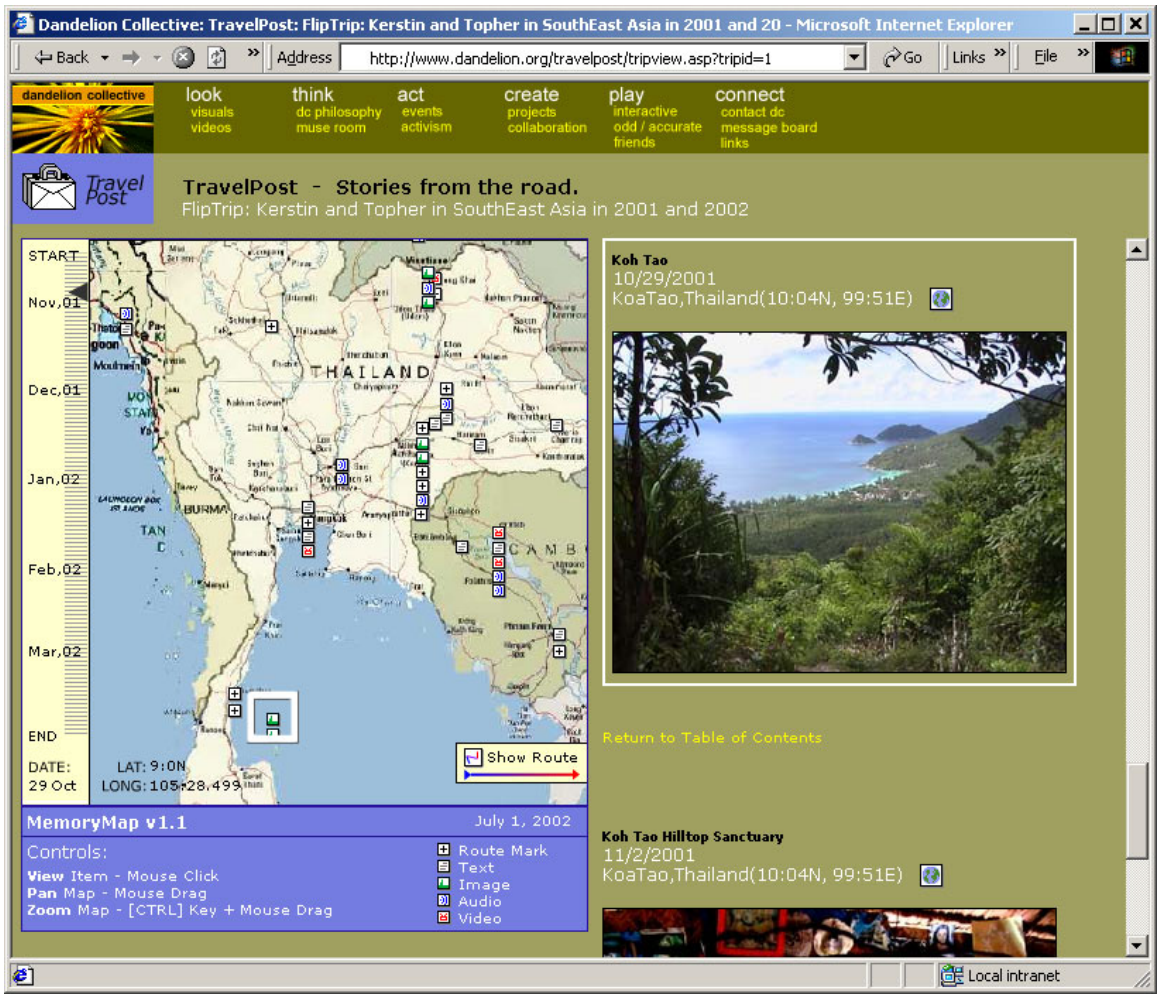
Displaying the location and time of a collection of media on visual tools such as a map and timeline give a viewer additional information about the media, both individually and as a collection. Not only can the viewer see where a particular "mediaitem" is, they can see how the mediaitems relate to each other; which mediaitems are nearest to a particular mediaitem - where there are clusters of media – what is the full geographical extent of the collection. Likewise with a timeline a viewer can learn how the media in the collection relate to each other temporally. Overall, the viewer can see the "shape" of the media collection.

Additional information can be extracted by the viewer by the relationship of the shape of the media collection to the timeline and the map. A cluster of media around a particular location or moment in time indicates that it is a significant place or timepoint. This is information that a dataset could be queried for, but a visual representation reveals it in a way that people are intuitively familiar with, and can reveal things that one might not have thought to inquire about.

Visual presentations of geotemporal metadata could be used with any collection of media; media from a particular archive, from a newspaper, television program, the result set of an image search from a search engine, or media collected during a travel.

4 TRAVELPOST

The Travelpost internet application implements these GIS + Media presentation concepts to create an interactive travel journal incorporating images, audio, video and stories. TravelPost is built with standard web components including ASP and HTML pages for media and text display, an Access database for metadata storage and a Flash component for the map and timeline. It is designed to be used by the casual web user with no previous training. The application includes an integrated admin function to allow users to create and modify their own trips.



The interface consists of three interrelated views of the media, a map, a timeline, and a standard web browser window to display the media itself. Each of the three views is also a control. The user can interact with the data (the travel) from a location, time, or media perspective.

A click on an item's icon in any of the three views causes the other two views to react:

1. The map centers on the mediaitems icon, and changes the icon to a selected state.
2. The timeline marks the mediaitems date with a selection mark.
3. The web window displays the media item and selects it in a white rectangle.

Additionally, to provide a constant realtime feedback and further integration between the views, moving the mouse over the icons in any of the three views also causes reactions in the map and timeline view.

1. The icon in the map is temporarily highlighted
2. The date in the timeline is temporarily highlighted.

Several other features in the application take advantage of the geotemporal data: The bounds of the timeline, the start and end dates, are automatically determined by scanning the dates of the mediaitems. Likewise the initial bounds of the map are determined by an analysis of the full geographic extent of the items. (The user can later zoom in on areas of interest.) The viewer can choose to "Show

Route" which connects all of the mediaitem icons on the map with a line to indicate the travel route. The line is colored with a blue to red gradient to indicate the direction of travel, and each icon on the map is numbered in order.

Travelpost accommodates the traditional method of telling a travel story by placing the media in chronological order in the web window with Back and Next buttons allowing the user to move through the story. But inquisitiveness and exploration are encouraged by allowing the user to explore areas of interest on the map by clicking on them. A user can also seek out specific media types such as audio or video, as the icons on the map indicate the type of media.

5 AUTOMATIC

Geotemporal metadata for the media is a key requirement for GIS + Media scenario. Temporal data is embedded in all digital files, but most file formats (other than JPEG and TIF via the EXIF specification: Exchangeable image file format for Digital Still Cameras) lack even a standard for storing geographic information. Typically geographic coordinates must be determined manually and stored in a specific database or GIS format. While this is not difficult, it is enough of a hindrance that most media today does not have geographical metadata.

For media yet to be recorded, GPS technology provides the possibility to automatically calculate the coordinates of the media. A software package is available commercially that synchronizes trackpoint data from a GSP device with digital images via the timestamps stored in the trackpoints and images. A digital camera with an embedded GPS unit provides the ideal scenario for capturing media with automatic coordinates. Surprisingly, the first such widely available device to hit the market comes in the form of a cell phone (Casio A3012CA). Given the current trend of including cameras in cell phones, and the imminent US requirement for positioning technology in all mobile phones, it appears likely that there will soon be many such devices.

With digital media recorders that incorporate GPS technology it becomes plausible to imagine a very large collection of geotemporally coded media available on the internet. A Travelpost type application could provide access to this media collection via a world map and historical timescale timeline. Alternatively, the results of any search engine keyword-based media search could be displayed both as thumbnails, as they are now, and on a custom built map and timeline.

On a personal level, this type of geotemporal media presentation would be useful to browse the media on ones own hard-drive.