A NOVEL APPROACH TO PANORAMIC GALLERY MANAGEMENT USING THE EXAMPLE OF THE BALTICMUSEUMS 2.0 WEBSITE

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Summary

The paper describes a novel approach to management of panoramic galleries in which a web-based system is used to configure and manage panoramic gallery without need for IT personnel with highly specialized skills. The proposed solution is fully configurable, and allows for the augmentation of the gallery with various types of interactive and multimedia objects, such as boxes, banners and maps and an environment for creating simple games set up within a gallery.

The solution has been implemented and applied in practice for a website promoting South Baltic oceanographic museums (www.balticmuseums.net).

Keywords: virtual tours, panoramic gallery management, web-based system

1. Introduction

Panoramic gallery is a set of connected panoramic views, each of which allows the viewer to change horizontal viewing angle (cylindrical panoramas) or both horizontal and vertical viewing angles (cubic and spherical panoramas) [9]. The viewer is also allowed to switch between different views using so-called navigation points.

The presence of panoramic galleries in the Web started with Apple QuickTime VR [4]. Nowadays, panoramic galleries are one of the most popular ways of implementing virtual tours, and as such, they are used extensively for promoting tourism attractions [10].

In this paper, we describe a novel approach to panoramic gallery management, which was inspired by the requirements posed by the development of a virtual tour for a group of South Baltic oceanographic museums (www.balticmuseums.net) [2]. The novelty in the proposed solution is that it gives the power of creating and editing panoramic galleries to users who are not IT specialists fluent in virtual tour construction. In other words, the software that realizes this idea, Panorama Manager, does to panoramic galleries what Content Management Systems [1] did to websites.

The proposed approach has many advantages, which will be elaborated upon later in the paper. We start, however, with a short description of panorama-related technology for readers who are not acquainted with the topic. Then, we briefly discuss the BalticMuseums 2.0 project and the requirements for panoramic gallery management that ensued from the project's specifics. Then we describe the basic features of Panorama Manager, followed by examples of the galleries implemented using this tool. The final section concludes with the importance and advantages of the described approach.
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2. Panoramic galleries – technology of realization

The preparation of panoramic galleries starts with collecting and processing photographic material. The pictures can even be taken with a standard consumer-level camera, although a tripod is required, with a head that allows the camera to be rotated so that the whole sphere can be covered on the picture. In order to obtain high quality images with a wide tonal range that includes both dark and light areas (and a range of tones in between), High Dynamic Range (HDR) technology should be used [12]. A single HDR image is a result of combining at least three identically positioned input images with different exposures: one is underexposed, the second has an average brightness, and the third is overexposed (use of more input images improves the dynamic range of the output image).

![Fig. 1. Example of an output HDR image (rightmost) and its three input images with different exposure](source: own elaboration.)

Although such images can be taken using any camera that allows a manual setting of exposure parameters, it is more suitable if a camera capable of autobracketing (automatic taking of several pictures of the same scene with different exposure parameters) is used.

The HDR images are obtained using image processing software, either an element of a general-purpose imaging suite such as Adobe Photoshop, or an HDR-specific tool, such as HDR Express, Luminance or Photomatix Pro. Some of the contemporary digital cameras have a function for taking pictures enhanced by embedded HDR technology [12].

The second stage of preparing panoramic galleries is converting images into panoramic views. There are specialized algorithms developed for making smooth panoramas based even on mediocre quality component images [14].

A single view is prepared with at least several images using dedicated software, such as, e.g., PTGui (Graphical User Interface for Panorama Tools) [8]. The view is then converted to a format that is...
appropriate for a given panorama type, e.g., for a cubic panorama – a net consisting of six faces (see Fig. 2).

![Fig. 2. A scheme for cubic panorama](image)

Source: own elaboration.

The third, and final, stage consists of connecting panoramic views into a gallery and embedding additional elements within it [15]. A ready-made gallery is published on the Internet, usually as an Adobe Flash animation. There are scripts available for viewing panoramic galleries with embedded objects, such as, e.g., Flash Panorama Player [7].

3. BalticMuseums 2.0 project: basic characteristics and special requirements

The BalticMuseums 2.0 project is realized within the South Baltic Cross-border Co-operation Programme 2007–2013 and is partially financed from the European Regional Development Fund under the European Territorial Co-operation objective of the cohesion Policy [13]. The entire budget of the project exceeds the sum of one million euro, whereas refinancing from the European Regional Development Fund amounts to about 85%. The duration of the BalticMuseums 2.0 project is three years.

The main objective of the BalticMuseums 2.0 project is the promotion and effective use of the natural heritage stored in the oceanographic museums by means of cross-border tourism information tools, in order to increase their attractiveness and competitiveness, especially for international tourists [5]. Detailed aims of the project include:

- developing a multilingual online platform, which enables a common presentation of tourist information by the museums – participants of the project,
- delivering an online ticketing system,
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- developing a prototype of a modern, multilingual visitor guidance system,
- propagating the information about the museums taking part in the project and their joint ventures by using the cross-border tools of information dissemination,
- creating favourable conditions for the cross-border collaboration of organizations from the countries of the south Baltic region.

The BalticMuseums 2.0 project was realized by an international consortium consisting of two scientific institutions – the University of Applied Sciences in Stralsund, the University of Szczecin and four oceanographic museums – The German Oceanographic Museum in Stralsund, Gdynia Aquarium, Lithuanian Sea Museum in Klaipeda and the Museum of the World Ocean in Kaliningrad. The University of Szczecin is directly responsible for the tasks connected with the development of the Online Information Platform. The aim of this Platform is to offer a website that gives the possibility of obtaining the most important information about museums, purchasing entrance tickets and making the museum’s presence on various social platforms visible and accessible from one site. All this is supposed to increase the attractiveness of the museums taking part in the project.

Understanding the powerful promotional effect of panoramic galleries [10], it was decided that they would be included in the Online Information Platform. The museums involved in the project defined two specific requirements for the panoramic gallery. The first one was interactivity, seen as the ability to place active objects inside the panoramas, to augment its effect on the viewer and give an opportunity to create simple games within panoramic galleries, which could be interesting, especially for young visitors. The second was easy configurability. The project is a short-term endeavour, but its results should be preserved in the long term. As it is quite probable that there will be a need for a change to some parts of the panoramic gallery and the museums will not have adequately skilled IT staff at their disposal after the end of the project, the galleries should be managed in a simple way so that even a museum employee with moderate IT skills could modify them.

After carefully analysing the possible solutions compliant with these requirements, a concept of a web-based panorama management system has been conceived, which was proposed to the InterAnt Company and developed into software released as Panorama Manager.

4. Panorama Manager: key system features

Panorama Manager is a web-based system for managing and configuring interactive panoramic galleries. It was developed in PHP 5 (server side) [16] and JavaScript with jQuery version 1.6.1 (client side) [11]; it uses contemporary web technologies, such as XHTML and CSS [3], as well as MySQL database management system [6].

The core element of the Panorama Manager is a clear and intuitive administration panel used for the management of panoramic tours and augmenting them with additional items. Fig. 3 depicts the main menu of the Panorama Manager administration panel (in English language version).
Basic features available to the users of the Panorama Manager through its administration panel include:

1. Adding, editing and deleting panoramic views that form a gallery.
2. Adding, editing and deleting navigation points that the viewers can use to move between panoramic views.
3. Adding, editing and deleting box-type elements shown by default as icons embedded within panoramic views that the viewers can click to display a box with additional content (e.g., text, multimedia or external website).
4. Adding, editing and deleting banner-type elements embedded by default within panoramic views (e.g., images, movies).
5. Adding, replacing and deleting a gallery map (in a form of a building plan, or an aerial photo) as well as adding, editing and deleting markers on that map that the viewers can click to move to specified panoramic views.
6. Adding, editing and deleting active objects (view areas or embedded icons or images) within panoramic views that can be used to construct games based on a “treasure hunt” scheme (the viewer has to find all objects dispersed in various views within the gallery).
7. Setting global gallery parameters, such as: the title, initial view, zoom-in and zoom-out limits, background soundtrack.
8. Gathering and reporting visitor statistics, including the time and number of visits as well as IP-based geolocalization.

Basic features available to the viewers of the panoramic galleries include changing the direction of observation (left/right, and in the case of cubic and spherical panoramas, also up/down), zooming in and out and going from one view to another. The feature of moving among views may be (and often is) realized in different ways, with the use of arrow icons for changing views in the order pre-defined by the author of the gallery, with the use of active areas within images (walkthroughs, doors) enabling the visitors to go to the preferred neighbouring view, or with the use of the list of views (in the form of a text menu, a miniature view list or a map), making it possible for the user to move to any view in the gallery.

Panoramic galleries can be enriched by additional elements. The first group are static elements, which can be seen in a certain place of the screen on all views of the gallery, independent of the view or the direction of observation. An example of such an element can be the name or logo of the panorama publisher. Such elements are usually interactive, which means that clicking them can open a linked webpage, play an advertisement, etc.

The second group are icons. The icons can indicate active areas of a view (which is especially useful if the activeness of a given area is not intuitive to the user), or they can have special purpose – for
example, they can serve as a requisite in a game played within the gallery. Clicking an icon may result in changing the active view or displaying a box. The box is an element embedded in the panorama but invisible to the user until it is displayed after the user clicks on an icon or an active area of the view. The displayed box can include text, graphics, video or a webpage.

The last group of elements that enrich panoramas are banners. They are elements permanently assigned to a certain area of view, e.g. a video fit in a TV screen, a photo in a picture frame, etc. Clicking such an element can cause a change to its state (e.g. turning the video on or off, photo change) or trigger other actions (e.g., redirection to another webpage).

5. Examples of interactive panoramas

Panorama Manager was first used to create panoramic galleries presenting four South Baltic oceanographic museums (www.balticmuseums.net) [2].

Among the elements used in the panoramic galleries created for the South Baltic oceanographic museums, there are some basic elements, which are essential for creating a complete virtual tour and other elements that are an interesting addition to make the virtual visit more attractive, encourage to visit the museum or be an amusement element, especially for the youngest Internet users. The basic elements include:

- arrows, which enable to move from one view to another;
- navigation elements, which enable the user to look about the panorama and to zoom the image in and out;
- list of panoramas, which make it possible to move to a given view, without the use of navigation elements.

Fig. 4 presents a panoramic view, a part of a virtual tour, containing the basic elements mentioned above.

![Fig. 4. One of the panoramas from the virtual tour through the Lithuanian Sea Museum in Klaipeda, with a visible arrow, navigation elements and a list of panoramas](image_url)

Source: [2].
The group of additional elements includes:

- static elements, which are common for the entire virtual tour, e.g. museum logo;
- boxes and banners, which enable the creation of active areas within the panorama (clicking them can display any graphic or audio-visual element or open a webpage);
- map of the building, making it possible for the user to move to localizations indicated on it;
- language icons, which enable one to change the language in which all navigation elements are displayed;
- the game, which consists in searching for hidden objects within the panoramas.

Fig. 5 and 6 present examples of panoramas containing the abovementioned elements.

Fig. 5. One of the panoramas from the virtual tour through Gdynia Aquarium, with a visible game element (fish), museum logo and language icons

Source: [2].
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The employees responsible for managing panoramic galleries in each of the museums can use the administration panel of the Panorama Manager to determine the look and the placement of the interactive elements. They can modify them adequately for the current expositions and exhibitions or other events taking place in the museum as well as extend their scope after having taken additional photos and creating panoramas of further rooms or localizations. In this way, presented virtual tours can always be up-to-date and instantly adjusted to the offer and needs of each museum.

Fig. 6. One of the panoramas from the virtual tour through Lithuanian Sea Museum in Klaipeda, with a visible icon, enabling display of a film and an icon to access the map of the building

Source: [2].

6. Conclusions

The proposed novel approach to the management of panoramic galleries described in this paper features a web-based panoramic gallery management system (Panorama Manager) that does not require advanced IT skills to set up and manage a panoramic gallery on a website. The solution is fully configurable and not only allows for an easy extension and reorganization of a gallery, but also makes it possible to diversify the views within the gallery with different types of additional objects, such as boxes, banners and maps. It even allows one to create simple games set up in the environment of a gallery.

The solution has been implemented by the InterAnt company and applied in practice for a website promoting South Baltic oceanographic museums (www.balticmuseums.net) [2]. The positive feedback received from both publishers and viewers of the panoramic galleries proves it solves the problem of making interactive panoramas configurable by non-professional-level users at the same time achieving professional feel of the galleries.
Bibliography

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Streszczenie

W artykule opisano nowatorskie rozwiązanie problemu zarządzania galeriami panoramicznymi, stworzone pierwotnie na potrzeby witryny internetowej opracowanej w ramach projektu BalticMuseums 2.0. Rozwiązanie to wykorzystuje prosty w obsłudze system webowy do zarządzania galeriami panoramicznymi przez osoby nieposiadające specjalistycznych umiejętności informatycznych w zakresie budowy takich galerii i zarządzania nimi. Zaproponowane rozwiązanie jest w pełni konfigurowalne i umożliwia urozmaicenie galerii poprzez osadzenie w nich różnego typu obiektów interaktywnych i multimedialnych, takich jak boksy, bandery i mapy, a nawet umożliwia tworzenie prostych gier rozgrywanych wewnątrz galerii.

Opisane rozwiązanie zostało zaimplementowane i jest wykorzystywane w praktyce na witrynie promującej muzea oceanograficzne regionu Południowego Bałtyku (www.balticmuseums.net).

Słowa kluczowe: wirtualne zwiedzanie, zarządzanie galeriami panoramicznymi, system webowy

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