BOOK@HAND BIDL: Mobile Exploring of the Bulgarian Iconography by Using Panorama Pictures

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Abstract. The paper presents the newest developments in integrating Bulgarian Iconographical Digital Library (BIDL) and the tourist mobile application family named as (GUIDE@HAND). The integration made it possible that collections can be created by the user at the BIDL Web page and then they can be downloaded to the GUIDE@HAND Veliko Tarnovo application by using QR codes. This year, a new standalone offline mobile application (BOOK@HAND) was created providing information on icons available in BIDL where the collection presentation functionality of the former system was enhanced with new features. The main novelty of the application is the option to present collections in a virtual exhibition room by using panorama pictures in off-line mode.

Keywords: Mobile Application, Tourist Guide Application, QR Code, Museum Learning, Exhibition Technologies, Bulgarian Iconography, Digital Library, Digital Collection, Panorama Picture

1 Introduction

The number of mobile devices including smart phones and tablets increases quickly and they are always at the hand of the users. They are useful tools for presenting cultural heritage in an interactive way. They can bring cultural heritage closer to the people, impressively present the heritage values, overcome cultural and linguistic barriers in acquiring new knowledge, provide new kinds of interactions and user experiences, offer ubiquitous access to information on cultural heritage, increase their visibility and reach a broader audience than ever.

The Bulgarian Iconographical Digital Library (BIDL) [1] is a Web-based environment where iconographical objects of different kinds and origins are documented, classified, and "exhibited" in order to make them widely accessible to both professional researchers and the wide audience. It was developed by the Institute of Mathematics and Informatics of the Bulgarian Academy of Sciences (IMI BAS). BIDL was integrated with GUIDE@HAND Veliko Tarnovo mobile application developed by the Institute for Computer Science and Control of the Hungarian Academy of Sciences (MTA SZTAKI) in order to make information on Bulgarian icons accessible in off-line mode on mobile devices [2,3].

GUIDE@HAND is a tourist guide application family providing tools and interactive services for mobile exploration of cultural places and objects [4]. The aim of the applications is to enable the visitors to change their perception of new or

familiar locations, objects and motives and explore the past and present of an area in an entertaining and exploring way. The GUIDE@HAND family covers many destinations in Hungary and abroad. The applications are available on iOS (iPhone, iPad) and Android platforms. In addition to its primary objective as an audio tourist guide, the GUIDE@HAND applications have been adapted to several application domains as follows:

- Museums
- Events
- Municipalities
- Zoos
- Musicians
- Universities
- Conference series
- Sport teams
- Books

The two academic institutions IMI BAS and MTA SZTAKI have an intensive co-operation for many decades. The integration was performed within the framework of a joint IMI-BAS – MTA SZTAKI bilateral academic cooperation project entitled "Development of Software Systems for Multimedia and Language Technologies". One of the results of the cooperation was the tourist guide application GUIDE@HAND Veliko Tarnovo including a demo guided tour in Arbanasi. The integration made it possible to mark digital iconographical collections with QR codes on the Web page and download and then explore them on mobile devices through the GUIDE@HAND Veliko Tarnovo mobile application.

This year, a new standalone mobile application BOOK@HAND BIDL was developed and published in order to present the user generated collections of the iconographical library. The new mobile application is built on the results of the integration. It provides general information on the iconographical library and provides new collection presentation technique as well while preserves the list view applied in the former application.

Interactive presentation of sights by using 2D panorama pictures represent one of the most recent developments in GUIDE@HAND. The use of interactive panorama pictures can present sights indoors or outdoors, in real or virtual environments. By turning around with the smart phone, you can look around, or even zoom onto the picture and can get further information (detailed description, narration, etc.) even in several languages. Virtual panorama pictures represent a new and very impressive presentation technique and it have been integrated into the new iconographical application as well in order to present a collection of icons.

The next section introduces the iconographical library. Then we describe our former development for integrating the icons in BIDL with the mobile application. Section 4 describes the panorama techniques used in GUIDE@HAND. Section 5 introduces the functionality of the application. The last section contains the conclusions of our development.

2 Bulgarian Iconographical Digital Library

The Bulgarian Iconographical Digital Library (available at http://bidl.math.bas.bg) is an Internet-based environment—a place where iconographical objects of different kinds and origins have been documented, classified, and "exhibited" in order to be widely accessible to both professional researchers and the wide audience. The icons, presented in BIDL, originate from the end of the twelfth to the beginning of the

twentieth centuries and the majority of them belong to the Bansko-Razlog iconographic art. The BIDL also presents icons from the following schools and regions of Bulgaria: Triavna iconographic school, Samokov iconographic school, icons from Veliko Tarnovo, Sozopol, Rila Monastery, Arbanasi, etc. This group includes painted icons and icons built with mosaics that are located in European museums, churches, monasteries, and private collections.

The Bulgarian Iconographical Digital Library provides services for registration, documentation, access and exploration of a practically unlimited number of Orthodox iconographical artefacts and knowledge, and end users can use this rich knowledge base through its interactive preview, complex object search, selection, and grouping. The digital objects could be grouped into thematic collections according to their topics, as results of searching, grouping, etc. For each object and collection, special meta-descriptions are created. They include data about the title, the artist, the period (in years and centuries), the school, the dimensions (width/height/thickness), the technique, the base material (type of wood, ground coat, etc.), the category, the location, the author (biographic data), comments (features of the icon such as state, founder's and other signatures, previous restorations), etc. Also, they contain links to other digital objects and collections, keywords, and so on. This information is used for the semantic annotation and indexing of the digital objects, which facilitate their locating during search requests, and their web-based representation [5]. The organisation of the media databases, the representation and description of the digital objects, and the classification of the artefacts in BIDL, are developed according to the recommendations of the international group of museum experts of East-Christian Art (UNESCO/I.DB.I) and the standards of CIDOC/MICMO.

BIDL development started ten years ago during the national project "Digital Libraries with Multimedia Content and its Application in Bulgarian Cultural Heritage" of the Institute of Mathematics and Informatics – Bulgarian Academy of Sciences [6]. BIDL was supported by several international and national projects (viz. FP6 project LOGOS Knowledge-on-Demand for Ubiquitous Learning and national research project SINUS Semantic Technologies for Web Services and Technology Enhanced Learning), mainly using the BIDL content for e-learning purposes (from formal and specialized professional education to self-training or personal cultural investigations). A complete description of the rich BIDL functionality is included in [7][8][9][10].

3 BIDL-GUIDE@HAND Integration

QR codes represent a commonly used technique to quickly download content to mobile devices. GUIDE@HAND mobile application maintains extended QR code services for art exploring and learning. The application used this technique originally to present additional information on objects in museums and exhibitions. The BIDL-GUIDE@HAND integration uses QR codes for marking digital iconographical collections stored in BIDL and for sharing them as virtual exhibitions on mobile devices. The integration opened new ways to present information on icons through the GUIDE@HAND mobile application.

During the BIDL-GUIDE@HAND integration, several issues were considered and appropriate services were created. The BIDL content editor tool were improved. This tool allows the users to create personalised collections of selected iconographical objects (Fig.1). It helps the users to save, edit, or delete these collections. Furthermore, each collection has a unique QR code, which can be used to generate an

export zip file of the selected collection. . This export is stored on the BIDL server and can be read by the GUIDE@HAND mobile application.

The GUIDE@HAND mobile application can read this QR code, and if it recognizes that it is from BIDL, downloads the zip file. The GUIDE@HAND mobile application stores locally the downloaded collections, manages the collections directory and presents the downloaded icons and the related descriptions. See [3] for more information on the integration.

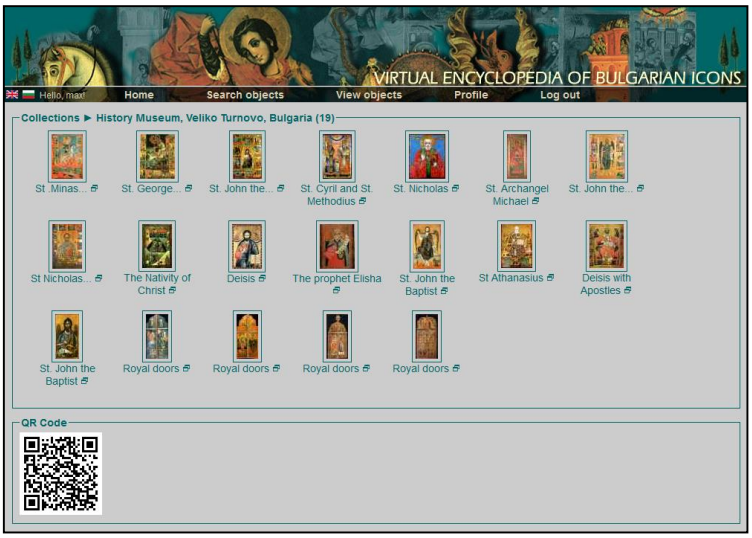

Fig. 1. Collection of icons from Regional History Museum in Veliko Tarnovo

4 Virtual Exhibition Based on Panorama Picture

Due to the continuous development of the GUIDE@HAND family of mobile applications, we offer more and more innovative services to our customers. These services include guided audio walks, possibility to record experiences, offline guided tours, using interactive internal maps etc.

The use of interactive panorama pictures belongs to the newest services of the application family which can introduce sights indoors or outdoors, in real or virtual environments. The example below (Fig.2) introduces an application created for a virtual exhibition. Six famous paintings can be found in one of the rooms of the virtual exhibition. By turning around with the smart phone, you can look around in this virtual room, as well, or even zoom onto the paintings and can get further information (detailed description, narration, etc.) even in several languages.

Fig. 2. Virtual panorama 2D picture presenting paintings from the Italian Uffizi Gallery

5 The Application: BOOK@HAND DIPP

MTA SZTAKI and IMI BAS decided to apply 2D panorama pictures to present Bulgarian icons and to create a new mobile application (BOOK@HAND DIPP) for presenting offline the Bulgarian Iconographical Digital Library (Fig.3). The new application uses the user generated collection presentation capabilities embedded in GUIDE@HAND Veliko Tarnovo. It also includes an option to present collections as virtual panorama pictures. The application will initially be available in two languages (Bulgarian and English).

BOOK@HAND BIDL contains the following basic components:

- The *BIDL* function presents general information on the digital library.
- The *Icons* function present some preselected icons.
- The *Download* function can scan QR codes and download collections from the Web page.
- The *Collection* function presents the downloaded collections.
- The *Settings* function contains some general setting options of the application (e.g. language, update, etc.).

Fig. 3. Opening **s**creenshots from INFO@HAND DIPP.

Let us consider the main functions one after the other. The *BIDL* functions contains an introduction to the Bulgarian Iconographical Digital Library (Fig.4). It also contains a Web link to the home page of BIDL. If the device is connected to the Internet the user can open the Web site in an external browser by clicking on the link.

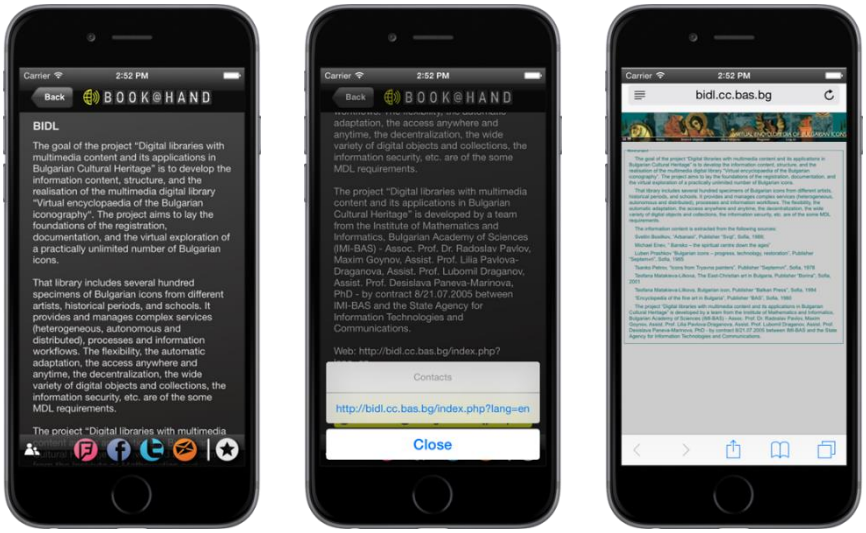

Fig. 4. Screenshots from function BIDL and the BIDL Web site.

The *Icons* function presents some selected icons from the digital library as a taster in order to provide the first impression about the content (Fig.5). It contains the list of the icons with title, type and thumbnail. After selecting an icon, the detailed information appears which contains the picture of the icon and its detailed description including the type, period, author, size, location, source, technique, etc.

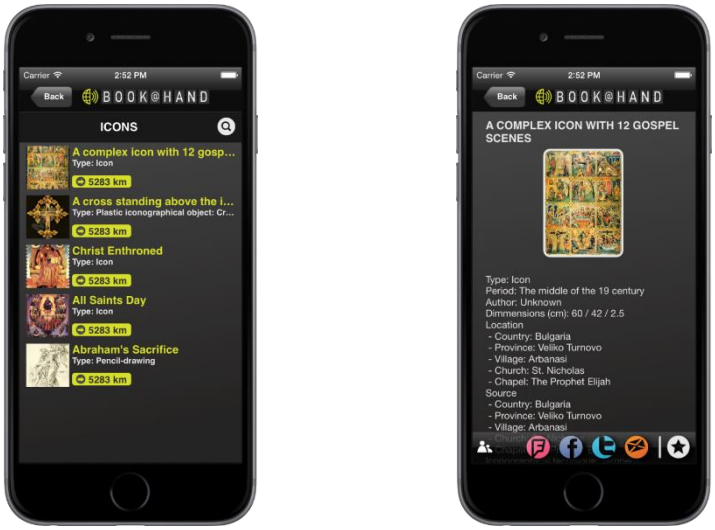

Fig. 5. Screenshots from function Icons.

The user may download iconographical collections in addition to the preselected icons by using the *Download* function from the BIDL Web page (Fig.6). The function starts a built-in QR code reader to scan the QR code of the selected collection on the BIDL. The result of scanning is an URL pointing to the BIDL archive file which can

be downloaded from the BIDL web server. The mobile application analyses whether the URL points really to the BIDL web server and if a match is detected the application will start to download the archive file. Once the file is fully downloaded the application will extract the content of the archive into a predefined directory structure. After this the application will delete the archive file from the device

Fig. 6. Screenshot from function Download.

After starting function *Collection*, the application will read up the directory where the downloaded collections are stored and enlist the names of collections on the screen. When the user selects a BIDL collection from the list, the application will offer a selection where the user may choose from list view and panorama view.

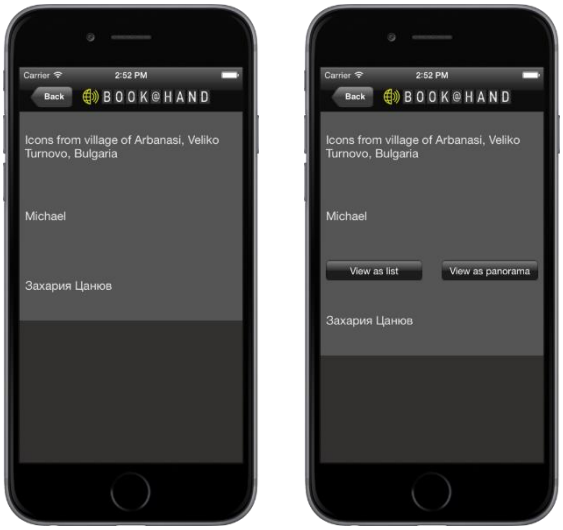

Fig. 7. Screenshots from function Collection.

The list view is identical with the collection presentation mode used in application GUIDE@HAND Veliko Tarnovo. It displays the content of the collection for the user on the screen of the mobile device as a list containing thumbnails and titles of the

icons (Fig.8). After selecting an item from the list, the picture and the detailed data sheet of the icon appears on the screen.

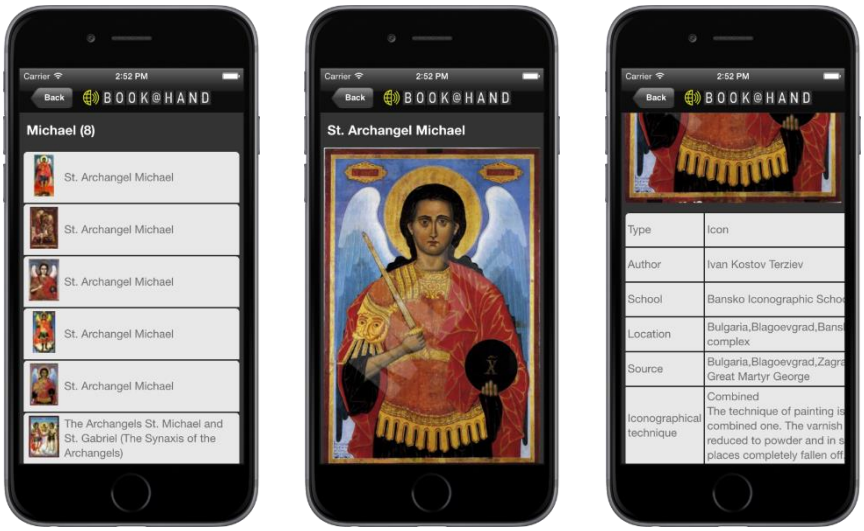

Fig. 8. List view and detailed description of an icon.

The new 2D panorama view represents the main novelty of BOOK@HAND BIDL application. It displays the icons of the collection positioned in equal distance around in a virtual exhibition room (Fig. 9). The screen displays only a segment of the virtual room but you can look around by turning around with the smart phone. You can even zoom onto the paintings. You can get further information (detailed description) on an icon by selecting its image in the panorama view. The detailed information is presented in the same format as at the list view.

Fig. 9. Panorama view in landscape mode.

These virtual panoramas are generated on the fly, and can contain any number of icons.

For viewing these panoramas the users can choose from two methods:

- The panorama can be moved by using the mobile device's motion sensors – Automatic mode – Fig.10a. This gives a very realistic impression, however the drawback is that the number of icons in the collection must fall within an optimal range (6-12) because the full width of the panorama is equivalent to a full 360 degree turn. Otherwise, the speed of the panorama will be too fast, or too slow.

- The panorama can also be moved by hand – Manual mode – Fig.10b). The user can freely switch between these two modes anytime. In Manual mode user can view the icons in detail by zooming in. When the mobile device doesn't have any motion sensors only the manual mode is available.

(a) **(b)**

Fig. 10. Panoramas views in Automatic and Manual mode

You can do several general tasks related to the application in the *Settings* function:

- change language,
- update the application and the content,
- connect to 3G network,
- display About screen containing general information on the application

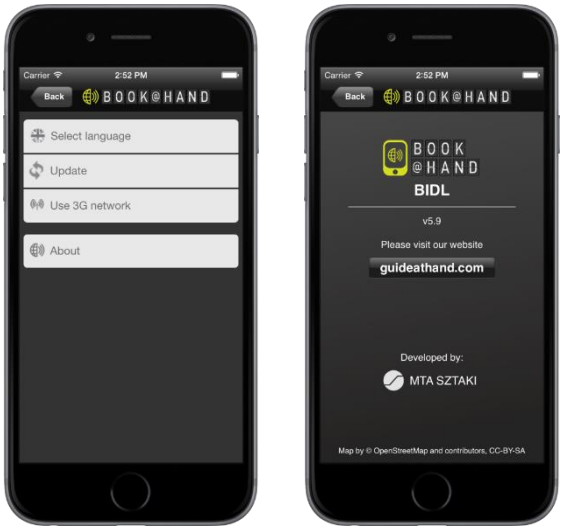

Fig. 11. Screenshots from function Settings.

6 Conclusions

The development presented applies mobile devices for presenting personalised information on Bulgarian icons available in a digital library. The people can get the information about the icons through their own devices (smartphones or tablets) at any time and any place. The users can get personalised information by creating own collections on BIDL Web site. The collections can be downloaded in advance, therefore the user does not need Internet connection to see the content on mobile device. The application opens new channels to reach a broader audience with the iconographical content. Panorama view proved to be an attractive way to present cultural heritage and our plan is to apply it in further applications related to tourism and cultural heritage. Our experiences gained in mobile application development could be successfully exploited in other collections, and we are looking for further contents.

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