

# Personalized Video Summary of a Museum Visit

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**Abstract.** We describe a novel system that automatically generates a personalized post-visit video summary of a museum visit, based on detailed personal visit log data captured by a museum visitors' guide system during the visit. Based on the exhibits visited, time spent at the various locations and interaction with a mobile visitor's guide used during the visit, the system infers the visitor's focus and interests and generates a personalized short video that summarizes the museum visit, and can be used by the visitor as a reminder of his or her visit as well as an artifact to share among family and friends.

**Keywords:** mobile guide, museum visit, personalization, visit summary.

## 1 Introduction

A visit to the museum is a classical leisure and social activity. The visitors arrive at the museum for various reasons including general or professional interest of the museum's exhibits, experience seeking, or simply for "recharging" [4]. Studies of museum visitors have shown that many visitors expressed a strong interest in creating a record of their experience for their own purposes as well as a means for interacting with others about their visit [5]. This coincides with the museum's interest of extending public awareness of their collections and extending their influence outside the confines of the physical museum itself [2]. In fact, the need for extending the boundaries of museums beyond the onsite visit has been advocated by museum researchers [4], as that a single visit is only a chain of a lifelong experiences that interleaves the before, during and after the visit experience and makes them a link in a lifelong chain [6]. This is especially important in cases where a visitor returns to the same museum to further explore it. Thus, an artifact given to the visitors after the visit can help visitors in reminiscing about the visit and sharing their experience with their families and friends. Personalization is a key in making this artifact effective. A unique personalized artifact that relates to the visitor's specific visit is likely to better engage the visitor and be shared with family and friends, than a general brochure or video clip.

We describe a system that automatically generates a post-visit summary video of the museum visit. The visitor is using a location-aware visitor's guide to receive context-aware information of the surrounding exhibits, thus, the visitor is tracked and time spent at various locations as well as interaction with content on the guide is logged. At the end of the visit, the visitor would be offered a video (or link of the video) that summarizes his

or her visit. The video is personalized to show the visitors the exhibits they saw, specific interest they took in given exhibits, and important exhibitions that they have missed and might be interested in future visits.

## 2 Related Work

Only a few applications in the past looked beyond supporting a museum visitor onsite. Cyberguide [1] is an example for an early research prototype that briefly pointed out the need for “post visit” support, to let visitors see where they visited, yet did not implement it. LoL@ [8] was a mobile guide application that tried to extend the visit experience beyond the onsite visit. The prototype system enabled the user, using a smartphone to look at various points of interest in the city, to get some information about them, and plan a tour. At a later stage, the visitor, using the smartphone explores the city following one of a pre-defined tours. The system may help the visitors find their way to points of interest, if positioning is turned on. The visitor can also record the experience in a visit diary. Finally after the visit, the visitor is able to access the visit diary (list of visited points of interest) from a desktop.

The Rememberer tool [5] helps visitors build a record of their visit which they can access during or after the visit. When the visitor decides they want to remember an exhibit, they register an exhibit by placing a specialized RFID device near a situated RFID reader to record the exhibit. This automatically triggers a camera that takes photos of the exhibit with the visitor. After the visit, the visitor can access a record consisting of the registered exhibits, including the photographs on which the visitor can add typed notes. Similar, a commercial solution is suggested by Espro ltd<sup>1</sup>. Visitors can bookmark items of interest either for future on-demand printing or other post-visit services such as emailing information home.

PIL [7] suggested a different “post visit” support – the users of the system were able to view and reflect on their experience as a group when sitting at a simulated “museum café” using a shared display, when they take a break during the visit or at the end of the visit. PEACH [2,3] demonstrated the ability to generate a personalized textual visit summary, describing what the visitor have seen and seemed to be interested in, and suggest future activities that relate to the visit experience and matched the visitor’s interest. Our work follows this path and generates an automatic video summary based on the same idea.

## 3 Museum Infrastructure

In the framework of the PIL project [7], a research prototype was converted into a working museum visitors’ guide that is used on a daily basis by visitors to the Hecht museum<sup>2</sup>, a small size museum, located on the campus of the University of Haifa, which contains both archeological and art exhibits. The Hecht museum includes seven main *exhibitions* (each in a separate room or hall), with each exhibition including many *exhibits*. The

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<sup>1</sup> <http://www.acoustiguide.com/>

<sup>2</sup> [http://mushecht.haifa.ac.il/Default\\_eng.aspx](http://mushecht.haifa.ac.il/Default_eng.aspx)

system is location-aware and its positioning is based on automatic proximity detection. The system architecture is illustrated in Figure 1. Fixed *Beacons* are placed in points of interest in the museum and the visitors are carrying mobile devices called "*Blinds*". Once a visitor is detected at a point of interest (the *Blind* detects the *Beacon* and reports this event to the server), the system presents the user with a selection of nearby objects on the handheld device with a list of questions regarding the objects. Once the visitor selects a question of interest, a one-minute multimedia presentation is played, providing an answer to that question. All visitor positions, including time spent at each position, are logged as well as all interaction with the mobile guide, including presentations seen and feedback given to presentations (visitors are asked to provide a feedback on a scale from 1 to 5 for each presentation).

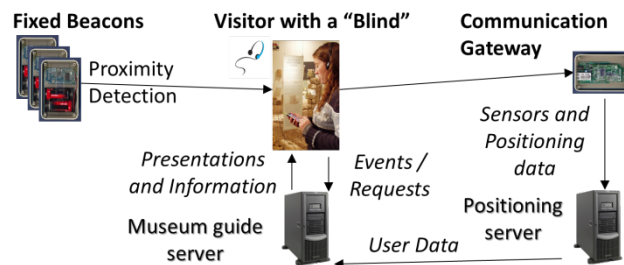


Fig. 1. PIL infrastructure

#### 4 Post-Visit Video Summary

The requirements for the video (Figure 2 presents screen shots from the resulting video) were that it would be interesting and attracting in order to engage the viewer and that it would remain relatively short. In addition, the video should be personal. It should connect the visitor as best as possible to his or her actual visit at the museum. The video should summarize the visit in the best possible way, by carefully choosing the places and content that the visitor was interested in. We decided that the video should include general information about the museum's major exhibits, with visual reminders of the actual visit. Nevertheless, the video should not be too general, since this is a personalized visit summary, and not a general museum brochure. Following this we decided on the following concepts:

- The video follows the visitor's visit in terms of content, but will not necessarily follow the visit step-by-step
- Audio commentary addresses the visitor in a personalized way
- The beginning of the video includes a regular (non-personalized) short explanation of the museum.
- The video body is divided logically the same way that the museum is divided. It shows the various exhibitions, and within each exhibition, the various exhibits.
- The proportional time of each exhibition in the video is determined according to the relative time that the visitor spent at that exhibition.

- For exhibitions that the visitor visited, first a short introduction piece on that exhibition is shown, then selected exhibits that the visitor has seen, are shown, including the list of presentations that the visitor has seen on the mobile device.
- For exhibitions that the visitor has missed, a general explanation of the exhibition is seen, encouraging the visitor to come back and see it.
- At the end of the video, there is a summary showing general statistics of the visit, while encouraging the visitor to revisit the museum.

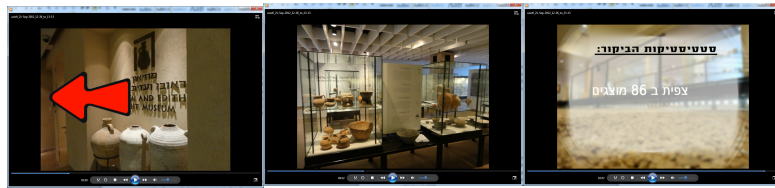


Fig. 2. – post-visit video summary

#### 4.1 Content creation

Automatically generating a unique video clip out of multiple building blocks such as images, short prepared clips, text overlays and audio snippets is not a simple task [3]. Our approach was to create basic video snippets and to tie them together according to the visitor's specific data. The basic building blocks used were *content snippets* and *transition snippets*. Content snippets are short prepared video clips composed mainly of sequentially changing images with recorded audio commentaries on top. For each exhibition, two short video snippets (10-20 second long) were created, one for visitors who visited the exhibition and one for visitors who did not attend the exhibition. For each exhibit, a short video snippet (around 10-15 seconds long) was created. Content videos were augmented with a recorded narration that gave verbal explanation of the exhibit or exhibition related to the shown images. In addition, a short general introduction snippet to the museum was created. Transition snippets were composed of “moving images” that simulate the visitor moving towards a location (for example, images taken 15, 10 and then 5 meters from a landmark), accompanied by the sound of footsteps. This gave the illusion of walking from one location to another. Images were enhanced and improved using Adobe Photoshop. Enhancements included stitching two images together, changing background, highlighting areas on images with annotations, adding text to an image, removing unwanted elements from an image (for example, people), blurring and sharpening filtering and more. Text and content were based on the information given in the mobile guide (which in itself had a long creation process - see [7]), and the museum labels with the aid of the museum personnel. The presentations from the mobile guide itself were not reused, in order to have a less didactic, less formal and lighter style of presentation.

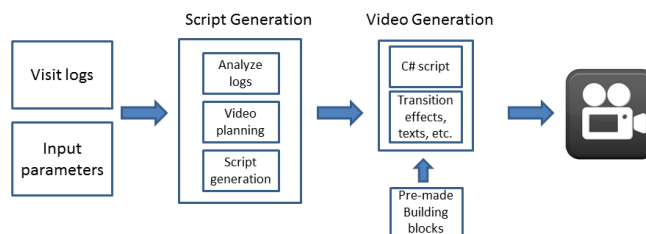
#### 4.2 Personalization

The content of the video is based on the visitor's visit as gathered in the system logs. Because we cannot always show all exhibits that the visitor has attended (due to lack of

time), the selection of exhibits is based on the user’s visit history and interests. The visit history includes the ordered list of exhibitions and exhibits that the visitor attended and the list of presentations that the visitor has seen on the mobile guide. The interest model is built according to the time the visitor spent at each exhibit, the number of presentations the visitor has seen at the exhibit, the ratings given to the presentation (visitors explicitly rate each presentation they watched in a 1 to 5 Likert scale), and whether the visitor has stopped the presentation (an implicit indication that the visitor did not like the presentation). In addition, for each exhibit included in the video, the presentations that the visitor has viewed were listed in the summary video. Additional input items that the system uses for personalization include the visitor’s name, sex and a photograph of the visitor that might have been taken at the start or end of the visit by the person handing over the mobile guide. This is used at the beginning of the video, by showing the visitor’s photograph along an opening text (i.e., “[Jane], here is a summary of your visit to the Hecht museum”).

### 4.3 Video creation

The basic building blocks for the construction of the final video include the exhibition snippets, the exhibit snippets, exhibit images, and the transition snippets. The challenge was to automatically create a cohesive video out of these building blocks based on the visit history and visitor interest model. In order to stitch the building blocks together as well as add automatically generated subtitles (for example, to write the name of the visitor on a slide at the beginning of the video, or to add the list of seen presentations on top of the exhibit image), we used the Sony Vegas Pro<sup>3</sup> software.



**Fig. 3.** – Video creation process

It supports a C# based scripting language that enables organizing media objects into a video, including adding voice, transition effects and more. The process of creating the video is described in Figure 3. The script generator is a java program that accepts the visit logs and a set of parameters as input, including the length of video (currently, short, around 3 minutes medium, around 5 minutes and long, around 8 minutes), video file format and more. The script generator analyzes the logs, builds a user interest model and accordingly, produces a C# script that provides instructions on which building blocks to take and how to connect them in order to automatically build the video. Along with the

<sup>3</sup> <http://www.sonycreativesoftware.com/vegaspro>

snippet building blocks it is used as an input for the second step which is run using the Sony Vegas software and produces the video.

## 5 Conclusions

We have presented a system that automatically generates a personalized video summary of a museum visit. This process is of interest to museums and other cultural heritage sites that may be interested to provide such a service for their visitors. Personalization is a key feature of such a video so the visitor would feel that it summarizes his/her own visit, and is not simply a general brochure. Such personal summaries can be a useful and attractive artifact for visitors, both as a souvenir and as a way to share the personal experience with family and friends. For the museum, it may serve as a way to keep in touch with the visitor after the visit as well as a way to further promote the awareness of the museum and its collections and trigger repeated visits. Our next step is to offer the video to actual museum visitors in order to evaluate its acceptability and underlying concepts.

## Acknowledgements

The work was supported by the Israeli Science Foundation (ISF) grant 226/2010 and by the collaboration project between the Caesarea-Rothschild Institute at the University of Haifa and FBK/irst and FIRB project RBIN045PXH

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