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Museum Apps Investigated: Availability, Content and Popularity

The widespread proliferation of smartphones allows the museums of the world to provide their visitors with mobile applications (hence referred to as apps) which not only offer a convenient and usually cost-effective alternative to traditional means of passing information to visitors, but also make feasible new forms of interaction with visitors. In this paper, we draw a snapshot of the current situation in this area by reporting the results of a survey comprising 100 apps dedicated for museum visitors, analysed with regard to their availability, content and popularity.

Key words: mobile technology, mobile apps, ICT in museums, software for visitors

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Introduction

In the world of increasing competition among tourist attractions, they need to constantly improve their offerings in order to deliver quality experiences to their visitors, so that their rising expectations could be satisfied (see e.g. Tussyadiah, 2017, p. 173). A huge role in this area can be played by Information and Communication Technologies, and, particularly, mobile devices (Lamsfus et al., 2015, p. 1, and works cited therein). Tourist attractions may make use of mobile devices primarily by providing apps supporting visitors in various ways (Kennedy-Eden & Gretzel, 2012, Fig. 1).

In the case of museums, provided apps may feature general information about the venue and exhibitions, helping to plan a visit, additional informational and/or educational content relevant to objects watched during a visit, providing individual visitors with an easy access to extensive knowledge tailored to their different backgrounds and interests, which could not be easily achieved using other means, and interactive elements, that could be used to implement gamification, stimulating visitors' motivation and engagement, as well as reinforcing educational effects of a visit.

The last of the mentioned features, that is the implementation of gamification in visitor apps, is the main theme of the ongoing BalticMuseums: Love IT! (2019) project involving the authors. As a part of preliminary research, before the development of gamified visitor apps has started, a number of museums have been visited to study the apps they provide to visitors (Swacha & Muszyńska, 2018). While such an approach delivers in-depth information on the respective apps, it is too time-consuming to be applied at a greater scale to learn the current state of the museums' offer of apps for visitors. This motivated the research described in this paper, in which a sample of available museum apps was examined with regard to a set of their basic properties.

Its purpose was to answer the following research questions:

RQ1: what is the availability of museum apps with regard to user's language and distribution model?

RQ2: what types of content are typically provided within museum apps and whether the way it is provided includes advanced techniques such as gamification or augmented reality?

RQ3: are museum apps popular and well-received?

The results of the survey are presented later in this paper. We start, however, with reviewing existing publications of similar kind.

Literature Review

Economou and Meintani (2011) identified 71 museum mobile apps with interactive and multimedia features, and categorized them using criteria of: publication year, country where the relevant museum is located, app distribution platform, app download fee, notification about the app availability at the museum's website (interestingly, only less than a quarter of apps were mentioned on their respective museum's website), type of application (guides tours for permanent and/or temporary exhibitions, apps devoted to a single exhibited object, apps allowing the user to create or manipulate exhibition-inspired content, and mobile games), use of the apps in relation to the museum visit (before, during, after), user interaction with the content (e.g. navigating, zooming in or out, tagging), integration of multiple perspectives (i.e. other than the curator's) and social interactions.

Yovcheva et al. (2012) investigated 22 mobile apps chosen upon meeting the following strict criteria: "provide visual augmentation of the environment", "deliver content for the territory of the UK related to urban leisure experiences", "are available for iPhone smartphones and can be downloaded/purchased from the Apps store" and "use a marker-less,

GPS-based approach to track, register and align virtual and physical objects”. The results of the study revealed the benefits and drawbacks of the investigated apps.

Dickinson et al. (2014) analysed 22 tourist attraction apps (not counting single apps shared by many attractions) and 49 tourist destination apps to identify five mobile app functions relevant to the tourism travel domain: information, two-way sharing capabilities, context awareness, Internet of Things support and tagging.

Luna et al. (2019) analysed 35 (from the 61 considered) museum apps featuring augmented reality, having found, e.g., that they focus mostly on historical heritage, particularly from Antiquity, and the tone and type of communication is almost exclusively academic.

Note that we are also aware of literature surveys dealing with the current state of art in the research on mobile technologies and applications in tourism, such as the ones by Dorcic et al. (2018) or by Liang et al. (2016), yet these surveys investigate the topics of publications rather than properties of mobile apps these publications were written about, hence they cannot answer the research questions stated in the Introduction.

As can be seen from the review above, three of the four identified relevant publications are at least five year old, which is a very long time considering the fast development of mobile technologies, and the last one covers only one specific type of museum apps (those featuring augmented reality). This confirms the need to perform a new study on the currently available museum apps of various types.

Methodology

Data Collection and Sample

There are over 2.5 and 2 million apps available respectively on Google Play and Apple App Store at the moment of writing these words (Statista, 2019). Among them, there is

an unknown number of apps for museum visitors – establishing this number would be a research task of its own. Rather than tackling this problem, we used a single search phrase “museum app” to retrieve the first 100 results from Google Play. This store has been chosen for two reasons, as being the biggest app distribution platform at the time of research and the target distribution platform for apps developed in the project which instigated this research.

We then scanned the list of the found apps, removing those which were not in fact dedicated for visitors of particular museums (14 in total, e.g. museum-themed games or puzzles) and replacing them with the next items from the query results (101st for the first removed item, and so on) to keep the total number of analysed apps exactly at 100.

Despite the simplicity of this procedure, assuming that the Google Play search engine is, to much extent, relevancy- and popularity-based, the results it produced can be considered as a fair sample of the actual set of popular apps dedicated to museums. The exact procedure used by the Google Play search engine to rank the results (and, therefore, select the sample) is unknown to us, and while it is highly probably affected by the profile of the user making the search, the fact that none of the local museum apps qualified to the sample (and we are aware of a few such apps) suggests that this factor is not decisive. We are aware that using just one app distribution platform is a limitation that should be considered in the interpretation of the results, though many of the Google Play museum apps we investigated more deeply had also Apple Store versions. One more limitation we are aware of is the language of the search phrase, though English being *lingua franca* of modern tourism is usually one of the languages available in museum apps even in non-English speaking countries.

Data Analysis

The analysis involved the comparison of the apps retrieved in the search query defined above with regard to criteria arranged in the following groups: 1) Availability, 2)

Content, and 3) Popularity. In the first group, the following three criteria were considered: access (paid; free; free with paid content; free functionally limited version of a paid app), country (where the relevant museum is located) and languages (in which the app communicates with the user). In the second group, the considered criteria were the forms of content provided in the apps (text, images and multimedia; premise maps and route definitions; augmented reality and gamified elements). In the third group, two criteria were considered: number of installs on devices and user rating (as published by Google Play).

The measurements for each criterion were obtained from the information provided at the app store page (by the store operator or app publisher) and by short-time testing of each app. In the cases of discrepancy between the provided information and test results, the latter were used. The survey was carried over a two-week period starting on 9.09.2019.

Findings

Availability

Country: The analysed apps covered locations located in 37 countries (Figure 1; red indicates the most apps, dark green just 1 app for a country). Note that we investigated the country of the covered locations not to identify the countries for which the apps are actually available (as the sample size was too small for such a purpose), but to check whether the sample covers apps devoted to attractions in a variety of countries. While as much as 24 of the surveyed apps were devoted to museums located in the USA, and unexpectedly none of them was dedicated to museums in such renowned tourist destination countries as China or Greece, or even our home country, Poland, we still consider the sample rich enough with regard to representation of various countries.

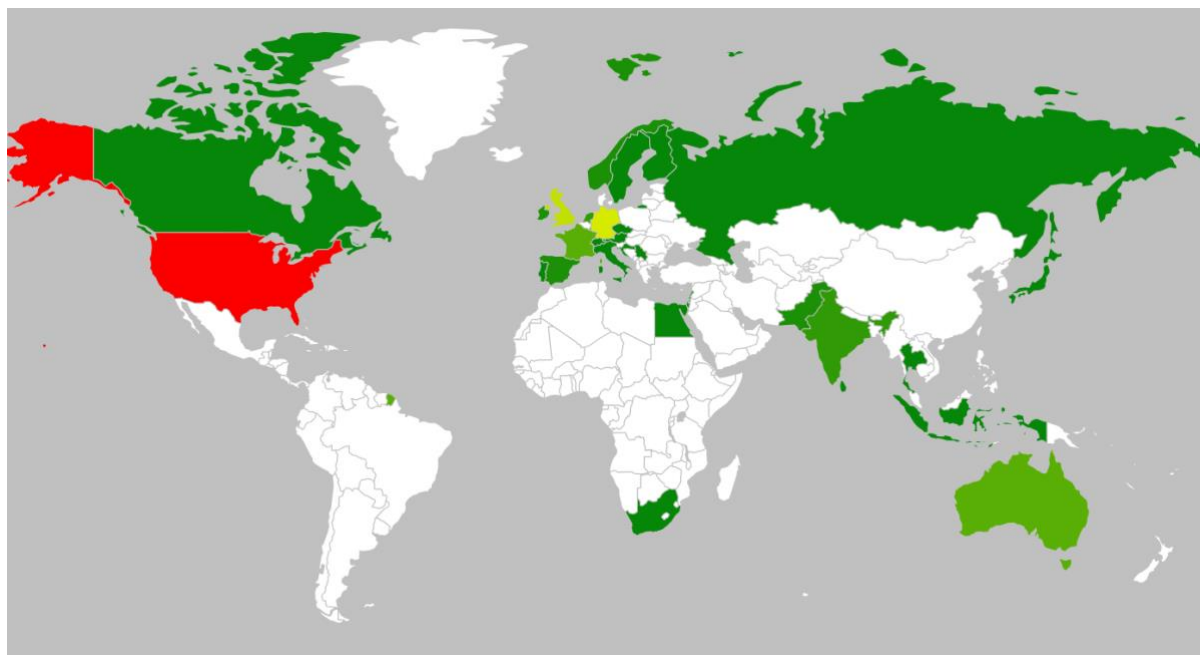


Figure 1. Countries of the attractions featured in the apps

Language and Access: For a foreign visitor, app language is an important usability factor. We present the results of an analysis of the surveyed apps in this regard along with the information on the distribution model: free or paid (Table 1).

Table 1. App Language and Access

Language	Free	Free limited version	Freemium
English	83	6	7
German	17	1	3
French	12	2	2
Spanish	12	0	2
Italian	8	0	1
Other	36	0	3

In fact, there were no apps requiring payment before download among the 100 we analysed, however some included paid content, and others were free companions to paid applications (not included in the list). Although there is a huge gap between availability of

museum apps in English and other respective languages, about half of the surveyed apps provides more than one language.

Content

All the surveyed apps provided users with informational text and images, whereas only about one-third of the apps included videos (Figure 2), which may suggest that the latter are considered as too heavy content for mobile museum apps. Regarding the content supporting navigation in the museum premises, three-fourths of the surveyed apps featured defined routes (organizing points of interest in an ordered way) and two-thirds of the apps included more or less detailed maps. This confirms that museum apps are often seen as navigational aid.

As for the more sophisticated forms of content presentation, only about one-fifth of the apps had any gamified elements and 15% apps used augmented reality techniques to embed their content in real-world environment. It therefore seems that these hot industry trends (Ioannides, 2017, p. v), despite their technical feasibility, did not spread widely into the popular apps.

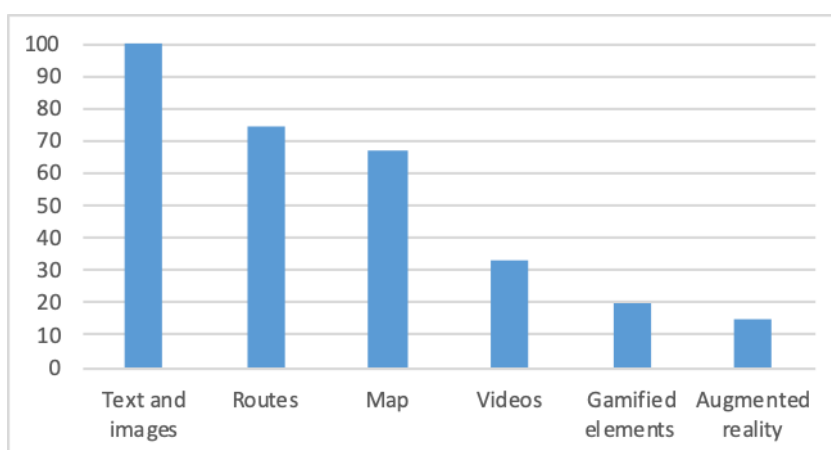


Figure 2. Forms of content provided in the apps

Popularity

The museum apps do not seem to be used by majority of visitors (Table 2): even though some of the featured museums are attended by hundreds of thousands of people per annum, only two of the surveyed apps surpassed the threshold of 100,000 device installs and only one-fifth of them surpassed the threshold of 10,000 device installs.

Table 2. Number of app installs and average rating

Installs	Number of apps	Avg. user rating	Apps without rating
50-99	3	5.00	2
100-499	14	4.97	11
500-999	14	3.72	3
1000-4999	34	4.08	11
5000-9999	15	3.85	0
10000-49999	16	3.90	0
50000-99999	2	2.45	0
100000+	2	4.15	0

At the other end of scale, about one-third of the surveyed apps did not pass the threshold of 1,000 device installs which rises two questions: firstly, were these apps properly advertised: it is worth to remind here the findings of Economou & Meintani (2011) who observed that most of the apps they examined were not even mentioned at the respective museum's homepage; secondly, are the outcomes of publishing these apps worth the cost of their development, considering they are used by only a small fraction of museum visitors. In this context, we also have to remind our methodology of museum app selection (top 100

results from Google Play search), which suggests that the device install numbers for less popular apps could be even much worse.

As for the average user rating, apart from the two apps in the 50000-99999 installs range, the reception of the surveyed apps is generally positive, which means that most of the visitors are satisfied with the museum apps they used. We have not detected any meaningful correlation between the number of installs and the average rating of apps.

Conclusion

The technological feasibility of providing information and content to visitors via mobile apps installed on smartphones and other mobile devices the visitors bring with them is actually exploited by museums worldwide, as indicated by the sheer number of countries in which the museums featured in the surveyed apps were located (although there are notable white gaps, we attribute them to the small size of the sample rather than to actual lack of apps provided by museums in those countries, as we are well aware of such apps).

Regarding Research Question 1, most of the apps covered in the survey were free to use. Such a distribution model, while very attractive for the visitors, requires to cover the app development and maintenance cost from other sources (e.g. a share of ticket income or an external financial support from, e.g., sponsors or government).

Although the content of the apps is provided in various languages, only visitors having knowledge of English language can expect to be able to use museum apps regardless of the country they are paying a visit to.

Regarding Research Question 2, the visitors may expect museum apps to offer basic types of content and support them in navigation in the museum premises, yet they should not expect a typical app to feature rich multimedia, gamified elements or augmented reality.

Regarding Research Question 3, the number of installs of the surveyed apps confirms they are used by visitors, though for most of these apps, the numbers are low relatively to the number of visitors to respective museums. Whether this is a matter of merely better app promotion or instilling new visitors' habits remains to be answered in future research.

On the other hand, those who bothered to use the surveyed museum apps mostly have a positive opinion about them, which may be interpreted to support the view that the museum apps provide a way to increase visitor satisfaction.

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