HUSH app: digital tools to explore the natural patrimony of urban areas

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Abstract. In recent years, urban trekking and geotourism have gained relevance in the tourism industry. This has been accompanied by an increasing use of digital tools and techniques for developing immersive touristic experiences. The HUSH project aim is to enhance and disseminate the scientific and naturalistic heritage of urban areas by means of a mobile application. The naturalistic and geological components with relevant scientific value are first identified and tagged as Points of Interest (POIs). Then, high quality multimedia contents are created for each of them. Using the HUSH app and implementing Augmented Reality techniques, users can explore these contents by framing the POIs with their device. They can decide which POIs they want to visit by using keyword-search, by selecting a predefined path or by means of ‘intelligent search’, which applies data mining techniques to users’ data. Moreover, they can propose the addition of new POIs by using the Scientific Reporter tool and rate POIs they visit.

1. Introduction

The increasing interest of the public in scientific topics results in many initiatives aimed at spreading scientific knowledge, as well as in the development of tools and techniques that allow exploiting scientific concepts and resources to diversify the tourism industry. This is particularly true for Environmental and Earth Sciences [1]. In this context, Geotourism is a specific branch of tourism which aims at disseminating geological knowledge by focusing on the geological component of the natural environment, also in urban contexts [2].

Concurrently, the increasing use of mobile devices as well as their technological innovations have inspired educators and researchers to develop and/or use mobile apps for teaching [3]. On the other hand, there is still a limited number of mobile apps aimed at promoting naturalistic and geological heritage to a wider audience, for touristic purposes (e.g., [4]).

The main goal of the HUSH project is to create a versatile tool that assists the public in learning about and appreciating the scientific-naturalistic heritage preserved in cities, through the use of tools that can have positive impacts on the touristic experience, as is the case with Augment Reality and data mining techniques. The test area for the app is the city of Perugia, in central Italy.

The project is co-founded by the Fondazione Cassa di Risparmio di Perugia and started in July 2017. The app built for the test area will be released by the end of February 2020 and will be supported by the main mobile platforms (Android and iOS).
2. Methods and Application
The method can be summarized in three steps: 1) POI identification and content creation. This requires the survey of the POIs, the investigation of the scientific aspects related to them, the creation of multimedia contents and the construction of webpages that serve as repositories for these contents. 2) Construction of the app and its related parts. This includes database creation to organize and manage POI and users’ data, the development of the back-end of the app such as the scripts that guide the app flow and the building of the app interface. 3) This step comprises all of the actions necessary to open the content associated to each specific POI using Augmented Reality. This is accomplished by using Unity (cross-platform engine) and Vuforia (augmented reality software development kit).

2.1. POIs.
About twenty-five POIs have been identified in the downtown area of Perugia. The scientific contents are often connected to the historical and artistic components of the city, highlighting the strong link between natural and urban environments.

The geological POIs deal with aspects related to geomorphology (e.g., how landforms affected human settlements), rocks (e.g., origin of the construction materials used in Perugia), fossils (e.g., hidden in the stones of the historical buildings) and surface and underground waters (e.g., in relation to the ancient wells). The naturalistic POIs deal with both the wildlife that lives in the city (e.g., species of wild animals discovered thanks to the use of camera traps) and the botanical richness conserved in city gardens and parks (e.g., rare, endemic species of plants).

The scientific subjects of the POIs are conveyed in the form of multimedia contents by means of interactive 3D models, clickable images, GIFs, digital maps and educational videos and quizzes.

2.2. App.
Users can use the app by creating a HUSH account or signing in with their Facebook account. In the first case they can express their preferences on types of places and contents by completing a questionnaire, while when logging in with Facebook they allow the app to access their Facebook likes. Providing these pieces of information allows users access to the functionalities of the app.

Once logged in, users can decide how to visit the POIs. Among the options available, "find the POIs on a guided tour" allows them to choose between two routes that follow two ancient streets of Perugia; "search for POIs" allows users to apply search keys (e.g., they could decide to visit only POIs with naturalistic contents and located in historical places); "find POIs with the intelligent search" allows users to personalize their visit by suggesting the POIs that best match their preferences. In the case of Facebook users, the personalization is based on the similarities between the type of Facebook pages that the user likes and the type of content of the POIs. Similarly in the case of HUSH users, with the difference that their preferences are inferred from the initial questionnaire.

The selected POIs are shown in a map. By clicking on each marker it is possible to get directions and see the element of the POI that must be framed to open the scientific content (e.g., an architectural object). Moreover, in compliance with the ‘citizen science’ paradigm the Scientific Reporter tool allows users to contribute to the development of the database by suggesting new contents.

The results of this project consist of a versatile platform for the application of the touristic model proposed to a number of urban and non-urban contexts. Indeed, both the back-end of the app and its interface are reusable as such, all that it takes is to populate the database with the new POIs identified in the area of interest and to create the multimedia contents for them.

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