

Xiinbal: an App with Augmented Reality to Increase Tourism Potential.

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Abstract: Tourism is one of the most important economic aspects in the world, so that it constitutes the main source of income of entire nations. With proper planning and publicity, a place can have an exponential tourist growth, and new technologies can help to achieve such objectives. Through Xiinbal mobile application, any user can consult all the information for a touristic place in Mexico, and at the same time, users who interact can comment and rate the places. Augmented Reality is used so tourists can interact with different places in Mexico and get to know them in a different way. We believe that this app has the potential to increase the economic and cultural growth of small touristic communities.

Key-Words: Tourism, Augmented Reality, Mobile Application, Mexico

1 Introduction

Mobile technology development present an enormous growth because any smartphone can perform many different tasks with such small device. There are basic applications such as calculators or flashlights, games or even business security applications. The ease of programming this applications has provided the possibility of app development in many different areas such as tourism. This sector is of great importance in Mexico, becoming the third most important economic one in the country, representing 8.5 percent of the GDP and generates about 9 million direct and indirect jobs.

Augmented Reality (AR) is a technology that has existed for years but has had an exponential growth in recent years. It is defined as the vision of a physical environment of the real world, through a technological device, that is, tangible physical elements are combined with virtual elements, thus achieving to create an augmented reality in real time.

There are some applications with tourism impact using AR technology such as ‘Conoce Tepic’ (Get To Know Tepic City), an application that seeks tourists have a more pleasant and productive trip. The tool allows tourists to be guided around the city, especially the historic center. ‘Turimaps’ is an app where the user can discover the main attractions of Mexico City using 3D and AR. In addition to facilitate information such as addresses, schedules, promotions, museums

and attractions. In England, ‘Streetmuseum’ was created as an AR application that allows users to select a destination from a map of London or use geo-tagging and Google Maps to track down their location. Once selected, a historical image of the location in London appears on the screen, which can be expanded and explored in detail, along with historical information on the place. Basically, it will recognize the location and superimpose the historical image on the current view, which increases the reality that the smartphone camera senses.

Xiinbal (meaning traveling in the Maya language) is a mobile application that uses AR to provide information about tourist sites in Mexico, in order to promote tourism points of interest, as well as interaction to comment and rate the places. Augmented reality allows the 3D visualization of certain attractions along with a small audio description. We believe that this can help to improve the life quality of the inhabitants of touristic places increasing the number of visitors to the less known places or with less possibility of exposure when attracting tourism. In the same fashion, we hope that with the use of the app, it can boost the economic and cultural growth of the smaller communities, as well as those of greater importance or wet known. The functionality and benefits of this application are explained in more detail in the following sections.

2 App development and description

In order to build the app, first, an investigation about the tourist places of Mexico was carried out, including the types of tourism existing in the country. The evaluation of the different possible tools to be used for the development was continuous, in order to choose the appropriate tools for the correct functioning. Once the previous was completed, the corresponding implementation was carried out.

The main module of the mobile application was developed in Android Studio and is designed to work on mobile devices for versions 4.4 to 8.0. Another objective of the mobile application is to collect the greatest amount of information regarding the interaction of the users with the tourist attractions, therefore the flow of the application is oriented to facilitate the introduction of new information and displaying it in an easy way. It is necessary to have an internet connection to interact with the application.

For the AR visualization, an interface was made in which the user can visualize four different options of main monuments of Mexico that are: Puebla Cathedral, Guadalajara Cathedral and two archeological sites, Chichen Itza and Palenque in Chiapas. Following the same idea, three Mexican states are included: Guanajuato, Jalisco and Puebla, were the user can see a map of the state with its main tourist places, accompanied by small representative images of each one. The way it works is with the use of targets, which are identifiers for each 3D model to be visualized. The user must place the camera of his mobile phone using the application and point to the target, in this case can be an image of the place and then the 3D model will be shown on the screen, so that the it is possible to interact and listen to an audio file in different languages about the history and the main characteristics of that place. To achieve the aforementioned Unity was used, so each part of the interaction with augmented reality was designed, together with its interface. To develop the AR visualization Vuforia SDK was employed, which is one of the most complete technologies to develop this kind of technology, in our case, for the Android platform.

3 Results

First we will describe the process to use the app in order to display the AR feature (Fig. ??). When the application starts, the user will find a type of menu that will contain the options with the different places and monuments that are available to visualize them using augmented reality. Next, a representative image of the chosen place (the target) will be recognized by the ap-

plication to visualize a 3D model. Then, when the user selects an option, the camera will open and the user must point on the target mentioned in the previous step. Finally, by pointing the camera on the target in a correct manner a 3D model of the selected place will be shown on the screen, and the user can manipulate it to zoom in or out.

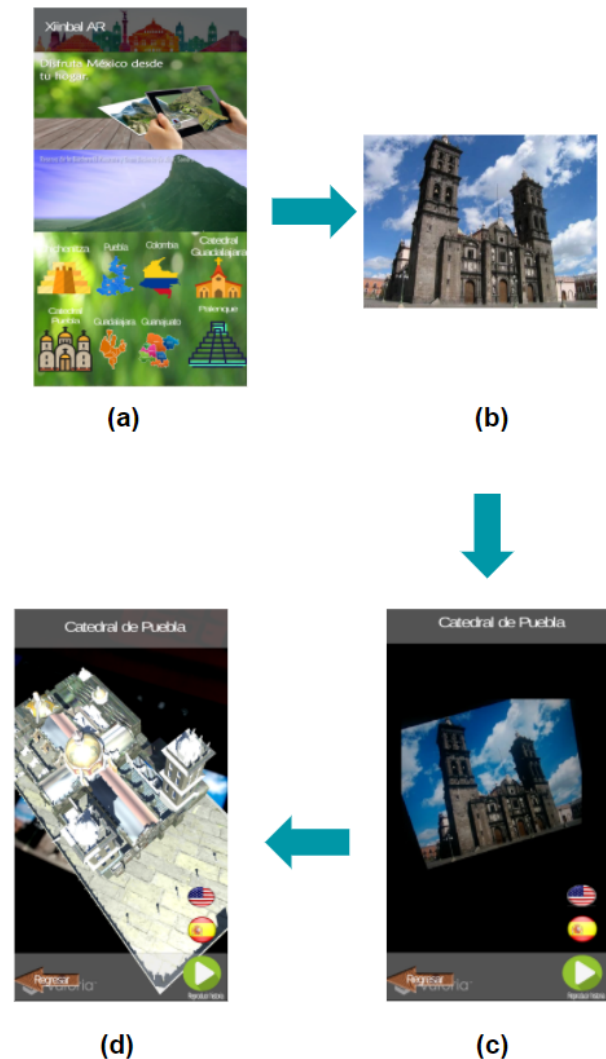


Figure 1: Process to use the app using the principal menu interface: (a) Main menu with the options of different places to get info about, (b) Representative image of the target place, (c) The device camera will open so the user can point to the target, and finally (d) A 3D model will show up.

As mentioned above, the AR part in the first section contains the icons that will direct the target recognition part to visualize the 3D model of the selected monument or archaeological zone, and each one contains a section of audio in English and Spanish to lis-

ten to a brief history comment of each place (Figures ??, ??, ??, ??, and ??).

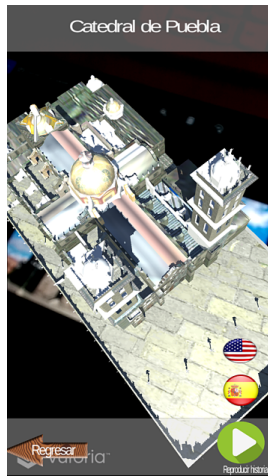


Figure 2: Cathedral of Puebla, audio available in two languages.

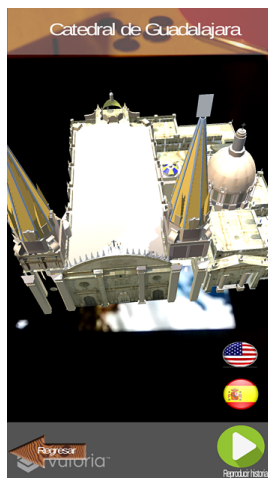


Figure 3: Cathedral of Guadalajara, audio available in two languages.

Another feature of the application is the option to comment and rate places, to do so the user must login (Fig. ??-(a)). If is not registered, registration can be done by filing a record form (Fig. ??-(b)) or by using an existent Facebook account. Next, the main screen will display two different lists of the top 5th tourist attractions (Fig. ??-(c)) both ranked by users, but the second one limits the places by geographic location. From main screen, users have two different search options. The first option works trough two different lists, one classifies places by geographic location and the other by tourism categories. The second search method consist on looking for a site by typing

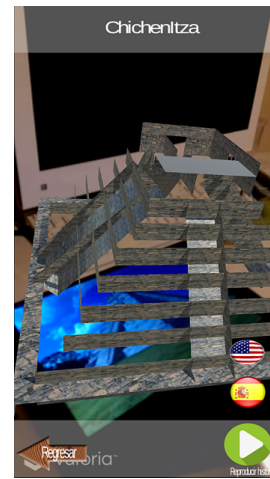


Figure 4: Archeologic site of Chichen Itza, Yucatan, audio available in two languages



Figure 5: Archeologic site of Palenque, Yucatan, audio available in two languages

its name on the search icon (Fig. ??-(d)). On place selection, more specific information will be displayed, including location description, pictures, a user score, Google Maps location and a short description of the place. It is also possible to rate a site and write comments of the place (Fig. ??-(e)). Finally, the app gives the possibility to take a look to other users reviews and scores in order to inform the level of acceptance to most of the users about the touristic places (Fig. ??-(f)).



Figure 6: State of Puebla, principal touristic sites.

4 Conclusions and Future Work

The Xiinbal application does not cover all the needs of a typical tourist, but we consider the app as a great and practical way help the discovery of new places, as well as to obtain information about specific places. All this together will help reveal hundreds of sites in order to attract domestic and foreign tourism, potentially helping to generate benefits for families and regions.

Data mining is a process of discovering new significant relationships, patterns and trends, therefore, for Xiinbal, a stage of Data Mining is planned. Data Mining process is planned to be included in the future in two stages: first one has the objective of describing the set of information that we have, specifically, to find association rules between the attributes of the database. This is possible only with the processing of information with unsupervised data mining methods, in particular, a priori algorithm. The second stage will be to propose a predictive model, which determines the degree of acceptance of a new tourist attraction. The algorithm C 4.5 will be used, which is expected to take advantage of its learning characteristic from previous examples. Being able to predict the acceptance of a new tourist attraction can have a great positive economic impact, in order to minimize the risk of investment on such touristic sites.

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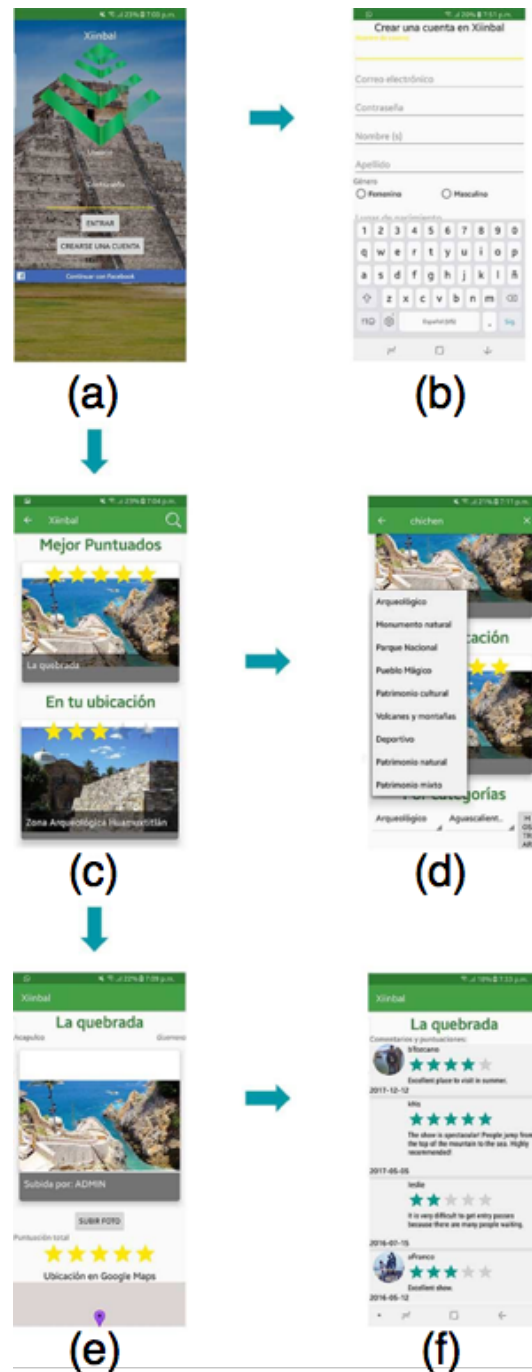


Figure 7: Feature description: a) Login of Xiinbal app. Facebook login is available as well. b) Registration form to create a user record. c) Main screen with suggestions of tourist attractions. d) Search options: type of tourism, place or keywords. e) On place selection, more specific information will be displayed, including directions to the place. f) Comments of a place and also users can rate tourist attractions. Additionally, opinions from other users are available.

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