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WALK LIKE AN EGYPTIAN: A SERIOUS, PERVASIVE MOBILE GAME FOR TOURISM

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ABSTRACT

Walk like An Egyptian is a location-based, mobile native game developed for tourists. The game provides information for tourists about the touristic places, motivates nationals to visit their historical sights and increase their cultural heritage awareness enabling them to explore the past and connect with it. At the same time, the game allows to gather information and data about the visited places as a side effect of playing. The data could be in a form of annotated photos, comments and reviews. This paper also provides some quantitative and qualitative analysis of the game.

KEYWORDS

Crowdsourcing, decision tree, location-based mobile games, serious games, tourism.

1. INTRODUCTION

Every country has plenty of fantastic attractions and unique sights to offer. Egypt, for instance, is full of landmarks in almost all of its cities. Unfortunately, some of these attractions, which are worth visiting, are not well-known and deserted, even by many Egyptians. This could be due to the lack of on-site tour guides, activities and advertisements and due to the political circumstances that Egypt has been going through for the last few years. This has largely contributed to the collapse of the tourism industry. Accordingly, other amendments are needed and new approaches should be developed to boost tourism. Walk Like An Egyptian is a serious, mobile game with a purpose (GWAP) that has a twofold purpose. It provides tourists with information about historical places, while connecting them to the place's history and discovering their ancestors' glories. At the same time it gathers information about places through tasks that should be accomplished while playing the game. Thus, it is a multi-purpose game that encourages players to explore their cities and contribute to historical records through providing their experience and knowledge for visited places. Being mobile, the game is not restricted to a specific area, city or even country and can easily accommodate other countries other than Egypt. Therefore, it is a more generic game that could be played at anytime and at different places; ranging from different neighborhoods to different countries through the use of mobile devices. Thus, this game can be considered to be a pervasive game as the game is taken to the streets and players experience games that are interlaced with the real world while not being attached to the console (Benford et al. 2005). The game also exploits human computation to collect and annotate data. Human computation refers to the humans' interaction and contribution to solve problems that are better solved by humans. The problems might be also solved by computers but not with the needed processing speed and correctness level that could be achieved through humans' interaction (Law and Von Ahn 2009).

Thus, Walk Like An Egyptian leverages the addiction and power of games, the many-in-one characteristics found in the mobile devices, human computation and crowdsourcing to connect the players with their past and gather information to increase the cultural heritage awareness. Consequently, contributing and sharing their experience with others to have mutual benefit. This is done by developing a motivating and engaging location-based mobile game prototype that enriches visitors' knowledge while maintaining the required game elements.

Some other approaches have been developed to encourage people to visit touristic places and boost tourism. **REXplorer** is a mobile, pervasive, location-based game designed for tourists of Regensburg, Germany. It is a spell-casting game that allows the player to awaken and communicate with spirits to reveal

their 'cliff hanger' stories related to important events and periods in the city's history (Ballagas et al. 2008). **The Castle Route** is a project aimed to develop a historical geo-referenced route for a castle in Portugal to increase students' knowledge in cultural heritage. Walking through the route, information in the form of audio, text and photos appears to the users. The users were asked to add and tag photos and to answer specific questions about the castle. The route was then displayed on Google Earth **(**Magro 2014**)**. **Intrigue At The Museum** is a location-based game aimed to make children explore and provide them with information about a museum in Italy and orientate them through the museum in an enjoyable manner. The children are told about a theft that happened in the museum and the probable suspects. Children get to know information about the place and master-pieces through solving riddles (Xhembulla 2014). **History Unwired** is a project made to take visitors to less-known neighbourhoods in Venice, Italy. The work provided a narrated walking tour via the use of location-aware mobile devices. The information was gathered and brought to visitors through visual characters describing the neighbourhood (Epstein and Vergani 2006).

This paper is structured as follows: Section 2 describes the game. Section 3 shows the game evaluation and results. The conclusion and future work are presented in Section 4.

2. GAME DESCRIPTION

Walk like An Egyptian applies the concepts and rules of the games which were studied carefully to come up with the game design and prototype to keep the objective of the game clear for the players. Thus, the prototype includes features like: receiving information from multimedia sources, learning 'just-in-time', instant gratification and instant rewards and learning that is relevant, instantly useful and fun (Derryberry 2007). Also, Facebook was integrated in the prototype to gain the benefits of social networks (SNs) (Murphy and Moulaison 2009). To be able to test the game, the game database was loaded with some information related to touristic places in Cairo to seed the database. This information was gathered from historical books, recommended by an Antiquities inspector, pamphlets of the places and trusted Internet sites. Afterwards, the information about various places was compiled from the players' entries after validating them.

After the signup and login view, the game consists of four rounds. Based on the player's location, a list of 'nearby places' is shown. These places are returned from the Google Places API. A map view for the nearby places is also available to get an insight of the proximity of the places. This is useful to eliminate the ping-pong effect; to leave and return to the same place as an effect of not knowing the place location. The map view consists of all the places including the player's location; the places are marked with blue and the player's location is marked with red. Figure 1 shows the welcome view and Figure 2 shows the map view.

In round one, information about a selected place is shown to the players through a call to Wikipedia and Google Images. From the Wikipedia page, we only extract the first paragraph to give a quick overview of the place. The players have the option to 'check-in' to a place; the check-ins are further used during the game play. Thus, in round one the players take a quick overview of any of the selected nearby places.

Round two takes the players back to the past through quick facts related to the places, questions and answers. After clicking on a certain place, the players can choose to take quizzes for that place. A place's information is stored in the database in a sort of question/answer and quick facts. The players learn the information by answering questions and getting notified with their result. For some questions, the stored answers consist of the correct answer and wrong answers that are wrong in a way that the player should not choose them as they cannot be related to the questions. However, not all questions have direct straight forward answers. This is to keep the game challenging and encourage the players to explore the place. If a question has a quick fact then it will be shown first till the player clicks a 'Got it!' button to start answering the question (shown in figure 3). The players are notified with the result. If the answer is wrong, they get notified with the correct answer; to inform them about the place. Figure 4 shows the notification shown to the player. The player's score is incremented for each correct answer he/she makes.

In round three, it is the player's turn to contribute to the social good and make other people benefit from his/her experience. Players are encouraged to add comments, upload and annotate photos. Their score gets incremented for sharing the comments and uploading the images. A capturing feature was added within the game to make it easier for players to capture images whenever they need. The players cannot upload an image until they add a title, tags and the place that the image belongs to. Consequently, the player selects the name from a check-list consisting of the player's checked-in places. Figure 5 shows a screenshot of the image

uploads. Moreover, the players know a priori that their entries will be used in the game database and are considered added values to the game. Accordingly, they are motivated to be information suppliers to engage others and introduce them to the historical places. The incentives are offered in terms of score keeping, instant gratification, leader board, badges and sharing wealth on SN. The player's score is recorded and whenever the player reaches certain scores, he/she gets notified with the new badge he/she won.

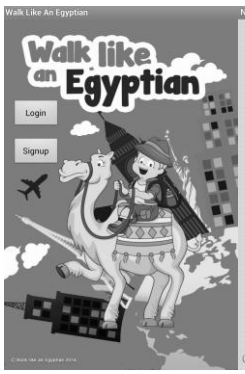

Figure 1. Welcome View

Figure 2. Map View

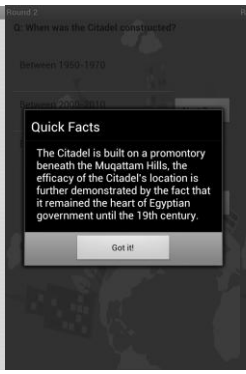

Figure 3. Quick Fact

Figure 4. Q&A

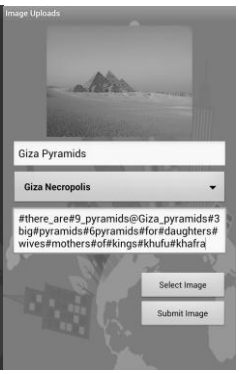

Figure 5. User-Upload

To make the cultural heritage awareness more pleasant, the game ends with a fourth round called 'Guess the place!'. In this feature, the player should think of a place (not only the ones they visited) and the game would guess it, by asking the players some questions. They are basic and simple questions which classify the place. The answers have two forms: yes/no and actual answers that describe the place. The WEKA tool was used to make the classification and decision tree (Bhargava et al. 2013). The tool is fed with a file containing a list of questions along with their possible answers and a data training set. All questions have 'Do not know' and 'irrelevant' answers. The questions and the answers were structured based on 'tourism attractions classification' that relies on 'folksonomy' of tourism attractions. This is to match the players' common knowledge and responses to the questions, compared to taxonomies (Tweed 2005; Kusen 2010). If the algorithm could not guess the place (whether because it is not stored in the database or the player's answers do not match any of the data), the player is asked to add the place he/she was thinking of. This feature adds knowledge about unknown places to the game database.

3. EVALUATION

3.1 Pre-Evaluation

In the first phase of the work, a survey was conducted to measure how far the individuals know their city history and cultural heritage. The survey also included a section for game features that players would like to have which helped in designing the game. The surveys were distributed offline and 45 were completed and all the participants were Egyptians. The participants' demographics, knowledge for their country's history and the knowledge of touristic places are shown in Figures 6.a, 6.b, respectively. Figure 6.c shows the game features.

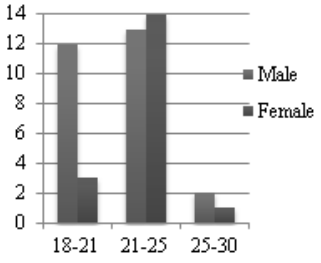

Figure 6.a Players' Demographics

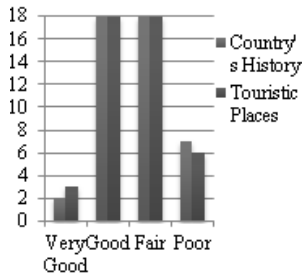

Figure 6.b Historical Info

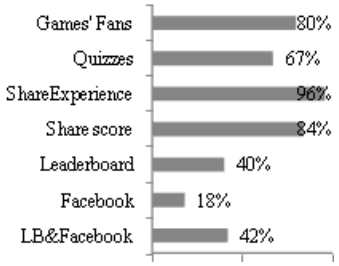

Figure 6.c Game Features

3.2 Post-Evaluation

This section describes the game evaluation and measures various game features that assess players' contribution and analyze the results of interviews conducted after testing. The game marketing was done through Facebook as well as promoting the game on campus by giving a short description of the game and its goal. The promotion on Facebook was done by sharing the application fan page which was created to inform Facebook users about the game and to act as an advert to the game thus leveraging the advantages of SN. Testing on random and diverse types of testers of different nationalities was needed to measure and evaluate the game prototype from different perspectives and get a wider range of feedback on the prototype.

3.2.1 Quantitative Analysis

The number of users who played the game reached 44 over 11 days of testing. The Facebook application fan page received 84 likes. The prototype was tested on both males and females and 70% of the participants were female users. The biggest age group was between 20 and 30 years while the biggest testers group was the random group. Four testers were American, two Australian, two Chinese and the rest were Egyptians.

By the end of the testing phase, eight historical touristic places were visited and explored. The places' selection was done based on the most famous touristic places in Cairo and Egypt. The places are of different types and historical eras. For example, the game was played at the Giza Pyramids, Salah-ElDin Citadel in Cairo, famous mosques, a church and a synagogue. The game was tested over several days with different participants to get a wide range of feedback and contribution and to be able to evaluate the game prototype. The database was loaded with 45 questions, 43 quick facts and 105 answers. By the end of the testing phase, 96 comments; given either as sentences or one-word phrases, having a total of 633 collected words. Out of the 96 comments, 75 sentences were useful comments that can be generated as 'Quick Facts'. The useful comments had variable lengths, reaching up to 34 words per sentence. 68 images and 866 tags were collected with an average of 12 comments, 9 images per place respectively and 13 tags per image.

3.2.2 Qualitative Analysis

The gathered comments, photos and tags were manually examined and analyzed. 95% of the words used in the useful comments were correctly spelled words in English. 96% were English words, 0.32% were misspelled in English, 4% were spelled in Franco Arabic (e.g. 'Ma'zana'), 0% written in pure Arabic, 2% were Arabic given names that were written as pronounced (e.g. 'Hassan'), 92% of the photos were unique and descriptive images, 26% related to places that did not appear in the near-by places list, but they were in the proximity area, 93% of the tags were single English words, 100% of the English tags were spelled correctly, 8% were spelled in Franco Arabic, 0.8% were considered bad quality words (e.g. '..').

The players' feedback about the game and its features was gathered through interviews. The choice of conducting interviews rather than surveys was to get more feedback as the interview flow goes and to ensure that we get the test points answered. The players were asked whether the answers were predictable, game was beneficial and if they liked the game. This is shown in Figures 7.a, 7.b and 7.c, respectively.

We show here some of the distinguishable players' comments: *"I am really happy with this experience! I have visited three new places in one day and knew about them through the game"*, *"I believe we need a game like that as that we could not find any tour guides!"*. The Australians commented: *"It is really nice, useful and interactive. I think it will work at my country. I would rather play it instead of listening to the audio records!"*. One player was more excited to have a narrated story: "*I would have got more engaged through listening!*". One player wanted to have the options whether to read the quick facts or not. For the time limit, one player commented: *"I like not being limited by time. We are not in an exam! We play for fun and knowledge, why the rush!"*. On the other hand, one player wanted to have the option to enable/disable the time. The players liked the fourth round, one player commented: *"That was exactly what I am thinking of!"*

4. CONCLUSION

This paper introduced a serious location-based mobile game prototype for the tourism domain. The game motivates players to visit their touristic places, get connected to their past and collect related information about such places. In eleven days of testing, 8 new places were visited and 96 comments having a total of 633

words were collected. Moreover, 68 images having a total of 866 annotations were gathered. After analyzing the gathered data, 28 new questions were formed and 72 quick facts were generated. The results' analysis showed that the game mechanics provided visitors with a fruitful, engaging history learning environment, increasing their cultural heritage awareness. Moreover, it showed how the use of mobile devices facilitates and encourages users to interact, learn, make good use of time, share experience and contribute to the social good. It is important to mention that the testing was done only in Egypt, but there is no restriction to use it in other countries. In our future work we want to validate the gathered data and determine its correctness level. Also, we plan to make a generic quick facts and questions/answers generators based on the gathered validated data. In addition, we want to add a story-telling part in the game.

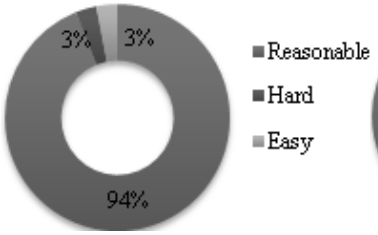

Figure 7. a Answers Predictability

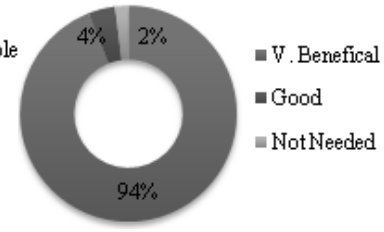

Figure 7. b Benefit

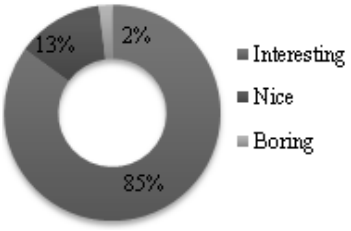

Figure 7. c Players feedback about the game

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