AiRCacher: Virtual Geocaching Powered with Augmented Reality

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ABSTRACT

Nowadays, smartphones and digital networks are being heavily used as data sources for research on social networks. Our daily experiences, interactions and transactions are recorded thanks to the digital traces that users leave behind their activities, both individual and social. In this work, we describe AiRCacher, a mobile app for virtual geocaching enhanced with Augmented Reality. By following gamification and Game With A Purpose design approaches, the aim is to bring people outside and make them move, by hiding and seeking virtual caches. As a side effect of their gaming activity, they became like social sensors able to provide geo-located social data. Therefore, the aim of our work is to carry out data analyses about users' outdoor behaviors, by looking for several findings such as trending places for different cache's typologies, and the detection of interesting events emerging from the concentration of caches in specific places.

Categories and Subject Descriptors

H.5.m [**INFORMATION INTERFACES AND PRESENTATION**]: Miscellaneous; J.4 [**SOCIAL AND BEHAVIORAL SCIENCES**]: Sociology

General Terms

Design

Keywords

Augmented Reality; Social sensor; Geolocation; Geocaching; Gamification

1. INTRODUCTION

Starting from the concept of users as social sensors [4, 3, 6, 5] and the worldwide success of Geocaching[1], our idea is to transform the concept of *cache* in a virtual one, by improving the user experience with the Augmented Reality. While performing their activities, users can became data sources, thanks to the technologies of their mobile devices, such as GPS. Several analyses can be carried out following this concept, from the detection of an earthquake through Twitter [6], to the description of human habits through their GPS mobile devices [4, 3].

In the AiRCacher system, a cache is a virtual container where the user can add messages, photos and videos. They can share these content with everyone, or decide to dedicate them to a single friend or a selected group of friends. Thanks to the addition of gamified solutions [2] to these virtual activities, our aim is to collect information about the users' behavior and patterns related to geocaching activities.

This work follows the concept explored in [1]: using game elements to encourage users to use geo-social systems, and providing important data about the performed actions as a side effect of the game [7]. A lot of information could be collected from the users game activity, such as favorite places where caches being hidden, trend places in specific moments, preferences on caches typology, and common paths between two caches.[2]

2. AIRCACHER OVERVIEW

2.1 Purpose

The scientific aim of AiRCacher project is to collect data about users behaviors, habits and movements. By providing the users with a gamified geocaching app powered with augmented reality, we try to stimulate them to spend time outdoor hiding and seeking their caches. Gamification aspects are used to engage the users, bring them outside and motivate them to be more active.

2.2 Architecture

AiRCacher has been developed with a client-server architecture. From the client-side point of view, the innovation is the addition of the Augmented Reality to the geocaching experience. Several features are provided to the users, as described in Section 2.3.
On the server-side, a SQL database has been developed, and the communication part is provided by JSON.

[1]http://www.geocaching.com

[2]Disclaimer: the iOS version of the app has been fully developed by NetAtlas company (http://www.aircacher.com) and it is downloadable for free from the App Store.

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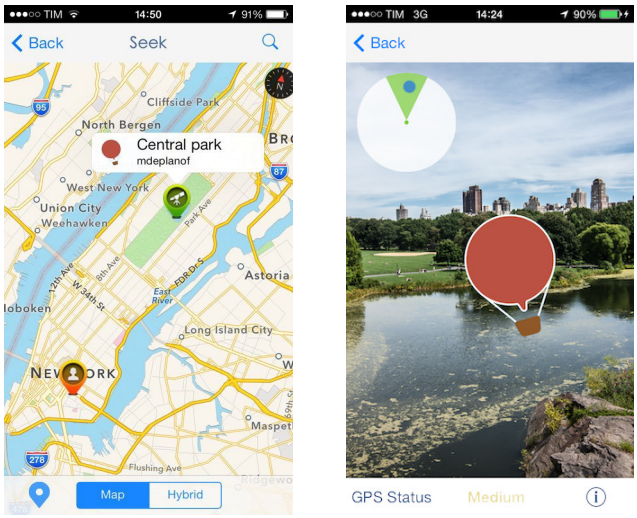
2.3 Functionalities

The main menu is divided into six sections: Seek, Hide, Profile, Leaderboards, Logs, and Tour. The three main functionalities are described below.

Hide: The hiding activity starts from the visualization of the geolocalized map. The user can choose the position of the cache by using his own location or by positioning the pin in another place of the map. After that, some information can be added to the cache: name of the cache, description, object to add inside it, and specific addressees. Different points are collected by the user, depending on the characteristics of these details. After hiding the cache, the user can share the news by posting it on Facebook.

Seek: The user can seek close caches. In the map view (See Fig.1(a)), all the caches are shown and identified with different pins depending on their status (close/far, found/to be found, restricted/public). When the user is close enough to a cache, its pin becomes activated (by changing its icon from the binoculars to the magnifying glass) and the user can start using the Augmented Reality to look for the cache. In the Augmented Reality view (See Fig.1(b)), the radar shows the location of the cache and an hot-air balloon appears when the user focus on the correct position. By touching the hot-air balloon, the player can collect the cache, see its content, add something new inside it and share the new finding with friends, by posting it on Facebook.



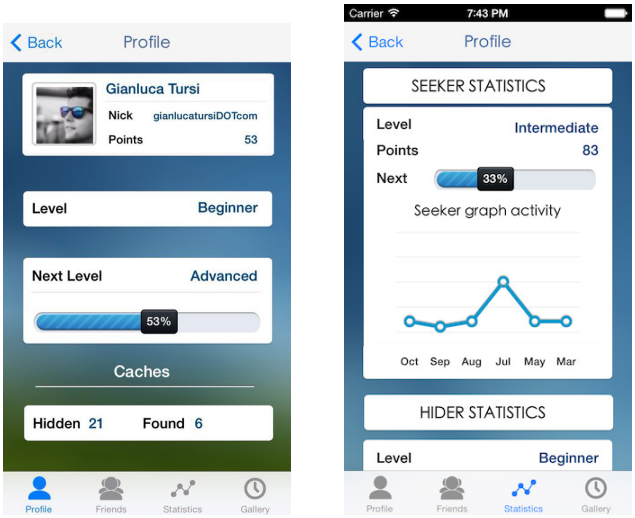
(a) Map (b) Augmented Reality

Figure 1: Seek modality: map with a far cache with the binoculars icon (a); Augmented Reality view for a close cache, identified by the hot-air balloon (b)

Profile: All the personal information about the user can be shown. In particular, in Fig.2(a) we can see the user's name, nickname, points, actual level, progression bar to the nest level, and the number of hidden and found caches. On the other hand, in Fig.2(b) the statistics of the user's activity are shown, divided in "seeker" and "hider" statistics.

3. USE CASE SCENARIO

Bob wants to dedicate a virtual cache to Alice, his girlfriend. He decides to hide the cache on the top of the Times Square's staircase, the place where he first met Alice. He



(a) Profile (b) Statistics

Figure 2: Profile section: personal information (a), and statistics divided into "Seeker" and "Hider" (b)

adds the YouTube url of their favorite song. He also collects some points, rising the ranking of the AiRCacher community. Alice receives a push notification of the dedicated cache and she is the only user allowed toseek and find it, because Bob set the restricted modality during hiding. Alice goes to Time Squares and, when she is near the cache, she enters the Augmented Reality mode to seek her hot-air baloon through the radar visualization. Once she taps on the hot-air balloon on the screen, she collects some points and she can watch the video linked to the cache.

4. CONCLUSIONS AND FUTURE WORK

The main goal of the AiRCacher app is to collect data about geolocated users' activities, by taking advantage of their social sensoring feature. While performing their activities, indeed, users can became important and accurate data sources, thanks to their mobile devices' technology. On the other hand, starting from the actual relevance of gamification elements, we think that these incentives can be able to drive people to spend more time outdoor, to move around and to socialize in order to hide and seek virtual caches. New gamified solutions are under development with the aim to enhance the user experience by providing more engaging and social activities.

Future work will be focus on analyzing users' behaviors and looking for interesting findings, such as trend places where users hide their caches, or common paths and patterns among them. Event detection analysis will be carried out when the system will be populated by a big number of users. In particular, by following the creation of a big amount of caches in a specific place, some inference could be done about the cause of this concentration.
Moreover, the Android version is now under development and it will be available soon.

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