fASK!: Encouraging User-Generated Content for Mobile AR Applications

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ABSTRACT

The marriage between mobile technology and Augmented Reality (AR) is a natural movement to enquire and receive information in the world. User-generated content can contribute to such intersections by providing more relevant knowledge in the physical space. In this paper, we point out four challenges for combining mobile AR and user-generated content: motivation for contribution, relevance of information, content filtering and speed of response. We designed and built a mobile AR application "fASK!", for people who may want to explore new linguistic or cultural spaces. We leverage the Facebook social network to motivate users to share information, and a few design decisions we made in this context, we believe gave solutions to the challenges mentioned above, and inspire further discussion about how to make a useful user-generated content based mobile AR application.

KEYWORDS: Augmented Reality, user-generated content, location-based service, social network, collaborative activity

INDEX TERMS: H5.2 [Information interfaces and presentation] User Interfaces—*Graphical user interfaces*.

1 INTRODUCTION AND RELATED WORK

With the fast development in hardware and software on mobile devices and Internet, augmented reality – 3-D virtual objects integrated into a 3-D real environment in real time [1]– is finally walking out from the labs, museums and game centers, and entering into our daily life. Mobile AR interface usually renders information/graphics (although sometimes not 3D) on top of the video taken by the camera on the back of the mobile device. GPS and compass are often embedded in these mobile devices, and supports location-based service.

These capabilities lay out a promising landscape with great potential to bridge the physical space that a user moves in and a virtual space that information resides in. Numerous applications of mobile AR have been generated in different domains, e.g. pervasive gaming [3], e-commerce [2], scientific research [5], just to name a few. While most of the apps can reveal the "hidden" information in the world, one problem emerges: where does the information come from? Existing databases is an important resource, but knowledge in the world seems to be user-generated by nature. In this paper, we aim to explore the challenges involved and propose some solutions when bringing user-generated information and mobile AR interface together using learnings from our prototype called fASK!.

fASK! is designed for people who may want to explore new linguistic or cultural spaces. In the application we leverage the social network on Facebook to motivate users to contribute information, and it provides an integrated experience with iPhone and web interfaces. The challenges we encountered in this project is summarized as follows:

- Motivation of contribution

Although there exists many successful web-based knowledge bases built by altruistic users (e.g. Wikipedia), tasks that require an immediate response need to give users a stronger motivation to contribute to it. Mechanical Turk (mturk.com), a service that leverages human intelligence to obtain answers to questions, relies on external motivation (money) for information contribution. In our project, we propose alternative solutions by means of a social network.

- Relevance of information:

The advantage of mobile AR over other interfaces is to have easy access to information in the real world when needed. Beyond using location to filter information, we focus on providing "information-on-demand", which hasn't been addressed by many existing apps. For example, the world browser by Wikitude (wikitude.org) encourages users to share information through a web interface and retrieve it through a mobile interface. However, the information shared and requested may be disconnected. It may happen that the user wants information for a different reason than the one who contributed to it had, even if they are in the same location.

- Content filtering

Content filtering here has two folded meanings. *First*, when information gets crowded, how to find the piece most relevant to the user and the scenario that it is situated in. *Second*, how to make sure that inappropriate content can be filtered out. These are issues related to other user-generated content in web 2.0 as well. But the limited and discontinuous attention from the user [4] and the small screen size makes the challenge even harder.

- Speed of response

When a user has the need for information in the real world, there is a relatively short time frame to get the answer. Speed of response becomes more important for mobile AR apps. Amazon's iPhone app *Remembers* uses both vision-based recognition and crowd-sourcing to provide answers quickly. The real challenge for user-generated content is to use the web that usually support asynchronous tasks to support such real time synchronous responses that a user needs.

These challenges have some overlap with their counterparts in Web 2.0 and online community discussions, but mobile AR provides a different physical and social context that requires new solutions. Our paper discusses a few possibilities and alternatives through our project fASK!.

2 RELATED WORK

Although a substantial number of commercial applications have been developed to show the appeal of AR, not many of them are designed for user-generated content. The most relevant work we found was World Browser, by a company called Wikitude, encourages users to geotag the places of interest on Google Map. At the same time, mobile clients retrieve the shared public information on top their camera view by location and orientation of the device. There are a few challenges along this path of creating location-based information: *first*, the arrangement of information: Wikipedia is organized following an encyclopaedia tradition in digital format. There is no limit on how much new data can be created; most of the terms and knowledge is just one search command away. However, mobile AR is motivated by putting information in the real world, which has physical spaces that limits the amount of information that can fit in one spot. We have seen on the Wikitude website, that some spots on the map

are already overcrowded, while most other locations have sparse information. *Second*, making the information relevant for those who actually need it by employing an information-on-demand approach. In our project, we also explore these two challenges.

3 CASE STUDY: FASK!

3.1 Motivation

The intent behind creating fASK! was to enable an experience that would enable people to better engage with culturally and linguistically unfamiliar environments. The idea was to leverage the viral nature of social interactions on Facebook, and introduce a simple GPS enabled device of everyday use like the iPhone, to create a cultural-linguistic probe.

fASK! creates a platform for a personalized mechanism for sharing of location-based culturally relevant knowledge. The user would be required to take a picture of an artefact – like a billboard in a local language or even a monument, add an annotation or question to it if they wish to, and send to the application server. The system would track the user's GPS location, and would post this information, along with other relevant information on the Facebook 'newsfeed' of the friends of the user. The receiver would be able to respond to questions, and, participate or be a spectator to discussions related to requests they receive. As and when people generate responses or content towards a query, the sender of the request would be notified and would be able to view the information spatially, or otherwise.

This application does generate the possibility of a collaborative activity for people to make the information of the world accessible to everyone in a seamless fashion. This system easily lends itself into becoming a cultural probe where people could use it to understand aspects (objects, practices etc.) of different cultures they don't understand.

3.2 Design of fASK!

fASK! (short for Friend Ask), is a locative-information enquiry, content-creation & sharing platform that leverages two existing technology platforms: **mobile devices** (iPhone) and **social network** (Facebook). The system was designed for a user to be able to quickly broadcast a question iPhone onto his/her Facebook network. The 'reach' of the question in the social network can be increased if the users of the system 'publish' the question to their friends, therefore allowing the information to trickle to friends-of-friends and so on. This greatly increases the chances of the question being answered more accurately and quickly, while still maintaining social responsibility from participants. The following is an elaboration of how these components function in synchrony in fASK!:

1) A mobile device should be capable of taking photos and is connected to the internet to enable location tracking, in our case, we used the iPhone. The iPhone allows fASK! to automatically get GPS information of the user's location. When we developed our prototype, the iPhone did not have the compass, so when the user attempts to tag something at a location (x,y), the iPhone could not automatically provide orientation information. Hence, fASK! provides the user with a novel way of providing this information manually, by allow him/her to draw the viewing angle represented by a single line from the user's current location to the entity that the user is tagging in the environment. This line is drawn with reference to the user's location, overlaid on an existing mapping platform called Google Maps, that provides enough visual cues of the location through its highest zoom-level. Using the iPhone, apart from creating and posing questions, the user can also view the environment around him that contains information hotspots created as a result of previous questions & responses synthesized through fASK! by other users on his Facebook network. So, for instance, as the user scans a certain side of a street, he/she can intuitively interact with the phone's touch-screen interface to choose the information-element of interest, and perform further actions on it, like viewing the complete information thread or even appending the thread with new bits of information.

2) A social network (Facebook) that allows for both synchronous and asynchronous communication with a person's contacts in different parts of the world

The Facebook application allows people to share their knowledge about the world with their social network. It provides for them a platform to engage in discussions and enhance their knowledge of the world by participating in them. Typically a user would receive a news notification regarding a question that a friend of their needs help with. The interface would allow the user to answer the question, which would get relayed to the user instantly, or publish or share it with their friend network. This would ensure that the question percolates to a network of people, thereby enhancing the chances for responses.

4 CONCLUSION

In fASK!, we made several design decisions to solve the challenges as we indentified in introduction. We leverage the social tie between the users to motivate users to help each other and contribute to the creation of knowledge. At the same time, the friendly action of helping becomes part of the socializing activities on Facebook, which may in turn reinforce the relations between users. We also focused our design for "information-on-demand". The content in fASK! is specifically requested from the mobile device, requiring that all content be relevant to a real-world user. By relying on the information contributed by the friends on Facebook, which has its own established social norms, there is little worry about spamming or inappropriate content on fASK!. Moreover, we improved our design by allowing friends' friends to view and answer the questions as well. By extending one degree of friend network, we vastly increase the potential users who can answer these questions. With an average of 120 friends per person on Facebook, the potential users who can contribute to answer is potentially expanded to 120*120. We expect the speed of feedback can be vastly improved accordingly.

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