Evaluation of Mobile Augmented Reality Applications of Tourism Destinations

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Evaluation of Mobile Augmented Reality Applications of Tourism Destinations

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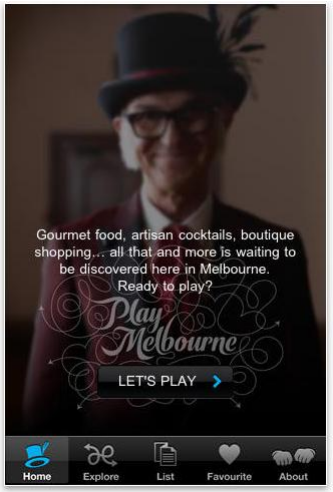
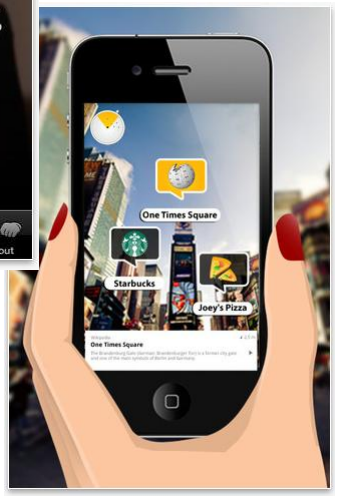
Agenda

- Introduction
- The MobiAR project
- Evaluation of the prototype
- Results of the questionnaires
- Results of the semi-structured interviews
- Conclusions

Introduction

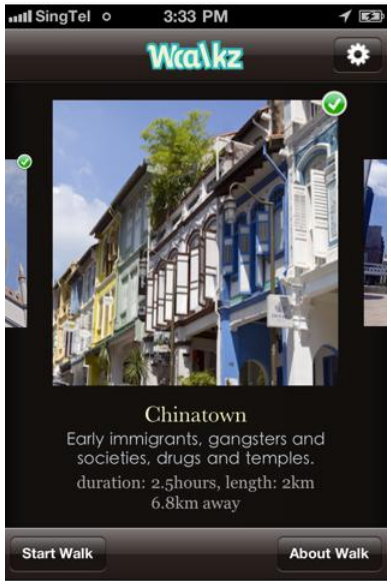
- Mobile Augmented Reality (AR) has recently become very popular





Introduction

- Consumer-based mobile AR application development has grown very quickly over the past few years



Introduction

- There are nearly 700 applications with descriptions listing AR as a feature in Apple's iTunes store

Introduction

- Only few studies have analysed the experience of the user and have evaluated Augmented Reality mobile applications
- Such knowledge should benefit developers to move forward from the initial surprising factor
- If mobile AR is to become a viable medium for delivering visual information, empirical research must be conducted to discover the perception and usage of commercially available applications

Introduction

- This paper presents the results obtained during the user evaluation process of MobiAR, a mobile AR guide for urban tourism
- The main goals pursued by the user validation were twofold
  - Assessing whether users find the developed application suitable or not
  - Gathering suggestions about how to improve the application

The MobiAR project

- Development a mobile service platform for tourist information based on mobile AR technologies
  - MobiAR targets users who are willing to discover or better know a destination with enhanced experiences by enriching their visit with multimedia and location-based information
  - Users can be either tourists who need a guided tour, or local citizens eager to discover more about emblematic places in a destination
  - In both cases, users can generate their comments and reviews, so as to share them with others

The MobiAR project

- Main use cases covered by the MobiAR platform
  - User registration
  - Configuration of the user profile
  - Visualisation of the city map that illustrates the Points of Interest (PoIs)
  - Access to the description and the browse of multimedia content attached to particular PoIs
  - Sharing of pictures taken by the users to the system
  - Update of the comments about a particular PoI

The MobiAR project

- Description of the experience

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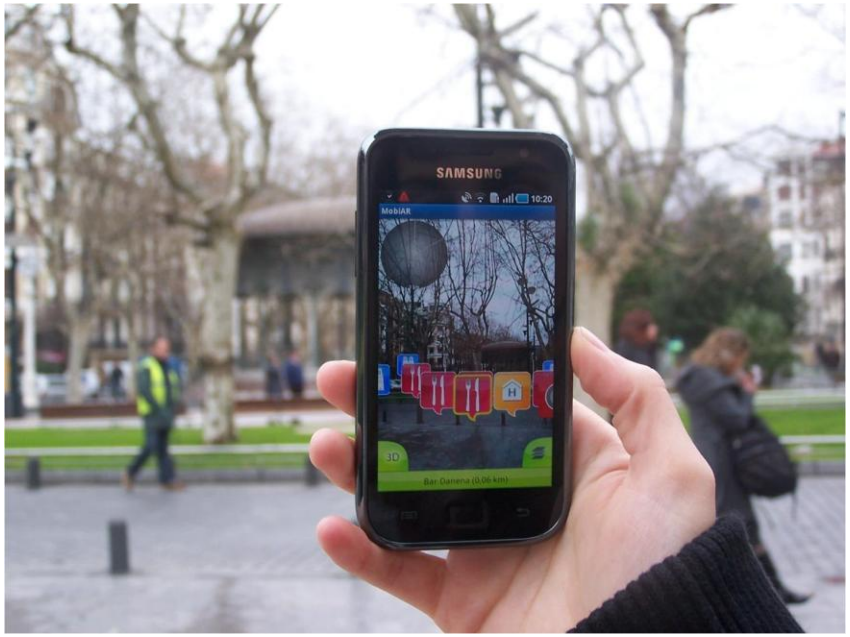
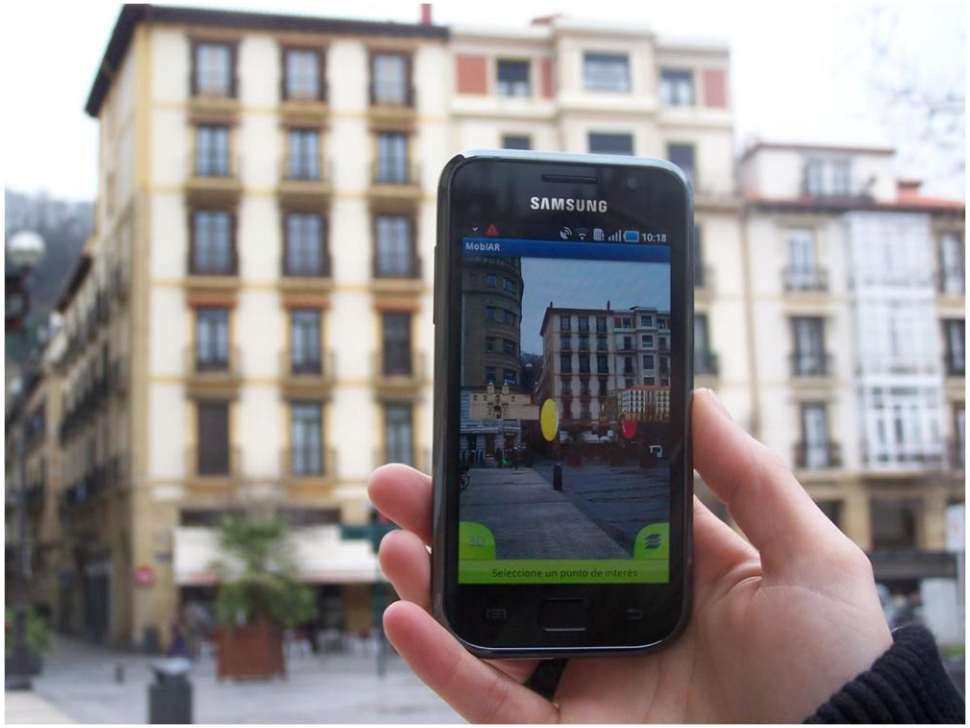


The MobiAR project

- Description of the experience



The MobiAR project

- Database of reference images
  - Panoramio
    - Manual geo-tagging by users is not reliable enough for the targeted enhancement
  - Google Street View.
    - The precision is higher
    - Tests showed the viability of the proposed solution
    - However, since the places where the user evaluation was conducted where mainly pedestrian and no images from Street View were available, qualitative studies on user experience could not be conducted and deferred for future work.

Evaluation of the prototype

- Description of the methodology
  - Formative evaluation in order to improve the development of the project
  - Questionnaires for quantitative evaluation methods
  - Interviews and observations as qualitative evaluation methods

Evaluation of the prototype

- Validation scenario
  - The city of San Sebastian has been the validation scenario of the MobiAR application during the last week of November 2010
  - The field trials were carried out in the surroundings of the Town Hall and the Alameda Boulevard, making use of the free Wi-Fi network supplied by Fomento de San Sebastian
  - A set of 25 PoIs was selected, including accommodation, restaurants, places or buildings of interest, and monuments

Evaluation of the prototype

- Recruiting the candidates
  - 15 participants from both sexes (9 men and 6 women)
    - Regarding their age, 7 participants of the sample were users between 36 and 60, 6 were users between 19 and 35, and the remaining 2 were under 18
    - The vast majority was familiar with computers, Internet, email or traditional mobile phones, but not with SmartPhones and mobile games
    - Tourist offices of San Sebastian and Bilbao, the School of Tourism of the University of Deusto, companies involved in the development of Information and Communication Technologies (ICT) and other representative local institutions have been contacted

Evaluation of the prototype

- Description of the experience
  - Before the beginning of each experimental session, participants were welcomed and introduced to the research team who explained the goals and the context of the project to the users
  - A short introduction about Android devices was provided to make the experience easier, especially for participants who did not have any experience of using such devices
  - Given their availability, users tested the MobiAR application individually or in pairs
  - Once located at the starting point in the real scenario, users interacted freely with the MobiAR application during nearly one hour
  - After the experience, users received a complementary explanation of the features of the application that were not tried out
  - The last step consisted of completing a questionnaire and an informal interview with the observers in order to gather further information about their experience

Results of the questionnaires

- Usability of the AR guide (I)
  - "Most usable visualization option for PoIs"
    - 3 out of 15 participants (20%) to "3D"
    - 12 (80%) to "Normal"
  - "Have you been able to interact with 3D icons of each PoI?"
    - 1 participant (7%) that could not interact at all
    - 2 (13%) that found it quite difficult to interact
    - 8 (53%) for whom it was quite easy
    - 4 (27%) that interacted perfectly

Results of the questionnaires

- Usability of the AR guide (II)
  - "Have you been able to interact with the PoIs and 3D representations?"
    - 3 participants (20%) that had difficulties interacting
    - 8 (53%) that interacted easily
    - 4 (27%) that found it very simple
  - "The PoIs were correctly placed in the AR view"
    - Perfectly located (47%)
    - Quite near to their real location (53%)

Results of the questionnaires

- Content effectiveness
  - "Was the content interesting?"
    - Quite interesting for one third of the participants (5)
    - Very interesting for the remaining two thirds (10)
  - "Which type of PoI did you find more attractive?"
    - Monuments and buildings (5.71 over 6)
    - Tourist offices (5.35 over 6)
    - Accommodation and restaurants (4.9 over 6)
    - Pharmacies (4.71 over 6)

Results of the questionnaires

- Hypothetical future use of the guide
  - "Would you use such a guide in other cities?"
    - Only one participant would not use the guide in the future
  - Estimation of the price participants would pay for such a guide
    - 8 participants agreed on a price between one and five euro
    - 2 (13.3%) less than one
    - 2 (13.3%) between six and ten euro
    - Another 2 (13.3%) more than ten euro
    - Only one participant (6.6%) would only use it if it was free

Results of the semi-structured interviews

- Usability of the application (I)
  - The evaluation of the usability was very satisfactory
    - Users found the tested mobile phone quite easy to use
    - They browsed through the application with almost no problems
    - The application was very intuitive
    - The selected icons for tourist resources were very suitable
    - The application had an easy-to-use interface
    - Almost all the users found the map view more functional than the AR view during navigation

Results of the semi-structured interviews

- Usability of the application (II)
  - Some problems
    - Sometimes it was difficult to interact with the AR view icons because of their oscillation
    - The display of 3D illustrations was not clear enough, because users did not discover the 3D view button
    - The lack of experience in using the Android operating system prevented people from discovering different functionalities that were only accessible through the menu button
    - The back button of the Android device was often pressed by accident due to its sensitivity

Results of the semi-structured interviews

- Content and services provided
  - The comments gathered about the contents have been very positive, especially those related to additional services and the possibility of including more user-generated multimedia content
  - Users gave high importance to the quality and quantity of the multimedia content available at each PoI
  - The option for uploading photographs seemed to be not intuitive enough for some users, because some did not discover the button for this purpose

Results of the semi-structured interviews

- New functionalities (I)
  - Route navigation service in the application
    - One of the most frequently mentioned features
    - Once the user selects a PoI, the system would show how to reach it, either through an audio-guide system or visual signs on the map
  - Content
    - Include other type of tourist resources like parking and more information about the existing PoIs (i.e. opening hours, or address)
    - Addition of audio files (besides pictures)
    - Storing all the visualized contents in the mobile device in order to be able to send them by e-mail

Results of the semi-structured interviews

- New functionalities (II)
  - Inclusion of a help menu
    - Explanations about how the application should be used, by means of either textual or audio descriptions
  - Change of the colours of some of the icons and screens
    - Menus become more intuitive and accessible
  - Management of their own PoI by content providers
    - Help them to keep contents under control
    - The owners of tourist resources can register and update the information about their own PoI
    - This tool has already been developed within the MobiAR platform, but it was out of the scope of the user validation

Conclusions

- This paper presents the results obtained during the user evaluation process of MobiAR, a mobile AR guide for urban tourism
  - The goal of the MobiAR project is to develop a mobile service platform for tourist information based on mobile AR technologies.

Conclusions

- The main goals pursued by the user validation that took place in San Sebastian were twofold
  - Assessing whether the users find the developed application suitable or not
  - Gathering suggestions about how to improve the application

Conclusions

- Aspects as the usability of the MobiAR application, as well as the suitability of the content provided by the application analyzed during the evaluation
  - MobiAR is a compelling medium to display visual information
  - AR technologies are an engaging tool for the provision of personalized context-based information
  - Users are used to 2D views for searching and browsing and they do not feel so comfortable with 3D icons
  - Content will be a critical aspect for the acceptance of such applications taken into account the importance given to the quantity and quality of the multimedia contents available at each PoI

Conclusions

- Aspects related to the acceptance in the market
  - Tourism applications are among the most-logical ways an AR app can create a business model
  - Lots of opportunities for marketing partnerships and advertising specifically designed for SmartPhones
  - Mobile AR has potential although it needs time to mature

Thanks for your attention!!

Any further questions?