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AUGMENTED REALITY BROWSER ANDROID APPLICATION

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Abstract - ***Augmented Reality (AR) is an emerging approach in experimentation, in which the real world is enhanced by computer-generated data linked to specific places or activities. That is, augmented reality allows digital content can overlaid and mixed perfectly with our perceptions of the real world. Therefore, in this paper we propose an augmented reality system for mobile devices, which enables to enrichment the content of books and printed magazines by superimposing virtual objects, allowing increasing the user knowledge according to its environment. The system can be implemented on mobile devices with touch screen, such as smart-phones and tablets based on the Android platform***

Key Words: *Augmented Reality, mobile devices, virtual object.*

1. INTRODUCTION

Augmented Reality android applications contain technology that allows superimposing virtual computer graphics into the real world. Augmented reality opposite to virtual reality, the AR interface allows the users see the real world at the same time see virtual objects attached to places and real world objects. As processing power for mobile phones increase, we are beginning to see more of these types of applications. They represent the future for AR and the days of the marker are numbered. Whereas hyper linking solutions enable the user to quickly go to a web page, natural-feature tracking enables the user to interact with the content. Therefore the main objective of an augmented reality system is to the perception and user's interaction with the real world through complement the real world with virtual objects in 3D from real world, which appear to coexist in the same space that the objects of the real world. According to Azuma, to define an Augmented reality browser application, three main features have to be considered. First is combination of real world elements and the virtual environment, second is the elements must be interactive in real-time and last one which are to be recorded on 3D; this means, that the visualization of the virtual objects, the virtual elements, or information are linked to the localization and real world orientation.

Augmented reality browser enables to overlay and mix digital content with the real world. In addition to that, 2D and 3D virtual objects, digital data assets (video and audio files and graphical data), textual information and tactile information can be converted into real-world perception by users of augmented reality browser applications.

The current features of mobile devices male possible the implementation of browser applications for augmented reality. Among these features include high resolution touch screens, cameras and Internet connection devices or wifi networks and the movement capture and localization sensors needed (like GPS, accelerometers, compasses, etc.). These sensors have works over the classification of mobile browser applications of augmented reality, i.e. applications based on object recognition or GPS-based location applications. In both cases applications use these features of the mobile device to virtual objects.

The development of augmented reality browser applications for mobile devices is complex or hard due to some factors. On the one hand, the processing and storage capacity through different memory types affects directly the augmented reality system. On the other hand, the type of the method used for capture the image and processing the image to be analysed, on which subsequently a virtual image is store on the cloud.

We propose an augmented reality browser system for mobile devices based on visual image recognition. Augmented reality approach consists of the super position of virtual reality objects over the real world object which is seen through a mobile camera, the one which feed directly the mobile screen of the mobile phone. First, it must identification of the object in the real world through camera and mobile device screen. Then the virtual object track. Search on store database match with database afterwards, the show is augmented with virtual objects. Augmented reality application process requires the estimation of the coordinates from the object in the real

world in 2D or 3D model, for accurate position of objects for augmented reality application.

2. MATERIALS AND METHODS

Augmented reality browser application system for mobile devices proposed is focused on the recognition of printed images from any books and any magazines. In where the tasks of object recognition and tracking of this object on the mobile device screen is divided into the task execution on the server-side means cloud storage and client-side, respectively. The capabilities and performance of client-server approach based networking technologies are demonstrated with a prototype using the Android platform, which is available to augment virtual objects, that is, the covers or front pages from books or selected magazines.

The server side database is composed by thousands of reference points this data point match with database, which are tracked using a pattern recognize images from photo collections media, to perform this function is implemented the algorithm SURF. To improve performance in real time augmented reality browser system, it incorporates a method proposed, which improves the time of geometric verification for matching characteristics of the identified objects those objects will later be augmented reality. In addition, tracking of the objects on the virtualization from client side is based on a multimodal combination of visualization features and measurements of mobile sensors.

3. RESULTS AND DISCUSSION

The browser architecture contains 4 layers:

1) Mobile applications,
2) Web applications,
3) Web Rest API, and
4) Content-based image retrieval systems

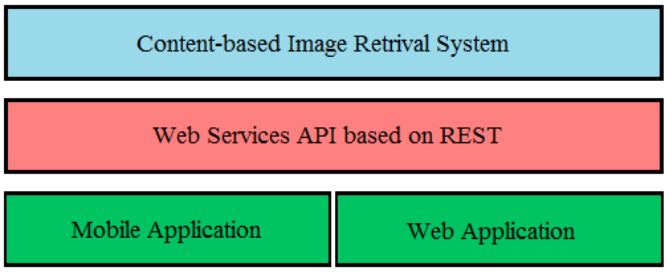

Fig -1: Architecture augmented reality browser.

The application architecture for the augmented reality browser is shown in Figure 1. The Web application functionality plays with upload and downloads the required images data, by application client side, in these images will apply augmented reality techniques. The browser application selects and recognize the specific area, in which is going to put the virtualization content. After load the image and select the recognition, the Web application uses the API and stores the image, the recognized area and their characteristics, inside the Content based image retrieval system.

When the image and its characteristics are stored in the database, then the mobile application sends the extracted features of the image (captured by the mobile camera) to Content-based image retrieval system using the API techniques. This System processes the features received, and then searches it on the store database. Then, when searching is complete, sends the results to mobile devices with digital content with augmented reality, in where it will on the book or magazine by virtualization. The definition of the framework is through the layers allowing each layer to working independently. This enables a scale and compatible against other augmented reality browser systems, such Kooaba. To achieve this proper functionality, every layer has to include a set of configurations that allow integration with external layers. The Web application was built using the Java Script programming language. This software application extracts the features from the image content. Next, these features are sent through an interactive application based on AJAX.

The mobile application is an augmented reality browser application developed with the Java programming language, using the Android SDK and OpenCV 2.5 (Open Source Computer Vision) libraries. OpenCV is an open source library and software that contains more than 500 algorithms optimized to analyse image, and video content. This mobile client application contains the necessary functionalities to recognize an object inside the image, insert the digital content over that object, and tracks the object.

The operative requirements for the mobile application for client side the following:

1) The video capturing mode must be activated on the mobile device.
2) The mobile camera should focus on the printed content.
3 Press the capture button if we need a frame from the actual video.

The server side implementation is composed of two layers: first is the Web services API and second the Content-based image retrieval system. The first layer contains the Web services API, which was developed using REST. REST is application architecture of Web development, which is supported in the HTTP protocol

standards are used, allowing creating services and mobile applications that can be used by any device that understands HTTP protocol. In the second layer of the system they implementation of the Content-based image retrieval system, which was developed using the PHP programming language, allowing a dynamic Web content retrieve on the server side. The Web server also uses the MySQL database engine to build (with the help of PHP) efficient dynamic website content.

In the Figure 2 shows an image of a book or magazine detected using a tablet or mobile with Android platform. The real world object is searched and retrieved from the database store on cloud, and then the virtual object augmented reality is displayed on the mobile device screen. Addition, in the Figure 2 are illustrated all points of coincidence between the object in the real world and the image found in the store server side database. Afterwards, the book or magazine is augmented with 2D/3D content and digital information.

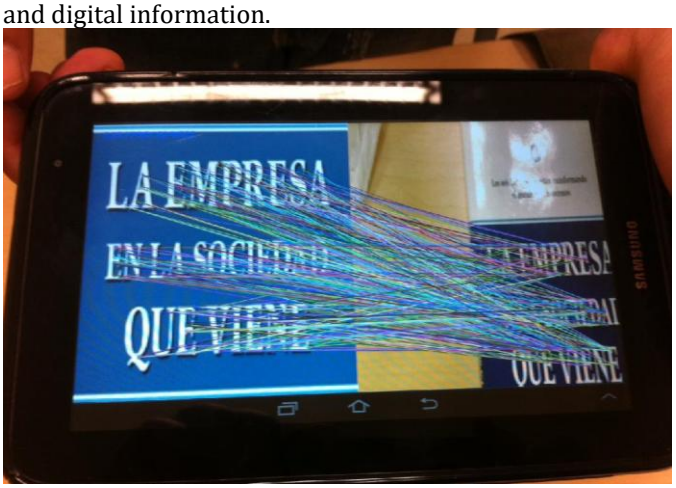

Fig -2: Image recognized from server.

4. CONCLUSIONS

In this work we proposed an augmented reality browser system for mobile devices applied to a printed media content environment, such as books and magazines. The augmented reality browser system allows enriching the book covers information by superimposing virtual 3D objects using augmented reality. In order to aim of developing an augmented reality browser application system with give high performance, the layered based architecture that allows extending and increases performance of the system, was proposed. Finally, augmented reality browser systems can be used to assist and improve the people's knowledge or experience, and also provide a comprehension about what is happening on their all environment. For some people this system can seem out topic, nevertheless, inherent digital limits augmented reality application allow users to perceive, without divisions, the real world with augmented reality objects.

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