

# Mobile Based Augmented Reality in Library

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**Abstract**— Augmented reality is a term in which real-time objects are converted into 3D objects in virtual environment. Augmented In a library, there is a variety of books having same name or same titled keywords but different contents. It is a tedious task to take out books from the library rack every time while viewing the contents. This paper basically introduces an android application which focuses on augmented reality used in a library with the help of internet connectivity. This application is based on image processing. The Optical Character Recognition (OCR) is used as open sourced software that is used to convert the text in the image of book into characters. The application basically captures the image of the books in a library rack and on selecting a particular keyword of a book we get the related books to the keyword and necessary details then on further selection of a particular book we get the contents of the related book. In this paper it is tried to introduce features to simplify selecting books in the library without any efforts. The application introduces easy way to decide books that are needed from the library. The application will be able to function satisfactorily across all android phones. Experimental results show that the image captured should be of good quality and the camera should be more than or 5mp, so that the data or information about books we get from the image is proper or accurate.

**Keywords**—Augmented Reality, OCR, Image Processing, Android, Open sourced software

## I. INTRODUCTION

The use of augmented reality in the library provides easy access to the contents of books and helps in making decisions to refer which particular book. Augmented reality (AR) is a technology which introduces fundamental change in digitally attractive view of the real world, relating one with more purposeful content in everyday of life. An Augmented reality system produces a conceptual view for the user and a virtual scenario formed by the computer that augments the picture with some more information. Now a days augmented reality is used in various fields of education, military, archaeology, engineering manufacturing, industries etc [1, 2]. This new technology defines a fine line between the real world and the computer generated world. After capturing the image the first stage uses the detection method to detect the edges of the image through image processing. For the development of augmented reality application, software development kits have been introduced that help in improving the performance. A greater degree of flexibility and maintainability is achieved on implementing augmented reality in a library [3]. This application is mainly developed since students have difficulty in finding the right book for reference. This application helps in selecting the appropriate

book from the library without taking out each individual book from the library rack, referring it and then selecting it. In this paper we are focusing on reducing the task and increasing the simplicity for students.

## II. LITERATURE SURVEY

1. Di Capua et.al have proposed a model for AR development and human-computer interaction through mobile devices [5].
2. Chaomei Chen developed the augmenting user interfaces for digital Libraries with Virtual Reality [6]. In this system we design issues about consistent browsing the digital library in a virtual world and users can search and browse within a consistent spacial metaphor.
3. S Shastry et.al have proposed a system known as “i” whose objective is at high speed, simple, font and size independent OCR system settled on a different segment extraction technique. This algorithm can work with different fonts. This algorithm is based on artificial intelligence [7].
4. K Fujimoto et.al have proposed an algorithm that works based on ruled-line extraction method for digital camera images which has lowlight [8]. This algorithm failed to solve the anti-shaking issues of the digital camera.
5. Badeche Mohamed et.al have proposed a proposal of 3D pattern for e-learning augmented reality application based on AR Toolkit library. This allows the system a distant teacher in which we have e-learning to enhance it with 3D virtual objects [9].

## III. SYSTEM OVERVIEW

This application is android based. We use eclipse software for developing the interface of the application. We use PHP in the server side and SQL in the database side. The mobile device and the server should be connected to the same wireless network. If the mobile device and server fail to connect to the same wireless network then the login and registration will not be possible since the mobile device cannot access the database so neither login will be possible nor registration. Demand for data through selection of image is transferred from the client to the retrieval of data from the database. Technologies like this function as the motivation for us to further study on designing an application for library automation to meet the issues related to referring books in a library [4].

A. System Architecture

In this architecture we used advanced technology of OCR and knowledge about the real world in order to make digital interactivity in more efficient way. The system architecture is divided into two parts that is the user and application. The user end performs only three steps that is the authentication, the image selection and the books selection. The application end performs four steps that is the authentication, OCR analysis, searching book and displaying the book summary.

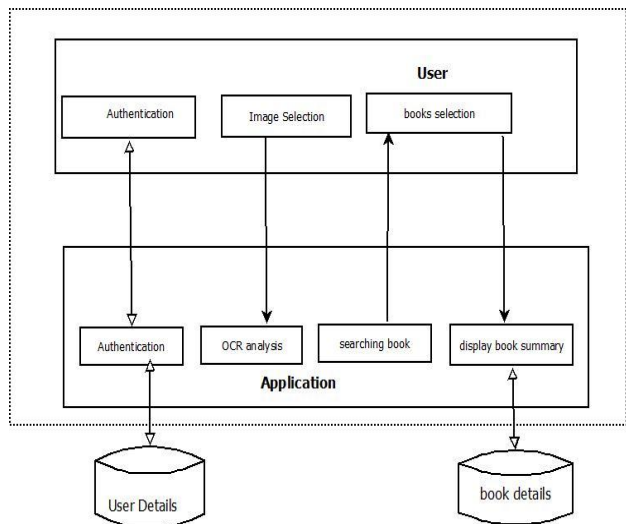


Fig.1 Architecture of our application system

The user interacts with the application and checks the authenticity as shown in Fig.1. Authenticity is checked from both user end and application end whether the user is a valid user or not. If the user is valid then the required user details are stored in the database. The user captures the image and the application performs OCR function on the image. The application then converts the image into characters and these characters are searched in the database. If available then the book details are displayed and we can view contents of the book.

B. Software and Hardware Requirements

Software requirements include the operating system, application server, database server, web server, web browser and others. The hardware requirement is computer, hard disk, RAM, visual display, network etc. The operating system used must be either windows7 or windows 8. The application server used is apache tomcat. The database server used is mysql server. The web server used in the application is apache HTTP. The web browser used is IE6 with SP1, IE7, Mozilla and Chrome. Office suite used is MS-Office 2000/2003/2007 with OWC11. The other specifications used are Adobe Flash Player 8.0 and SMTP Server. The computer used for developing the software is IBM compatible Pentium IV. The hard disk capacity should be maximum 40GB and minimum 10GB. The RAM size should be maximum 1GB and minimum 128MB. The visual display is Color with EGA/VGA/SVGA card. The keyboard should be of standard

101 keys. The mouse used is of Logitech. The network is used Intranet or Extranet or Internet.

IV. ALGORITHM

1. Initially, user takes the image of the book covers then that image will automatically uploaded to the server.
2. The server does the OCR (optical character recognition) detection.
3. After detection, data will be converted into OCR text and retrieved are stored as a temporary variable.
4. These data is compared with the list of books present in the database.
5. Then similar or exact books or data details send by the server, will be displayed on the user's android phone.
6. Now, the procedure of OCR detection, mainly it converts the image into text.
7. When the word is detected, but the sentence is not in the proper format then we perform stemming on
  - 1) data from database
  - 2) data from OCR text.
8. And later on, these data is matched with the database present on the server.
9. If the matched value returns true, we append the book details in a variable and so on.
10. At the end, the final string which we will get from the database is send back to the android application present on the user's android phone.
11. The android reads the response, and breaks the string in proper format and displays in the -GUI on the android side.

V. RESULT ANALYSIS

An augmented reality is a technology which recognizes the object and gives information about the actual world of the user to make digital interactivity in a better effective way also have controlling capability. Particularly, developing augmented reality (AR) technologies for taking information have assembled considerable attention in education field.

In this paper, we are explaining the work of an application in library. Experimentally, this application gives proper information about the library metadata on android phone. In above given system architecture shows that user gets all the data of library by this application only. Initially, the augmented reality server that is application server should have proper database of library. Now there will be following procedure with the client application, firstly the user need to register with the name, username, password, email-id, address and phone number. After registration user has to login with the same username and password to access the library metadata. Now the user will get the book images which are in the library shelf using the in-built camera of android device.

If the client application wants to know about the particular topic then user has to tap on related book which is in image. Then that images need to be uploaded on library augmented reality server. Now application server starts its work, it will analyse the image and extract the image from the tapped area. Now the extracted image will be taken by OCR recognizer

which we are using as an application program interface (API). It converts the image into the name of text book. The converted books name from images will be sent on application server's database for getting the result. The result will be joined together and sent back to the user. And the user will get the proper details of books such as books name, authors name as well as chapter's name. The complete steps of system which works on real time data and runtime image processing. The smart phone can take the snap of library and send it to the application server. The server further analyses the image result OCR and image analyser. After analysing, the server sends the computed data into the database for assembling the information. Finally the accurate result is displayed on the screen of android device as shown in Fig.2 and Fig3.

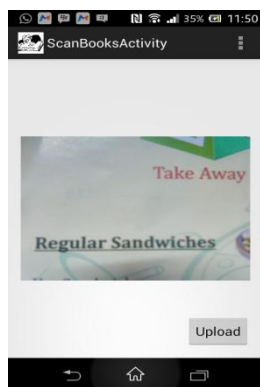


Fig.2 Image of book

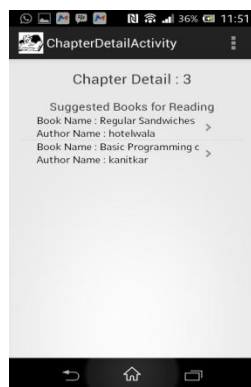


Fig.3 Chapter details of book

#### A. Advantages and Disadvantages

It is a user friendly application. Anyone amateur can use it. With this application client can easily get the information related to the library books. By capturing the rack of the library image and tapping on the image of the particular book we will get particular details of the book. Knowledge, information and increments are possible. Disadvantages are there is no proper safety and security. Admin should update the database regularly which very tedious and time consuming. Data connections are necessary to access the library metadata. In this application data protection is not guaranteed. Privacy control becomes major issue for this technology.

## VI. CONCLUSIONS

In this paper, we have implemented the architecture of library architecture using the concept of augmented reality. To implement this application study has been made in different areas like the OCR, image processing, tools used for implementing an android application etc. To convert the image into text an optical recognition engine called as the tesseract is used. In our future work we have planned to include data security in this application with the help of tokenization mechanism.

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