

An Operational Augmented Reality Demonstration System for Tourist Destinations

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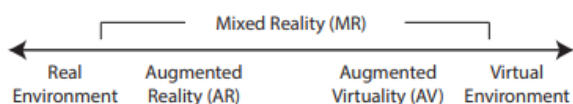
ABSTRACT

Augmented reality has great potential that really improves experience of the tourist to access proper and relevant information regarding an exhibit. This increases the tourists' level of the entertainment, thus also improves their knowledge in context of the touristic destination. The information presented to the traveller by making use of the augmented technology can be context-based and customized to the traveller's requirements and interest. The objective is to design an accessible and collaborative platform to enhance tourist's exploration experience using AR technology is to create a tourism platform using augmented reality as well as creating user friendly tools as well as a process that make the putting up of images, videos, text, animation etc. on application as well as VR. The system also explores the different ways in which the contents can be put, in order to enhance the presentation.

1. Introduction

Augmented reality is all about enhancing our experience within the real world using digital information. The simple way to express AR is that when we see a target image with our own eyes it remains static, but the moment when viewed with a help of the smartphone running the suitable application, the image becomes alive. The particular application depends upon the image recognition system. The information captured by the device's camera is forwarded to the software so that it could be analysed. The software searches for the features to make sure that camera have been pointed at the target image properly. Once the application software matches the number of the features more than number set by the specified threshold value of the pre-trained template, the overlay of the graphics in any augmented form is done on the real image which have been fetched. The camera can be moved around in any orientation and pose which causes the looking at the target image from the number of angles, the information we see will also be adjusted accordingly. Because many of the AR application depend upon handheld devices, hence the hope is that, we will approach all the segments from education to entertainment through the applicability of AR.

Hence the AR will make the world very soon as an encyclopaedia, a tourist guide, instructor and repair manuals all in one. The AR and virtual reality combination[1] is as shown (M. Januszka, W. Moczulski).



Augmented reality assists to access the virtual images that overlay real objects of the physical world around us in real time [2]. The augmented reality has the following main features which enables us to understand the proper definition of AR:

- Augmented reality combines virtual and real objects
- Interaction in real time
- Registration of both the objects (real and virtual)

An AR system comprises of parameters like sensing the target image, targeting the image in reference to its surroundings current coordinates and displaying the final augmented image. Among all these tacking is the most demanding and challenging parameter[18] in the augmented

reality. Very authentic tracking system is needed for a augmented reality as a small inaccuracy can mismatch the alignment of virtual and real objects.

1.1 Augmented reality using smart-phones: With the development of smart-phones, mobile based application of augmented reality became more and more usefulness. The todays smartphones include GPS, camera and compass, that helps to catch the basic global positioning [3]

1.1.a Tracking methods: AR has enough sophisticated means of the implementation and designing ways that this technology can be used in number of sectors of the different industries to achieve the prevailing requirements, the tracking system needs to be highly accurate to track the target images[6][5]. We have different tracking methods for different types of the applications.

- Marker Based AR
- Mark-less Based AR

I. Marker Based AR:

This tracking method had been in existence augmented reality nearly a decade ago. This method is used to track the target images by some indubitable markers on the image. These markers can be QR code or some square boxes generally in black colour within the white box. These black squares are designed to bear the identity [7] of the marker to be recognised by the sensors. We can use different techniques to decode these markers so as to extract the information in augmented form. Some examples of marker based application in AR include Google goggles, Microsoft 2D tags and popcode [23]etc.

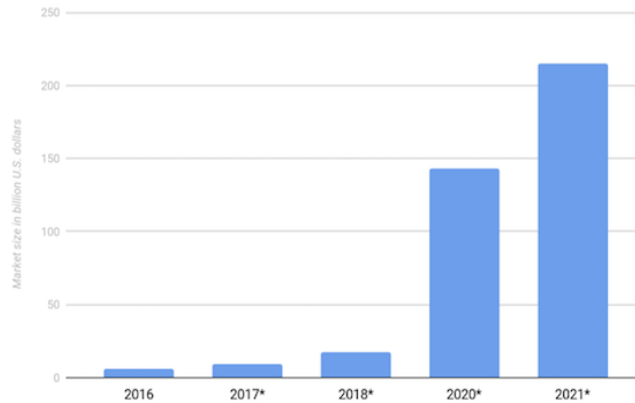
II. Marker-less Augmented Reality

With the advancement in hardware and software technologies a new method named marker-less method have been introduced in the field of AR to have the transition from QR /image to the system where no pre-knowledge of the target image is required. There may be some local administrative reasons or legal issues which does not allow us to paste any markers in the historical buildings or images. So, marker-less method overcomes these limitations and restrictions. This method makes use of the natural parameters of the surrounding environment and not the fiducially parameters. This method is implemented by using the built in feature of the smartphone like GPS and digital compass to locate the target

object and interact with resources of AR. Hence marker-less method when used in AR uses all or any part of the target for the placements of the virtual objects over the real objects.

According to a Statista forecast[31], the market of augmented and virtual reality is expected to reach the size of

\$215 billion in 2021. Being a rapidly enhancing market with great potential, AR attracts both huge corporations like Google, Apple, Facebook, etc., as well as smaller business sectors.



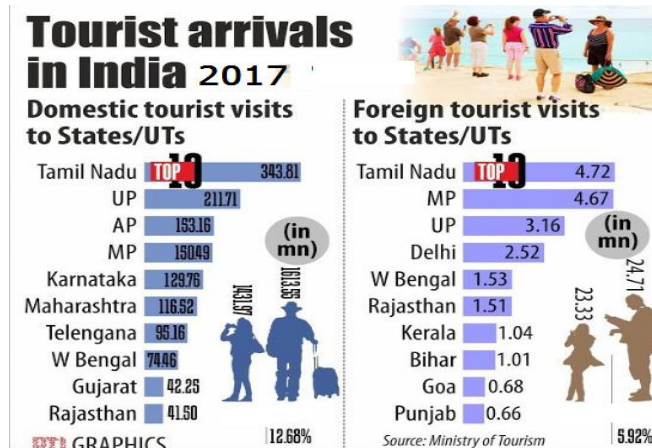
2. Applicability in Tourism:

For the tourism the augmented reality is a new concept. The main idea of this scheme is to explore the application aspects of the AR in tourism. There are many places in India which have very rich heritage, yet they are not properly explored because of lack in proper information to the tourists or pilgrims [14]. For example in Golden Temple Amritsar there are many points within the premises which are not known to the most of the visitors and they are deprived of such significant information that they should know about. Using AR the pilgrims will not skip any chance to know about the history of the underlined place. The aim of this proposal is to present an

overview of both research and application aspects of using augmented reality technologies in tourism.

2.1 India Tourism Statistics at a Glance

The statistics according to India tourism, 2017, released by the Ministry of Tourism along with Immigration Bureau, India has recorded 14.57 international arrivals in 2016, a 9.6% increase over 2015. The first six months of 2017, India welcomed 4.89 million foreign tourist arrivals recording 17.2% growth over the same time period in 2016. TravelBiz Monitor presents highlights [29]. Tourism in India generates approximately 8.4 million or 6.6 percentage of the nation's GDP. It supports 40.5 million jobs, 12.4 percentage of total employment.



Domestic and foreign tourists visits in Punjab (January-December, 2017)

Sr. NO	Year	Domestic	Foreign	Total
1	2009	53,69,995	1,10,404	54,80,399
2	2010	1,05,83,509	1,37,122	1,07,20,631
3	2011	1,64,16,638	1,50,958	1,65,67,596
4	2012	1,90,56,143	1,43,805	1,91,19,948
5	2013	2,13,40,888	2,04,074	2,15,44,962
6	2014	2,42,71,302	2,55,449	2,45,26,751
7	2015	2,57,96,361	2,42,367	2,60,38,728
8	2016	3,87,03,325	6,59,736	3,93,63,061
9	2017	4,02,93,352	11,08,635	4,14,01,987

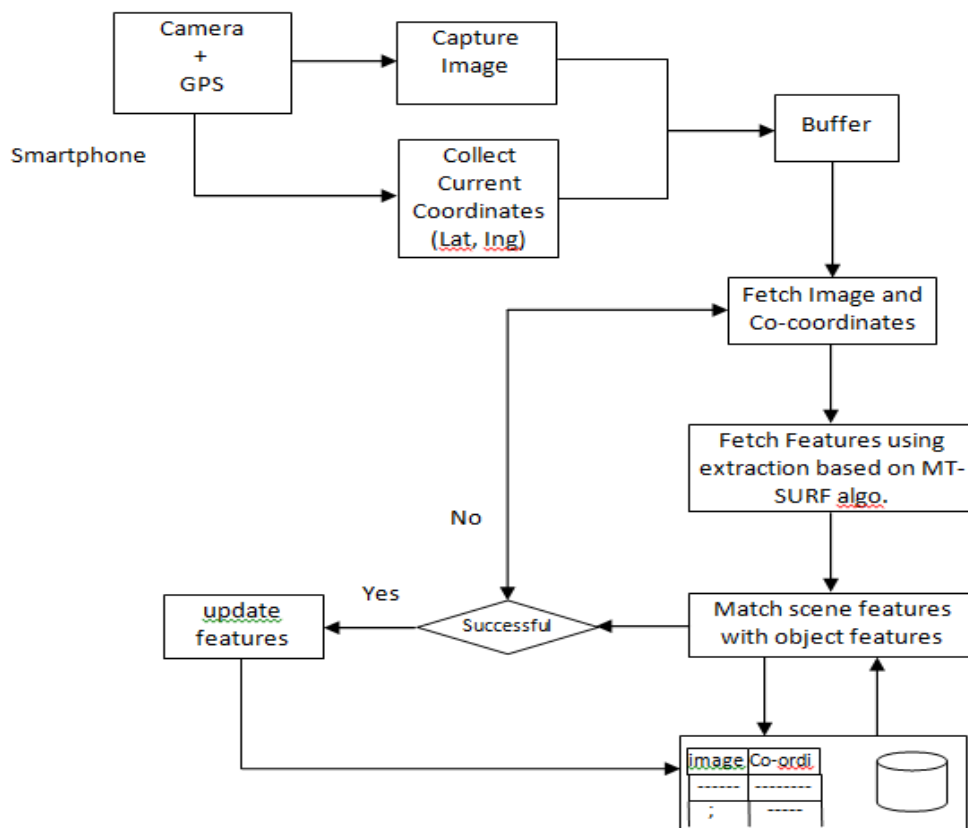
3. Proposed Methodology:

The system captures an image of the exhibit, analyses it on current coordinate's patterns, surmises the location and orientation of the camera, augments a virtual object generated by the computer on top of the real image and displays it on the screen. Augmented reality is very assisting technology to the travellers in many ways. There is one application platform that includes Information, navigation, education, tourism etc. The Travellers can use the augmented reality to choose their exhibits in the form of the any mode i.e. image, video or text. Our proposed system mainly contains two parts, online database building and online user tracking system using marker-less technique. We will be using the application development framework called Vuforia and integrate it with a building engine called unity 3D

3.1 Layout of proposed algorithm:

Input: Image, Threshold value
Output: Augmented object

- The feature extraction tables that includes image and corresponding current coordinates are maintained for all reference objects as the prerequisite. After loading all reference objects, we extract the features of these objects using the MT-SURF algorithm and save the extracted features in the extraction table for the future references.
- MT-SURF thread: The captured image is stored in a buffer ,the reference objects are not taken one by one, but instead multi threads will be generated in parallel to treat each reference object in parallel to extract the features
- The feature so far extracted will be compared in parallel to the pre-trained features for their similarities
- If similarities matches the track-thread will be activated and tacking algorithm executes
- Hence multiple threads will be executed each for feature extraction matching and tracking that makes the process fast.



4. Conclusion

Based on the literature review we found that there is lack of tourism platforms using AR. India, being a place with several tourist destinations backed by rich cultural heritage can attract

tourists from all over the world. For this purpose and to generate revenue and foreign exchange, technology driven approach is essential. With technology supporting interactive environment scaling is no more a challenge.

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