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A Survey on Real time Recognition and Augmented Reality for Restaurants Applications

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ABSTRACT: Augmented reality (AR) is a trending technology that superimposes an artificially and computer generated image on a user's view which consequently produces a multipart view. With this Technology the information and additional details of the milieu around the user becomes interactive and can be easily manipulated digitally. AR applications can be used in restaurants to provide an appealing and thought provoking presentation of dish to be ordered. Earlier, customer needed to ask the restaurant owner/support staff about the dish and its ingredients. Thus an AR application is designed to enhance customer experience in restaurants .The proposed system is implemented on an Android platform which provides the user to locate nearby restaurant and to view detailed description of a dish along with its image and nutrition. In this application a customer can get a brief information by simply scanning the text and also, images from advertisements. It also allows the user to give feedback regarding the dish.

KEYWORDS: Augmented Reality; Mobile Computing; Image Processing.

I. INTRODUCTION

Augmented reality is one of the highly embryonic topics in recent years. It is a technology that works on computer vision based recognition algorithms which augments sound, video, graphics and inputs obtained from sensors of real world objects using the camera of a device [1, 2]. It is one of the best ways to collect and render real world information and make it presentable in an interactive way which enables the virtual objects to become an essential part of the user's environment. Complete information of the surrounding environment and its adjacent objects is well shrouded on the real world. Thus an Extra-ordinary exhibition and visual manifestation of virtual objects is obtained by the users in a user friendly manner [3]. Augmented Reality has wide range of applications in this digital era which are mainly used in military, industrial, and medical applications. Moreover this technology has been further enhancedand been applied on a large scale in commercial as well as in the entertainment areas.

The goal of our system is to design and develop a robust Augmented Reality application which will provide customers an interactive experience in restaurants with augmented visualization of menu items and offer additional information, engaging and interacting with the customers .This will enable the customers to have an enhanced, interactive experience by retrieving or superimposing virtual information on menu-items which fancy the users interests or the items to which the user is completely unfamiliar with[4]. The use of new technologies makes it possible to offer the customers a personalized suggestion for ordering the dish which can be adapted by different age groups and interests. The user using the application can scan a text or image and can acquire complete information on the food he orders which includes obtaining brief description of the menu items, display of major ingredients of the items, stating the nutritional value of the items, mentioning the preparation methods. The text or images scanned by the user will undergo three optimal procedures

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a) Detection
In this process the text which is scanned from the menu is detected and also, images from advertisements
b) Recognition
This process takes the input from the detection phase and the text or image which is scanned is recognized by the algorithms used by the system
c) Rendering
The recognized text or image is matched with the database and the output is rendered and augmented on the user's mobile phone

II. RELATED WORK

Recognition and detection of text in video and images have gained a remarkable attention in the field of Image processing in wide range of computer vision applications. This process was much more challenging than simple recognition of text in plain background images. ChewLimTan[1]offered a work that would restore complete character Contours in videos or images from gray values. This is in contrast to the conventional techniques which considered edge images and binary information as inputs for recognition and detection of text
Zuo et al. [2] proposed a method implementing a multi-strategy used for tracking and detecting text in videos. Initially, a robust text detection approach was used for detecting text in each frame. This approach worked well for multilingual and multi-orientation text detection in scene images.
Roberto Frasca [3] developed a project in order to improve the visitor experience in museum and provided enjoyment of historical art. The project included an interactive device which allowed visitors to view some artworks along with their technical specifications. Touch applications were developed in C# language. The application used the Bluetooth Low Energy module integrated in the device to get geo-location information.
Changmin Lim [4] provided brief information on a spatial Augemented Reality system based on a projector and camera which provides a collaboration between the user's hands and the gestures based interface and mobile Augmented Reality. The proposed method used Kinect2. Largely the functionality of the system was estimating different poses of a somatic object with the help of a marker by means of an ARToolkit which was sported on the top of the object recoursed in mobile Augmented Reality.
An application was designed by ANDY S.Y. LAI [5] based on augmented reality in the educational field for publishing books, which aimed to bring interactive learning experience to life. In this system, they chose QualcommsVuforia Engine to develop the application.
WiradeeImrattanatrai [6] designed a mobile application"EduAR" , to provide educational uses on an android system. The EduAR system used FAST algorithm, FREAK algorithm, k-Nearest Neighbours algorithm and RANSAC method.
Satoshi Yonemoto[7] proposed a text detection method combined with image rectification.
Ashinshanie [8] developed a project to construct 3D models by using a series of 2D images.
An automated algorithm for text detection [9] was proposed for a mobile augmented reality based translation system. The system comprised of text detection, text recognition and translation of text which was displayed overlaid on the scene being captured from the real world.
A method which augmented paper documents along with electronic data was described by Jonathan J. Hull [10] and refrains from any alteration of the layout of document by any means. Paper based augmented reality project revealed that images including miniature blotches of text inhibit adequate information to brand them as unique and distinctive as a fingerprint.

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III. PROPOSED ALGORITHM

The proposed system is an augmented reality application for restaurants. The application will scan the names of dishes on the menu card and will augment it with images and description in the form of ingredients, nutritional value, etc. Another feature of the application is to provide customers with discounts on scanning advertisements of the restaurant. The application also gives the user a list of restaurants in the vicinity by accessing the user's location.

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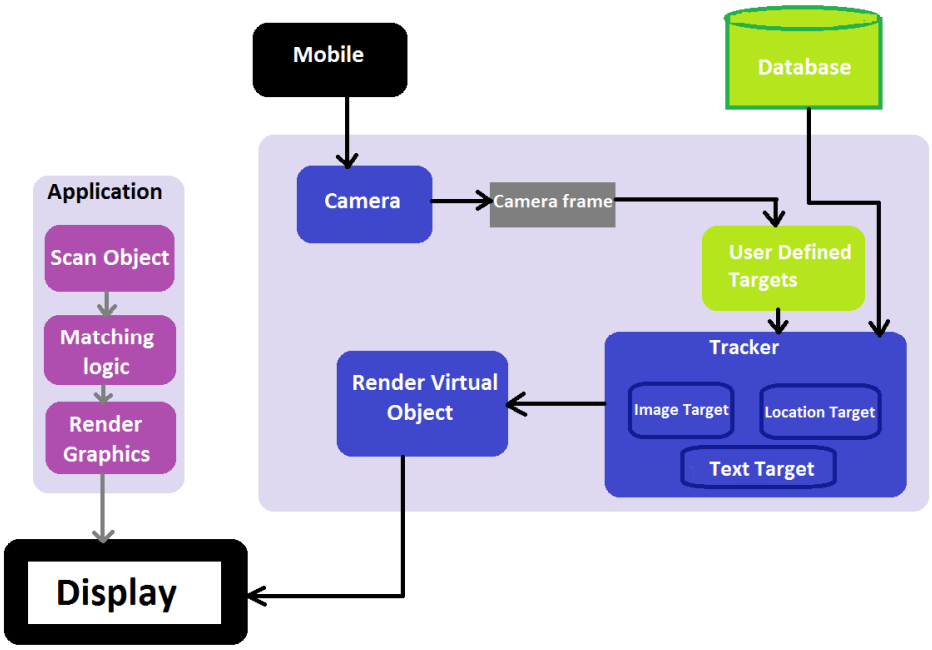

Fig.1. System Architecture

Fig. 1 shows an application containing the following components:

A. CAMERA MODULE

When the Application is launched, the camera module is invoked to serve the purpose of scanning the particular object. This module passes the camera frame to the user target for further processing. The user defined target is used to identify the type of target scanned i.e. image or text .Based on the output generated from the user defined target, the tracker module calls the respective target functions

B. TRACKER MODULE

The Tracker module is responsible for performing the following tasks:

- Text Detection

After scanning the names of the dishes on the menu card, a robust text detection algorithm called USTB_TexStar is used. The flow of the algorithm is shown in the figure below:

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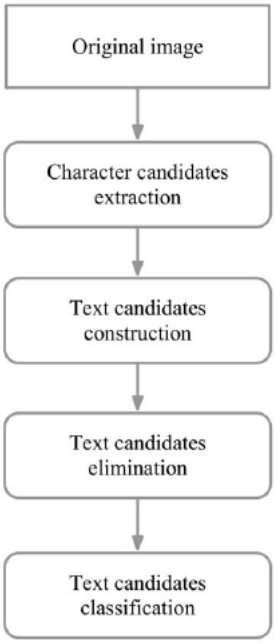

Fig. 2. Flow of the USTB_Texstar algorithm

The figure shows the stages of the algorithm which are as follows:
Stage 1: Character candidates extraction – The MSERs(Maximally Stable Extremal Regions) algorithm is used to extract character candidates. The MSERs pruning algorithm removes most of the repeating components. It does so by reducing regularized variations to a minimum.
Stage 2: Text candidates construction – A single-link clustering algorithm using distance weights and clustering threshold is used to cluster character candidates into text candidates.
Stage 3: Text candidates elimination – A character classifier is used to evaluate the posterior probabilities of text candidates corresponding to non-texts. The text candidates with high non-text probabilities are then eliminated.
Stage 4: Text candidates classification – In this stage, a text classifier is used to recognize those text candidates conforming to true texts.

- Image Recognition:

The system uses Scale Invariant Feature Transform (SIFT) algorithm for extracting features from images. These features are then matched with the SIFT feature database obtained from the training images and the required record is retrieved from the database.

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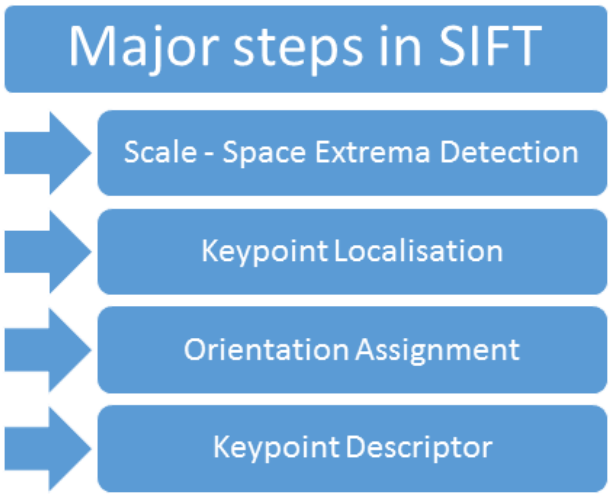

Fig.1.Steps in SIFT Algorithm

The steps involved in the SIFT algorithm are described as follows:
Step 1: Scale-space Extrema Detection – This step involves identification of the points of interest, termed as keypoints.The maxima or minima of the Difference of Gaussians (DoG)occuring at multiple scales are considered as keypoints.DoG is an algorithm for enhancing features that comprises the subtraction of two versions of images with varying blurredness.
Step 2: Keypoint Localization – The keypoints obtained from the first step need to be refined in order to get more accurate results. The points with low contrast are eliminated.
Step 3: Orientation Assignment – One or more orientations are assigned to each keypoint which helps in achieving rotational invariance.
Step 4: Keypoint Descriptor – A descriptor vector is computed in such a way that it is highly distinguishing. Every keypoint is assigned a descriptor.

- Locating nearby restaurants:

The location of the user is obtained through GPS (Global Positioning services). This location is then used to display a list of restaurants in the vicinity.

C. RENDERER MODULE

The aforementioned algorithms are used to fetch the required virtual image and description from the database, by querying the database to fetch the requested record. On obtaining the required image and description from the database, it has to be rendered in real time environment. Hence, the renderer module is invoked to give the user expected output in an augmented form.

IV. CONCLUSION AND FUTURE WORK

As Seen from the above survey and study we have found that there exists several approaches of the Food and Tourism Industry which have been attempted to attract customers and visitors with neoteric technologies such as augmented reality, Virtual Reality and social media. Though these technologies have not made a colossal impact in the area of Food industry, they provide an extensive range of opportunities and possibilities which would offer a customer new ways to interact in a restaurant ,personalize his/her experience in the restaurant ,share ones content and experience and enhance ones interaction with the social environment. Therefore it is one of the most promising prospective that foster the interaction of customers in restaurants, not only tourists but also local residents. The goal of this project is to provide the customers with one-of-a-kind interactive and informative experience and allow them all kinds of

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characteristic features they would wish for in the palm of their hand by concealing every single approach of granting suggestions and recommendation and a wide variety of information.

REFERENCES

1. Y. Wu, P. Shivakumara, T. Lu, C. L. Tan, M. Blumenstein, and G. H. Kumar, "Contour restoration of text components for recognition in video/scene images," in IEEE Transactions on Image Processing, 2016.
2. Z.-Y.Zuo, S.Tian ,W.yiPei ,and X.-C.Yin ,"Multi-strategy tracking based text detection in scenevideos,"in 2015 13th International Conference on Document Analysis and Recognition (ICDAR), 2015.
3. R. Frasca, A. Mazzeo, D. Pantile, M. Ventrella, and G. Verreschi, "Innovative systems for the enjoyment of pictorial works," in Digital Heritage, 2015.
4. C. Lim, J. Choi, and J. Park, "Interactive augmented reality system using projector-camera system and smart phone," in Consumer Electronics (ISCE), 2015 IEEE International Symposium, 2015.
5. A. S. Lai, C. Wong, and O. C. Lo, "Augmented reality for book publishing," in Business Engineering (ICEBE) 2015 IEEE 12th International Conference, 2015.
6. W. Imrattanatrai, C. Hanittinan, N. Tanachaihirunsiri, and N. Kamnoonwatana, "Real-time recognition and augmented reality for education," in Student Project Conference (ICT-ISPC) 2014 Third ICT International, 2014.
7. S. Yonemoto, "A method for text detection and rectification in real-world images," in Information Visualisation (IV) 2014 18th International Conference, 2014.
8. S. A. D. N. N. Ashinshanie, A. Hazari, H. N. Rupasinghe, D. P. Hettiarchchi, and D. I. D. Silva, " ," in Modelling Symposium (EMS), 2014 European, 2014.
9. M. Petter, V. Fragoso, M. Turk, and C. Baur, "Automatic text detection for mobile augmented reality translation," in Computer Vision Workshops (ICCV Workshops), 2011.
10. J. J. Hull, B. Erol, J. Graham, Q. Ke, H. Kishi, J. Moraleda, and D. G. V. Olst, "Paper based augmented reality," in Artificial Reality and Telexistence, 17th International Confere