Augmented Reality Application for Home Shopping in M-Commerce using Markerless Tracking

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Project Stage-II

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Outline

Introduction

- Augmented Reality is an interactive experience of a real-world environment whereby the objects that reside in the real-world are "augmented" by a computer-generated perceptual information.
- To track an object in AR we use
  - Marker based Tracking
  - Marker-less Tracking
- Why Marker-less Tracking ?

Problem Statement

- The hypothesis is to build an augmented reality application having the capability of showing virtual images of the products in the real world while shopping online using Marker-less Tracking through Vuforia SDK which uses QCAR algorithm for object detection and feature extraction.

Objectives and Scope

- To provide virtual view of the products
- To provide rendering of the view in all directions
- Not causing any hindrances when user changes the camera view
- Provide the application for all types of devices

Literature Survey

Sr. No	Title of Paper	Author	Publications	Summary of Paper
1	Application and scope analysis of Augmented Reality in marketing using image processing technique	Shivnarayan Rajappa, Gaurav Raj	2016 6th International Conference - Cloud System and Big Data Engineering (Confluence), Noida, India, 14-15 Jan. 2016.	The main aim of the research paper is to understand the concept and applications of AR and the process of creation of an AR image, the hardware and software requirements for the process of making such an image.
2	New augmented reality application in E-commerce and M-commerce	Mustafa Atalar, Mahamut Ozcan	2017 International Conference on Computer Science and Engineering (UBMK), Antalya, Turkey, 5-8 Oct. 2017.	In this paper, the authors introduced new AR application platform, called as Lify.
3	Superimposing 3D Virtual Objects using Marker-less Tracking	Sang-Woong Lee, Seong-Whaan Lee, Sand-Cheol Park	18th International Conference on Pattern Recognition (ICPR'06), Hong Kong, China, 20-24 Aug. 2006.	The paper shows that the rectangular objects in 3D real world are projected the perspective quadrangle onto image plane through camera.
4.	Augmented Reality in E-commerce with Marker-less Tracking	Xinyu Li ,Dongyi Chen	2010 2nd IEEE International Conference on Information Management and Engineering, 16-18 April 2010.	This paper proposes an approach to feature point correspondence of image sequence based on transient chaotic neural networks.

Table 1:-Literature Survey

Architectural Diagram
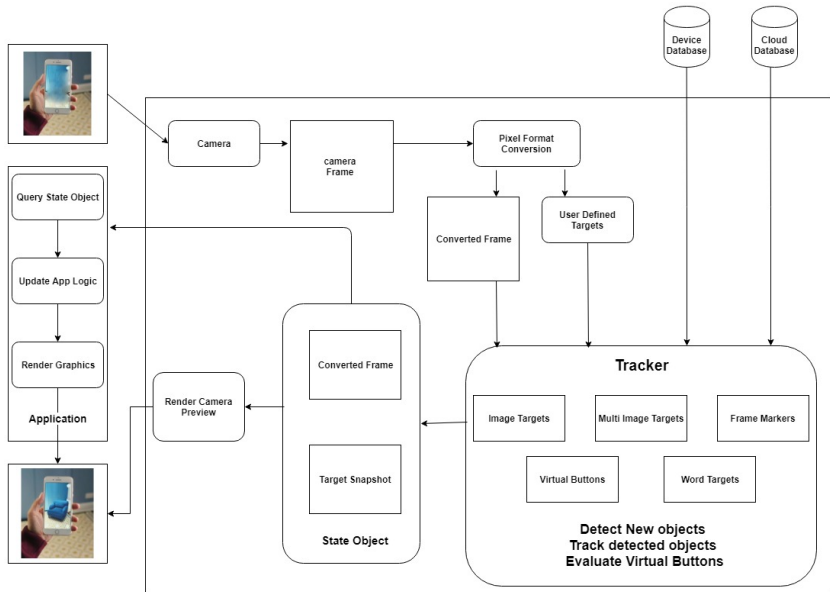
Algorithmic Approach(1/2)

- On opening the application, get a view of the environment using mobile phone's camera.
- Convert each Frame in Pixel Format.
- Detect new Objects in these converted frames (called as User-Defined Targets).
- The algorithm compares User-Defined Targets with objects stored in target resource database.

Algorithmic approach(2/2)

- Using QCAR algorithm, feature matching is done which considers the targets through various perspective including scaling, rotations, illuminations, etc.
- The distance calculations from users viewpoint is done based on z-scale.
- Render the camera view and 3D Models in the application and show the final converted frame on the application window.

System Specifications (1/2)

The Software Requirements of the system are:-

Sr.no	Software	Description
1	Operating System	Windows 7 and above
2	Language Used For Implementation	C#
3	Development Environment	Unity 2018+
4	SDK	Vuforia

Table: 5.Software Requirements

System Specifications (2/2)

The Hardware Requirements of the Android and iOS devices should be:-

Sr.no	Hardware	Android	iOS
1	RAM	2GB and above	2GB and above
2	Version	6 and above	9 and above
3	Processor	Quadcore	Dualcore
4	Sensors	IMU with gyroscope sensors	IMU with gyroscope sensors

Table: 6.Hardware Requirements

Input / Dataset

- The dataset is downloaded from website:-
  https://www.turbosquid.com/Search/3D-Models/free
  https://free3d.com/3d-models/
  https://archive3d.net/
- The data is in 3ds , obj format
- The models are of size 3-10 mb approximately.

Result(1/3)

The ground plane of the environment is the available space where the object will be placed. This space is calculated by the following formula.

$$FreeSpace = TotalSpace - OccupiedSpace$$

For example : Consider the following scenario.
Total space 1000 sq.ft
Space occupied by objects in the environment is as follows :

1. Chair : 30 sq. ft.
2. Shelf : 200 sq. ft.
3. Pouf : 20 sq. ft.

Free Space = Total Space (1000) - Occupied Space (30 + 200 + 20)
Free Space = 750 sq. ft.
If the user wants to fit a bed, then according to the calculations the available space is enough.
Size of bed : 300 sq. ft.
By placing the product in various places in the available environment, the user will get an idea of how much free space will remain to walk through.

Figure: 3.1 Model-sofa

Conclusion

- The application working on Marker-based tracking uses QR code for tracking an object.The QR code is placed in the environment where the user wishes to view the model. The application recognizes the code and then place the object on the code only. Carrying the code every time is not possible for the user.

- Hence, this application uses Marker-less Tracking for tracking of virtual objects.As in Marker-based Tracking the system recognizes the code to track the module, in the Marker-less Tracking the objects are tracked using QCAR algorithm of Tracker module. In this case, no such QR ode is required.

Papers Published and Participation in Project Competition

- Paper Published : Augmented Reality Application for Home Shopping in M-Commerce using Markerless Tracking,"International Journal of Applied Evolutionary Computation , Vol. 10 (3) , 2019".
- Conference attended : International Conference on Smart Computer Applications and Innovations (ICSCAI 2018) .
- Project Competition : "Concepts - InterCollege Project Competition", "Pune Institute of Computer Technology".

References I

[1] Young-geun Kim and Won-jung Kim, "Implementation of Augmented Reality System for Smartphone Advertisements", *International Journal of Multimedia and Ubiquitous Engineering,Vol.9, No.2 (2014)*, pp.385-392, 1955.

[2] Xinyu Li,Dongyi Chen, "Augmented Reality in E-commerce with Markerless Tracking", *2010 2nd IEEE International Conference on Information Management and Engineering.*

[3] Mustafa Atalar and Mahmut Özcan, "New Augmented Reality Application in E-Commerce and M-Commerce" in *2017 International Conference on Computer Science and Engineering (UBMK).*

[4] Shivnarayan Rajappa and Gaurav Raj, "Application and Scope Analysis of Augmented Reality in Marketing using Image Processing Technique", *2016 6th International Conference - Cloud System and Big Data Engineering (Confluence).*

[5] Cheng Xiao and Zhang Lifeng, "Implementation of Mobile Augmented Reality Based on Vuforia and Rawajali", *2014 IEEE 5th International Conference on Software Engineering and Service Science.*

[6] Dennise Adrianto , Monica Hidajat and Violitta Yesmaya, "Augmented Reality Using Vuforia for Marketing Residence", *2016 1st International Conference on Game, Game Art, and Gamification (ICGGAG).*

[7] Sang-Woong Lee, Seong-Whaan Lee, Sand-Cheol Park,"Superimposing 3D Virtual Objects using Markerless Tracking", *18th International Conference on Pattern Recognition (ICPR'06), Hong Kong, China, 20-24 Aug. 2006.*