Reaug an Implemented Augmented Reality enabled Scanner for Restaurants

Divakar Harekal, Veena G.S., Ankit Goyal, Rahul Sinha

Abstract—In our research paper with the use of a well-executed augmented reality (AR) marker in which we are using the combined properties of QR code and AR to scan the QR code associated with the particular restaurant menu. Scanning will result in obtaining of 3-D images of all the dishes present in that restaurant along with the dish details like health constituents, servings, how a particular dish tastes like and many more details associated with that dish. In this way we are elevating the dine-in experience by removing the traditional menu ordering process. It is directed at eliminating the discomfort customers are facing due to food and language gaps. Visual representation of food will give unique experience and due to this wide range of customers will prefer to come to restaurants. So overall it will revolutionize the conventional ordering system which is followed in the restaurants.

Keywords: Reaug Overview, Augmented Reality, AI Scanner, Fast Scan AI Techniques.

I. Introduction

We have made an augmented reality-based app in which we are embedding the features of augmented reality in QR code so that customers can enjoy the 3-D images of dishes. Earlier QR codes were only used to store web address information and website links. They were also not very stable and they need to be scanned from very close to fetch the information but after the introduction of AR in QR code, we have removed all of these limitations. Now AR based codes can be scanned from any angle and from more distance. We are using some AR-based algorithms to improve the scanning of QR codes. The traditional algorithm which was used in the QR code was a Reed-Solomon algorithm.

II. Literature Survey

Overview of Mobile Augmented Reality (MAR)

Due to the recent developments in telecommunication industry there is a drastic change in mobile phones technology. Nowadays smartphones can do all the tasks which modern computers can perform. Recently Augmented Reality has come into picture which will give the essence of virtual environment over real one. In order to design AR apps specific information is needed [1].

Three main features of AR are:

- It combines real and virtual environment.
- They can work in real time also.
- They also provide 3D experience to the users.

There are various limitations in using of AR for mobile phones. So, to overcome all these difficulties we have introduced AR code to develop AR applications for mobile industry [2].

Augmented reality in QR code

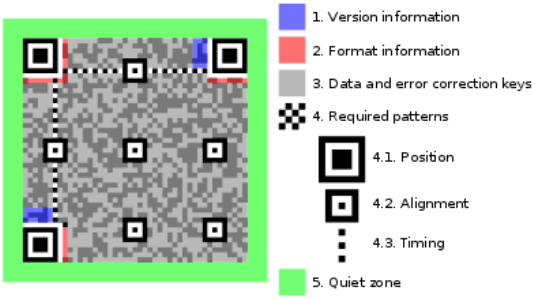

Fig 1.1: Augmented Reality using QR Code

QR code is the trademark for the two-dimensional Barcode which was first designed in japan in 1994. Four popular encoding schemes are used in QR code namely numeric, kanji, alphanumeric and byte/binary to store data accordingly. Extensions can also be used for more details. The background of QR code is white in color in which black squares are arranged in the form of square grid. Imaging and processing in QR code can be done by imaging device such as camera and Reed-Solomon algorithm respectively until the information is clearly processed from QR code.

Initially QR codes were based on deterministic algorithms but with the introduction of Augmented Reality probabilistic algorithms came into existence. They were able to interpret the results more efficiently as compared to the traditional QR codes. Integration of AR in QR code will give more clear and realistic contents.

Secondly, AR code is self-contained, so it means majority of the information can be retrieved by decoding the AR code itself [3].

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Types of Metadata in AR code

Once AR code data for MAR is defined, people can run AR based applications on their cellphones with the help of AR reader applications. Various categories of Metadata in AR code are:

- Code Metadata: It contains the basic information about AR code. This information is related to the real view of AR.
- Content Metadata: This is the second type of metadata which contains the virtual information which has to be augmented.
- Tracking Metadata: This contains the information related to the tracking aspects of AR and it helps in tracking of AR code [4].

Tracking Metadata

This type of Metadata contains the useful tracking information which can be used to decode reliable and faster tracking after AR code has been detected by the scanner. This metadata reveals about the third property of AR by relating how to track and where to track for optimum results. Various fields like multiple tracking, ROI region method, ROI type are considered to target specific region and to reduce the number of computations required for the tracking process. This type of Metadata is especially important in registration tracking and detection procedure of MAR, since AR code is used for different purposes like logos, pictures, app logins, and website links etc. [7]

Content Metadata

Content Metadata contain simple text or it can contain various types of information in the form of video or images downloaded from the URL decoded in AR code data. Various fields in content Metadata are text, scale, position, content URL and content type. Text determines the text which has to be encoded in the code. Basically scale is used for adjusting the size of content, position specifies the relative position of augmented content with respect to the absolute coordinates. Content URL specifies from where the Augmented Reality application has to be downloaded and content type gives the type of content to be augmented [5].

Code Metadata

Code Metadata comprises information which determines AR code used for mobile augmented reality applications. It contains the real physical information about the AR code. This type of Metadata comprises of various fields like author of AR code, AR code ID and particular characteristics of AR code namely AR code flag, AR code length and position marker length. The author field and ID identifies each AR code and lengths of AR code make it simpler for MAR applications to detect and track the code. [6]

III. Proposed Methodology

The idea to improve QR code decoding is by increasing the recognizable characteristic of the tracker. In the current system, we just have three dots on the three corners of the QR Code that sets the origin for the Decoder to decode the QR Code.

Our proposed methodology is to increase the recognisability from just three dots to one high track able unit. This will also help us to remove the need of the Quiet Zone in the existing tracking system.

IV. System Overview

The idea behind the Improvisation includes -

Use the Probabilistic methods to first detect the positioning of the tracker. Once the tracker location and orientation in the space are known we clip out the Image from the Data and Error Collection Area. Now, since the orientation is already known theimage can now be easily skewed and made into a perfect square.

The requirements for this Implementation -

1. Augmented Reality APIs. (We will be using the proprietary Vuforia image library to efficiently get the orientation and distance of the enhanced QR Code)
2. Image processing library to clip out the required texture to be scanned for QR code. (We are using Unity In-built library for the same)
3. Any platform which can support both of the above-needed requirements. (We are using Unity Engine for the same)

V. Benefits

- QR Codes can now be scanned from a distance thrice as distant when compared to normal QR Codes.
- The issues like lack of the quiet region making the object recognition would be totally gone.
- Since, we are using Probabilistic approach, now any small obstruction would still not affect the scanning unless the obstruction is in the actual content area.
- Make your personalized business QR Code that is different from anyone else's QR Code. Hence have a unique business presence.
- Have a feedback system for a user, when they are looking too inclined at your REAUG Code.
- We can make the Scanner image smaller than the traditional QR Scan image.

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VI. IMPLEMENTATION

Let's go step by step towards the process of how we can design a perfect QR Code Tracker which are capable to get the correct code even when scanned from a far off distance.

- Design a perfect track able Image for our AR Apis.
- Mark a region where you will be having the actual QR Code content.

Best Practice for designing a perfect Track able Image

- The image should be rich in details.
- The image should contain a lot of change in contrasts (what we call as features).

Example-

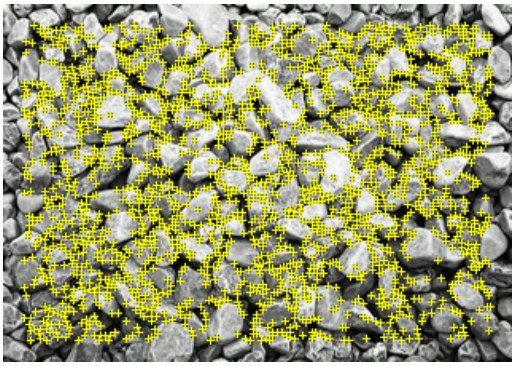

Fig 1.2: An object tracking demonstration

- The image should not have a lot of repetitions Example (This Image contains a lot of repetition so it has a really bad tracking) -

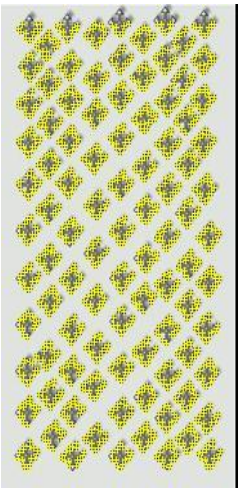

Fig 1.3: Image with repetitions of pattern

An example tracker used is this -

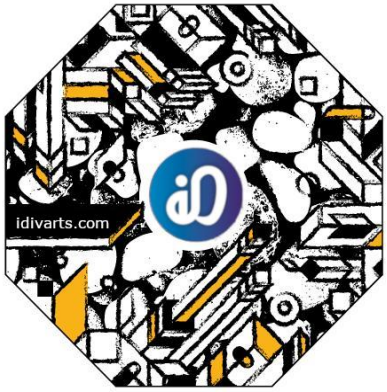

Fig 1.4: Tracker example for tracking image objects

This tracker suffices all the three needs for the best track ability.

The next challenge is to select a place to place the actual QR Content. This is a call that can be taken up by the business. Like, in this case, we used a placeholder mobile in the middle to hold the actual QR Code.

Fig 1.5: Scanning Image QR with mobile device

VII. RESULTS

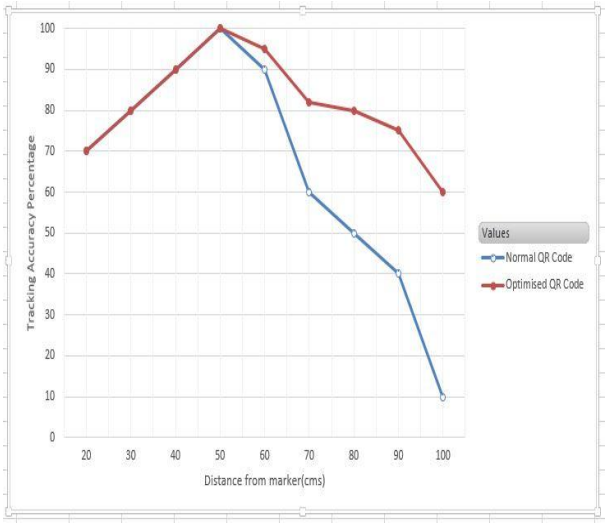

Fig 1.6: Result Graphs

From above line chart we can interpret that till 50 cm from the marker both

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give same results but after this point the tracking accuracy of normal QR code decreased drastically as compared to the optimized QR code which is developed with the help of Augmented Reality approach. Also in optimized QR code the tracking can be done at various angles but normal QR code can be scanned properly at very few angles. So in this way we are improving the tracking quality of QR code by embedding AR features in QR code.

VIII. CONCLUSION

The Idea can be really useful in increasing user interaction. We all have faced a time when you try to scan the Paytm Code to pay someone, but we are unable to get the actual pay link due to various reasons like we are not able to scan the code from an correct angle or the Paytm code is kept at an distance. This can be a really useful resource for such companies that have their business depends on these kinds of informatic images (QR Code).

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