

Sticky Notes through Augmented Reality

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Abstract - Sticky notes helps us to manage our to-do lists, tag our objects and documents and capture short reminders or information that we may need in the near future. We can also digitalize these sticky notes. This technique will add comfort and give luxurious effect to the users. Sticky notes can be digitalized through Augmented Reality concept. This application will allow users to interact with real world objects. This system is based on Augmented Reality in which we will map real world objects with digital content to implement sticky notes. Augmented Reality combines a live view of a real world environment with computer-generated virtual content. This system uses ORB algorithm to extract the image feature points and feature descriptors. This helps to obtain the image registration information by improved Homography matrix.

Key Words: Augmented Reality, OpenCV, ORB, Homography

1. INTRODUCTION

Augmented reality is the extension of virtual reality which combines the computer-generated virtual objects with the real world environment and makes interaction between them. Augmented Reality can be implemented to solve problems in various domains. In many contexts, AR system is one of the most suitable solution. With AR, the digital world comes to live inside the view captured by our tablet or phone camera.

Input the real world image captured by the camera to the computer, then combine the image with the virtual scene seamlessly, finally output the result to the computer screen.

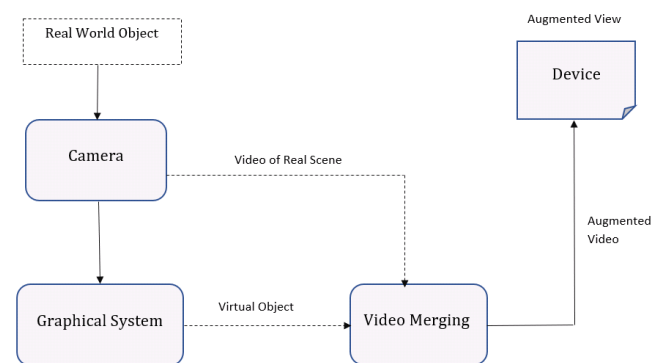


Fig. 1. Working of Augmented Reality

2. LITERATURE SURVEY

There are wide variety of applications found in the field of Augmented Reality. In our paper, we have proposed a system based on augmented reality to digitalize sticky notes.

Mistry in [1] proposed concept based on quickies which uses RFID tags to implement sticky notes. But this technique requires user to scribble on a sticky note and paste it on real world object. It then converts this hand-written text to digital text.

P.Pirarthani and S.Murugan in [2] has implemented concept of sticky notes using cloud. Sticky notes are saved on clouds and are synchronized by users on their device. These notes can be shared between the devices. It can be accessed from cloud regardless of user location.

Rutuja Kakade et al in [3] has proposed data hiding technique through QRcode. Quick Response(QR) code is a 2D matrix which is capable of storing large volume of unique data. Data is added in QR code for the ease of access of sending information. On scanning the QR code

present on the object, its details are popped up on screen.

Amanda E. Lackeyin et al in [4] presents a Notes-app which allows to write notes for routine work and also let the users to create provision list, films to be watched, books interested to read etc. It also provides facilities to email notes to others and tends more flexible with I-pod touch.

Taehee and Hollerer in [5] has proposed a survey on marker-less augmented reality. They have used a hybrid tracking method which extracts SIFT features to track real world objects. They achieved real-time performance by only extracting and matching SIFT features. They also performed scene recognition by recognizing previously recorded SIFT features.

4. IMPLEMENTATION

1. We will be having set of reference images in our system.

2. We will use these reference images to map with the real world objects and display the corresponding note once the object is recognized.

3. As per the real world video image taken by the user, system will identify the target object in real world using ORB's Algorithm and thereby, will superimpose corresponding note on target object.

5. MATHEMATICAL MODEL

$$M = \{Q, \Sigma, F\}$$

$$Q = q_0, q_1, q_2, q_3, q_4$$

q_0 = Mount Camera

q_1 = Capture Image and Add Note

q_2 = Map real world object with reference image

q_4 = Displaying corresponding note

Input for q_1 state = {image, note}

Input for q_2 state = {image}

Output = {note}

6. ALGORITHM

ORB Algorithm

Oriented FAST and rotated BRIEF (ORB)[5] builds on the well-known FAST keypoint detector and the BRIEF descriptor. Both of these techniques are useful because of their good performance and low cost. It is efficient alternative to SURF and SIFT algorithms as SURF and SIFT are patented and ORB is open source. The ORB descriptor is used to describe the feature points to generate a rotation invariant binary descriptor.

We extract the feature point and feature descriptors of the reference images and video image respectively. Then we can complete the feature matching by feature similarity measure and eliminate the error matching through the corresponding relationship of the characteristics and space mapping relationship. Finally we use the proposed registration method for homography matrix to realize accurate positioning.

Feature Extraction

This step consists of extracting useful features from reference image and target image. These features can be later used to find the reference object in target image.

Feature Description

A descriptor provides a representation of the information given by a feature and its surroundings. This step obtains a measure of how similar two detected features are, when being compared. Once the descriptors have been computed the object to be recognized can then be abstracted to a feature vector, which is a vector that contains the descriptors of the keypoints found in the image with the reference object.

Feature Matching

After feature extraction and feature description we will have features of both the object and the scene where the object is to be found. Now in this step, we look for matches between them. Feature matching can be done by taking the descriptor of each feature in the first set, compute the distance to all the descriptors in the second set and return the closest one as the best match.

Homography Estimation

After identifying the reference surface in the current frame and having a set of valid matches we can estimate the homography between both the images. A Homography[6] is a transformation (a 3x3 matrix) that maps the points in one image to the corresponding points in the other image.



Fig. 2. Homography Estimation

7. CONCLUSION

This paper presents ORB algorithm to implement image matching in real world. ORB is faster than SIFT and SURF. It is open source algorithm. Since ORB is rotation invariant, it is efficient to use. As per the real world video image taken by the user, system will identify the target object in real world using ORB's Algorithm and will display its corresponding note.

8. REFERENCES

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