

Dynamic Screen Object Detection Scheme for Non-Planar Interactive Digital Signage System

Jongbin Park, Jungeol Chun, Jae-Won Moon, Tae-Beom Lim, and Myung-Hyun Yoon
Korea Electronics Technology Institute
Seoul, South Korea
[e-mail: jpark@keti.re.kr]
*Corresponding author: Jongbin Park

Abstract

The digital signage system can be made in various display devices such as LCD, LED and projector to display the contents. Among them, the projector-based systems have an advantage of using arbitrary shaped surface as a signage screen. However, the screen area was usually defined previously in the content creation step. Although the manually defining screen shape could provide higher mapping quality, it is very time-consuming and costly process. If the position of the projector is changed, screen mapping process must be carried out again. In this paper, we present a dynamic screen object detection scheme for non-planar interactive digital signage system. Our proposed system focuses on dynamically detecting quadrangles for screen area.

Keywords: Dynamic Contents Mapping, Non-Planar Screen, Digital Signage

1. Introduction

The digital signage is a form of signage. In recent years, digital signage system is gradually extended to rich multimedia service framework, which uses many digital technologies and is useful to play contents for exhibitions, indoor/outdoor advertisement and the like. Thus, digital signage can be found in many places such as museums, retail stores, hotels, restaurants [1].

These system can be made in various display devices such as LCD, LED, or projector to display contents. Among them, the projector-based systems have an advantage of using arbitrary shaped surface as a signage screen [1].

However, the screen area was usually defined manually in the contents creation step. Although the manual method is providing a higher mapping quality, it is a very time-consuming and costly process. If the position of projector is changed, then a screen mapping process must be carried out again.

To reduce these difficulties, in this paper, we present a dynamic screen object detection scheme for non-planar interactive digital signage system. Specifically, our proposed system focuses on dynamically detecting quadrangles for screen area.

This work was supported by ICT R&D program of MSIP/IITP. [B0717-16-0019, Development of Digilog Signage System on Non-planar Screen]

2. Proposed Implementation

Our proposed system mainly consists of projector, screen and camera for digital signage system. Fig. 1 shows the testing environment. Various media resources and contents are played on the screen. The media contents are allocated in local area. Image processing is performed to extract the edge of the screen object as in Fig. 2. In our proposed method, many polygon objects are extracted from the captured image. Among these polygons, our system only selects the square polygon objects. Fig. 3 shows the content warping process for the projection. Fig. 4 shows the projected image on the screen. The proposed dynamic screen object detection module provides RESTful APIs for communicating with other applications.

The proposed system was implemented using the *C++* and *Python* with the *Open Frameworks* [2]. Image processing algorithms were implemented using *OpenCV* open-source library [3]. *XML* is used for configuration setting. Contents sharing is implemented by *Syphon* open-source library [4].

3. Conclusions

In this paper, we presented a dynamic screen object detection scheme for non-planar interactive digital signage system. Our proposed system focused on dynamically detecting quadrangles for screen area.

References

[1] F. Dupin, "Digital signage: the right information in all the right places", ITU-T Technology Watch Report, Nov. 2011.

[2] *Openframeworks software platform*, Available: http://openframeworks.cc/

[3] *OpenCV image processing library*, Available: http://opencv.org/

[4] *Syphon Library*, Available: http://syphon.v002.info/

Fig.1. Test screen

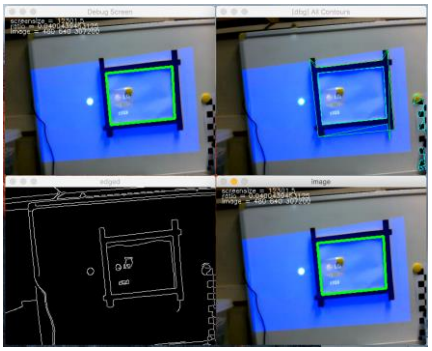

Fig.2. Screen object detection

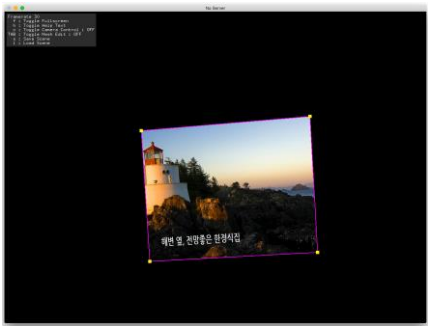

Fig.3. Content warping on the screen coordinate

Fig.4. Contents mapping result on the detected screen object