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Interaction, extraction and analyses of consumer reviews: A novel e-billboard system

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ABSTRACT

With the growth of Internet and electronic devices, the position of multimedia advertisement is getting more and more important. Our research aimed to combine this new technology with a web page to design a novel interactive e-billboard system which can collect consumer emotions. We developed an interactive e-billboard based on Kinect motion sensing camera. The system provides a friendly user interface for users and improves the exposure rate and quality of advertisement with a two-way interactive communication. The back-end system captures consumer emotions actively. The data collected will be used as a reference for the follow-up marketing strategy analysis.

1. Introduction

Due to the prevailing of capitalism, competition of opponents becomes fiercer. In addition, because of the popularity of science technology, the proliferation of new media technologies has made them an indispensable part of people's lives. (Wei and Leung, 1998; Hsu, 2015a) Advertisers can use a lot of new media and advanced technologies to stay close to consumers' lives to increase their own sales volumes. Advertising plays an important role in modern free markets. Thus, personalized advertisement is currently considered as a hot topic in product promotion. (Athanasiadis and Mitropoulos, 2010; Hsu, 2015b, 2017b) It becomes a very important issue for various organizations to make good use of advertising. The advertisements now are only offered by marketers, and it is difficult to realize consumers' reactions. In order to make information flow in both directions, marketers can design an interactive advertisement as a bridge for consumers and marketers. The advertisement is just like a game and has a great presence. (Bellman et al., 2014; Hsu, 2017a) The digital interactive advertisements set on the streets, in the shop windows or in the department stores make consumers feel like playing video games. They can directly participate in the advertisement. It can make a two-direction flow between marketers and consumers (Hsu, 2010). New media, such as the Internet or interactive digital television, often combine different sensory inputs and different types of media content simultaneously. (Cauberghe et al., 2010; Hsu, 2017d) Image recognition technologies and motion sensing technologies now are used widely in many fields. Our research submits a new technology combining motion sensors. We use sensing technologies as sensory inputs with dynamic webpages to develop an interactive e-billboard system which has cross-platform databases. The collecting data of consumers' emotions can be used as a reference when making marketing strategies.

We separate our system into front-end system and back-end system. The dataflow diagram is shown in Fig. 1. Compared with

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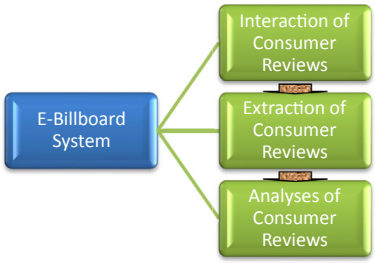

Fig. 1. Dataflow diagram.

conventional three-dimensional (3D) motion capture systems, Kinect has advantages of cost merit, easy system development and operation. (Hsu et al., 2012; Yamaoka et al., 2013) Therefore, we use Kinect as a focus in our front-end-system. It can not only increase the recognition rate, but also avoid the noises appeared in traditional RGB image processing. We can get three kinds of information such as colorful images, 3D depth images and voices. It also has tracking functionality, which means that Kinect sensor's motorized pivot will keep users in frame even as they move around. In addition, its software development kit (SDK) provides required environments and technologies that we need when developing and it also supports the open platform, Visual Studio (Hsu, 2015c). We establish a billboard platform which lets users to manipulate it with their hands. We hope to observe consumers' subconscious actions, facial expressions, or interaction synchronously. For instance, nodding represents agreement, skipping advertisements represents being disinterested, and scanning quick response (QR) code represents willing to purchase (Hsu, 2013). It captures consumers' perceptions when watching advertisements and we can use the information as a reference when designing the contents of advertisements and expecting sales volumes of products.

The front-end system focuses on the benefit of digits combining interactivity. New tendencies in digital marketing are focusing on added interactivity. (Hsu, 2012; Oliveira et al., 2014) Different from general digital signage or print advertisements, we can get consumers' preference degrees via the interactivity and consumers can also obtain more detailed information. Combine technologies with playfulness and people's curiosities to deepen consumers' impressions. In terms of motion sensing, different from touch screens, consumers can manipulate it at the remote end even if they are standing outside of glass or shop windows. If the shop is closing, consumers also can use it. It not only successfully makes propagandas but also makes the benefit of advertising getting larger. Sometimes it attracts onlookers, which can connect people's curiosities and childlike innocence to increase the appeals and visibilities of advertisements. The major difference between physical and digital advertisements is that digital one can propagandize many products as the physical one can only do a little. It decreases the costs of material objects and increases the number of products propagandas (Hsu, 2011, 2017f).

We create a database in the back-end system and use SQL Server to create cross-platform data which stores consumers' feedbacks and companies' information. Companies can upload or update the information about their products or special offers via the Web-base system, which is created with ASP.NET language, to simplify marketing process (Hsu, 2016). In addition, the Web-Base system also provides companies to search for the feedbacks of their advertisements. The information will be used as a parameter when making marketing strategies. Continuing advances in database management and communication technologies have greatly accelerated the ability of marketing to become more direct, highly focused, and increasingly interactive. (Csikosova et al., 2014; Hsu, 2018) By means of the high skilled analyzing ability of the back-end database system, companies are able to combine it with the statistical results of the front-end interactive e-billboard to understand consumers' preferences. However, studies on consumer psychology have indicated that consumer preferences are often unstable and developed over time. (Kwon et al., 2009; Hsu, 2017c,e) Therefore, via database and Web-Base system, companies can immediately submit the most appropriate marketing strategies to make it more concentrated and straighter for them to gain more benefits.

The remainder of this study is described as follows. In this section, we are discussing the motivation and the future goals of this research. Section 2 introduces related works. Section 3 discusses the implementation of the whole system, from developing, designing to creating. Section 4 is conclusion of the search and describe the effects of each aspect.

2. Objective

With the interactive function of the somatosensory detection device, the performance of the dynamic website and the convenience of the cross-platform database, we build an interactive e-billboard system. Consumers can use gestures to manipulate the interface of e-billboard system; companies can also store the information of consumers' actions into back end database where they can read the data and produce analytic graphics as a reference for companies to make strategies.

3. Motivation

Advertising provides incentives to attract consumers to buy products. Advertising serves the company as a medium of communication. The marketers can penetrate the untapped market. (Adhikary, 2014) Advertising lets consumers understand lots of information like usages, innovations, advantages and prices that they are interested in. It also explains about why their product is

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