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An Effective Method to Provide Shopping Information in Mobile Environments

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Abstract

Online shopping trend has evolved into a mobile environment due to the proliferation of smart devices. As a result, many online shopping malls are being updated and created to respond to the mobile environment. This paper deals with the framework for an effective cyber mart management and stimuli methods for consumer spending in mobile environments. The framework for the cyber mart systems adopts the MVC architecture in order to provide a virtual reality experience by applying game elements. Additionally it maintains a module that maps the shelves and goods for customers to shop in the virtual environment of the mart. And it provides a statistics system that extracts useful sales strategies using consumer order information. The framework makes use of advertisements, flyers, and time-marketing via PUSH notification methods to stimulate consumption in mobile environments. The proposed methods can contribute to the promotion of a variety of goods in online.

Keywords: *Online Shopping, Mobile Internet, Multi-platform, Game-based, Virtual Environment.*

1. Introduction

Due to the development of new mobile communication technology and the advent of smart phones we were able to access the Internet without restriction on time and place. Because of the ease of Internet access, our lives are being transformed into a form optimized for the Internet. We are more likely to connect to the Internet with mobile smart devices than from PC environments. These new changes in the way people use the Internet provide opportunities for new businesses in various markets. In addition, existing businesses will meet the crisis of tough challenges. To capture the market in the mobile Internet environment, companies are developing new products and customized services.

The online shopping system is also changing according to the change of internet usage environment. Many internet market fields such as home shopping, individual online shopping site, and online mall have developed mobile applications that can be easily accessed and used by consumers in response to the mobile environment. Changes in the operating environment of the mobile Internet has become a trend that does not change [1].

In Korea, the mobile shopping market has shown an average annual growth rate of 165% from 2010 to 2014 of 148 billion Won. In addition, online shopping survey shows that the usage percentage of mobile Apps was 42% among all Internet shopping methods. It can be seen that this trend in online shopping methods is not only domestic but also global [2].

Changes in online distribution are not the ultimate goal of simply creating a purchasing environment tailored to the mobile environment. Each online distributor is concentrating on UX/UI activities for mobile applications that are best suited to the customer's environment. It is expected that the ways of providing shopping information to stimulate consumer purchases will also continue to change in the mobile environment [3].

HCM (Home Cyber Mart) is an online shopping mall designed to enable consumers to shop in a familiar environment using a smart TV and various mobile devices [4]. For this purpose, HCM supports not only various devices but also various operating environments. It introduced a virtual online store similar to the look of a real shopping store. Customers can easily shop on HCM without the detailed knowledges of shopping operations and steps.

This paper describes the overall structure of HCM and consumer purchase stimulus methods applied in the HCM system. Usually a notification method such as PUSH messages is used to provide shopping information to stimulate the desire of the consumer shopping in conventional mobile shopping. Conventional online mall uses direct advertisement on site and timely discount information via e-mail or TMS. This paper examines the existing stimulus methods and designs more appropriate approaches to stimulating consumer purchase in mobile environments.

This paper is organized as follows. Section 2 describes the overall configuration and the management of the HCM system. Section 3 explains the stimulating methods that are

applied to the HCM online store. Finally, the conclusion and future works are shown in Section 4.

2. The Organization and Management of HCM

2.1 Overall Design

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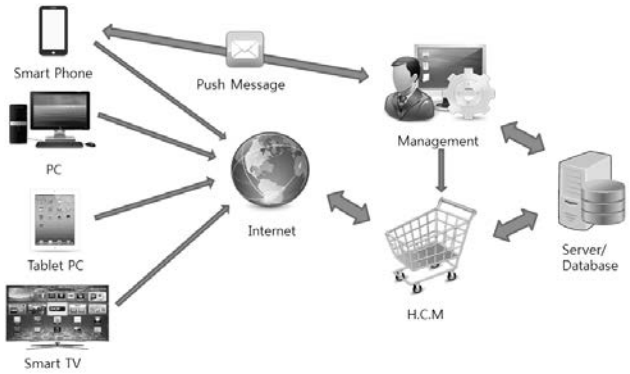

Fig. 1 Overall HCM structure.

HCM targets a multi-platform online stores. The entire structure was developed using web-based operations. The structure covers the capabilities of various smart devices so that HCM can be accessed with various smart devices as shown in Figure 1. The entire data related to product and display information is stored in the server. When each smart device access the HCM web interface, the system loads the corresponding information and displays the contents to match the user's smart device. The HCM view can be changed by an administrator. The changed settings are applied to the HCM through the server. The administrator can send PUSH messages to consumers on the administration screen and provides a variety of shopping information by using messages. The overall configuration of the HCM is composed of four parts that are the management system, the HCM virtual shop, the HCM shelves, and applications.

2.2 The Basic Structure of the HCM Management

The basic structure of a system for managing the HCM is the MVC model. As shown in Figure 2, the MVC architecture constructs a system with three parts that are Model, View, and Controller. The View part is charge of user interface that displays the contents of the system. Function processing including input/output and interaction with various users are handled by the Controller part. Model interacts with the Controller part and accesses the database inside the system. MVC architecture can build a system with isolated components in a loosely-coupled connection [6]. All pages of the management system are composed of the three parts of the MVC model.

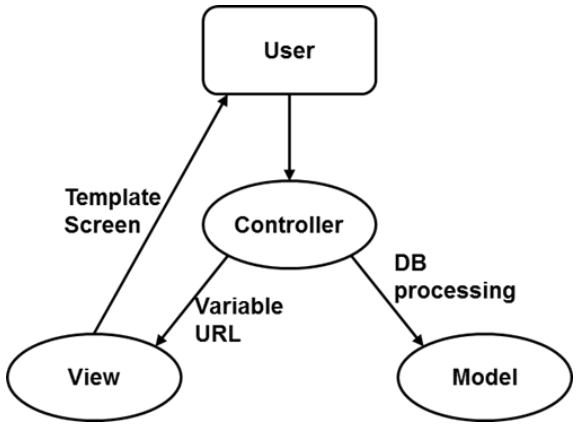

Fig. 2 MVC architecture.

2.3 Product Registration Process

Registration process for online products is very important because it is a part for controlling the view that is shown to the user in the mart system which manages various products. Currently, HCM uses real shop photos. The buyer is allowed to click on the items displayed in the photograph to purchase. The management part is required to implement the goods registration module so that the purchase can be done properly in virtual reality situation.

Product registration process registers the category and the manufacturer of a product and later registers the information about the product. This allows the manager to manage the relationship information of a product and the additional information of the product. For the efficient management of the database, it was implemented to verify the product information in the shelf image after the product registration is completed to the database. The linking of the product image shown on a shelf and the database information of the product was implemented by the mapping of the coordinate bounds of the image and the product identity as shown Figure 2.

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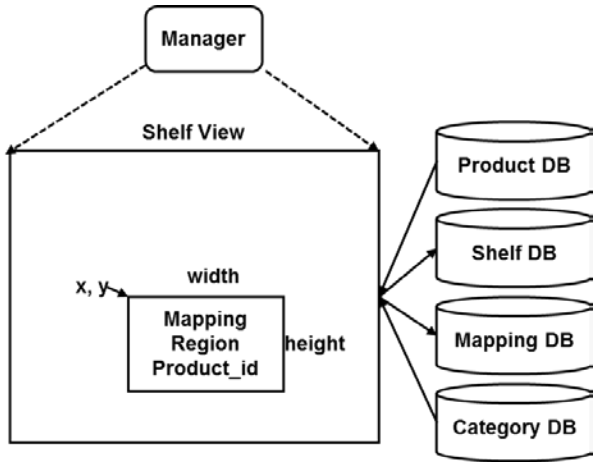


Fig. 3 Shelf mapping system structure

Basic frame for product management of HCM Mart has been developed in a form similar to the conventional online shopping mall. Because the existing online marts should handle many diverse products they systematically classify the products and manage the whole products [8]. HCM additionally implemented an image coordinate register method because it must support product purchase in the virtual reality environment. However the method lacks in automatic registration of products and, thus, it is needed to devise an automatic registration of images and corresponding product information.

2.4 Product Sales Statistics

In order to increase the effectiveness of customer management and sales efficiency the system should store a variety of information about the purchaser of the product in the database. Based on this stored information, it is very required that a statistical processing module provides useful information to system administrators or sales decision makers to make the right decisions. For example, when a customer orders a product, the system can pair the product and the customer information such as gender, age, and order time. If the system accumulate the data for the specific product order, it can statistically extract what types of customers are purchasing that particular product. This will be a great help in marketing decision-making. Information through data mining will be helpful in the decision of which products will appeal to customers.

HCM stores order information in Order, Product, and customer database when orders are placed for statistical information about products. Stored information is provided as useful information to managers and decision makers through statistical functions. Figure 4 shows the statistical system structure. Based on this basic information, the manager makes a decision about what kind of marketing should be performed to a customer, and how to make a customer as a loyal customer.

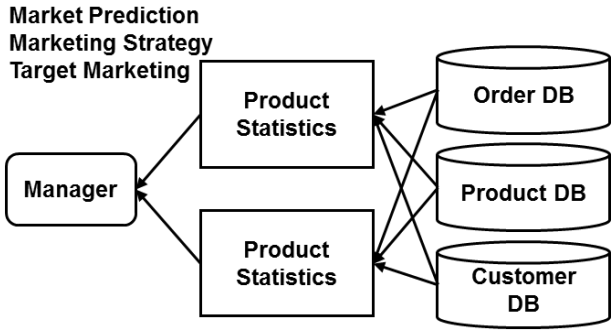


Fig. 4 Schematic statistical system

HCM can be operated on almost all smart devices including smart TV because it's designed with the web-based operations. In addition, it is accessible through mobile applications and thus has high accessibility. With the benefits of Web-based implementation it may be effective for product promotion and sale. A typical feature of these features facilitate the use by the PUSH alarm. Combined with the information in the statistical system, this feature can increase sales efficiency of certain products and reduce unnecessary marketing costs.

3. Shopping Information Providing

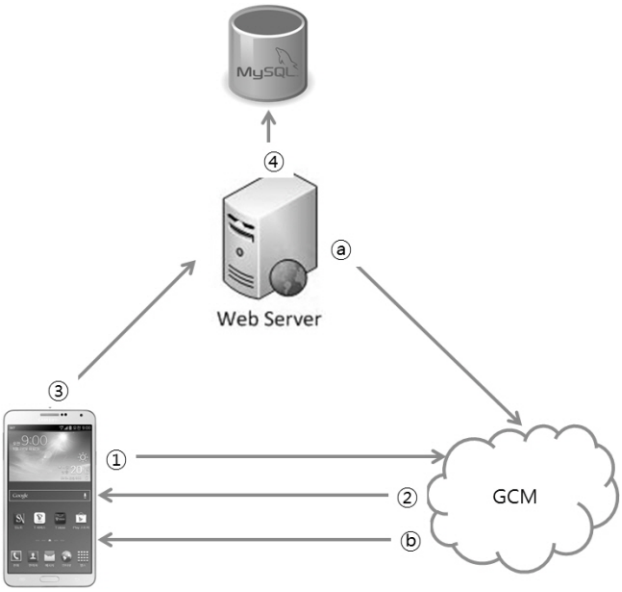
3.1 Shopping Information Using PUSH Alarm

PUSH alarm is a popular consumer stimulation method in applications developed for mobile environment. By using the PUSH alarm, information on discount information and shopping can be easily provided to application users. To develop PUSH notifications, you first need to create a server, such as Google Cloud Management (GCM), that provides push functionality. The server is responsible for sending messages to the cloud manager in the middle of the user environment. Figure 5 illustrates the operation of the PUSH notification system using the GCM. Applications that use GCM function can be maintained by using unified messaging protocols related to GCM library.

PUSH notification is in progress according to the following sequence. If PUSH notification is allowed in the application smart devices are connected to the GCM created by the developer. GCM verifies that the connected terminal is registered with GCM. If not registered, a unique ID is generated and issued. The terminal receiving the ID transmits the ID to the service provider’s web server, and

the web server stores it in the database. This completes the basic procedure for push notifications.

Fig. 5 Push alarm system structure



Service provider fetches the target device ID from the database to send a PUSH notification. And if the device ID is transferred to GCM, GCM sends a PUSH notification message to the corresponding device. A GCM server transfers the message as an intermediary rather than the web server and the device communicates directly. The terminal receiving the message informs the application of the message reception using the GCM related library Notification ().

The management system of a mobile shopping mall requires a module for managing the device IDs and the notification messages. Using the notification system and the customer order database, a mobile shopping mall can perform target advertisement that induces customer to more stimulated purchase.

3.2 Mobile Flyers and Time Marketing

Flyers delivered with newspapers or independently are used to advertise specific products. Offline flyers are easily discarded or lost by nature. On the contrary, mobile flyers can be contained in the mobile web pages and a discount information can be easily checked at any time. Time marketing is a sudden advertisement to guide the products and prices according to a specific time zone. Offline shopping marts usually use time marketing to induce buying interest of customers. It is difficult for online market users to know such time marketing information because they are not actually at market places. HCM can provide information about time sale by using PUSH notification function of the administrator page.

3.3 Information via Application View

When a customer accesses a shopping mall through a mobile application, information about the product should be provided easily and efficiently.

Fig. 6 Web window using Jquery Mobile

There are many ways to view product information in Android mobile apps. The mobile user interface should take into consideration both the mobile web environment with a small screen and the shopping mall environment. In this case, JQuery Mobile, which has the same structure as most normal server and client relations, is used.

Jquery Moblie has the advantage to provide a proper view for the mobile environment as shown in Figure 6. The web view provided by Android has the function of showing the page written by Jquery Moblie. When you modify the content or related information, you can modify the Jquery page instead of modifying the contents of the application. It can also be used on the iPhone without additional development for iOS.

Jquery Moblie interacts with the database on the web server and displays information on the screen. Therefore, the page showing the product information should use SQL effectively and make sure that it fetches the correct data. The structure of the page has been developed so that when the customer confirms the discount information and selects a product, the detailed information page of the product can be easily accessed to obtain detailed information.

4. Conclusions

HCM (Home Cyber Mart) is an online shopping mall designed to enable consumers to shop in a familiar environment using a smart TV and various mobile devices. For this purpose, HCM supports not only various devices but also various operating environments. It introduced a virtual online store similar to the look of a real shopping store. Customers can easily shop on HCM without the detailed knowledges of shopping operations and steps.

In this paper, we first describe the system architecture for efficient management of HCM. Product registration and management, sales management, promotion management is a very intimate part of the profits of the company. Thus, systemic administration of these parts are very important. Currently the cost of product registration is high because the task is performed by an administrator. It requires to develop a system to enable automatic registration. A detailed research is also necessary to establish a sales strategy based on the product order statistics data.

This paper describes the consumer buying stimulus methods applied in HCM. We investigated shopping information providing method that stimulates consumers' shopping desires in existing mobile shopping By using this, the notification method through the PUSH message, the stimulation method through the advertisement, and the direct discount information confirmation method are implemented. Various studies are needed to promote customer shopping desires.

Changes in the mobile environment has been already under way. Product distributors will constantly strive to survive in the future mobile era. To do this, we need to continuously study the UX/UI for mobile users in shopping malls, apply to cyber markets, and investigate feedback to maximize sales opportunities.

Acknowledgments

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