

Information Visualization System For Activation of Shotengai

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Abstract: This paper attempts to activate a large scale shopping district (shotengai) using new internet techniques. Recently decline of shotengai is a serious problem by development of large shopping centers. We made a new approach with internet techniques to activate shotengai, which is a typical Japanese shopping district. The Osu Shotengai is one of the most famous shotengai in Nagoya, Japan, which includes about 400 stores. We developed Osu shotengai official web site, called “At Osu.” First, the information of 400 stores in Osu shotengai, which includes 9 streets, was collected. Then we created an interactive “Information Visualization System” to put fresh information of shotengai on the web site in real time. It includes “Comment Upload System,” where store owners can upload their comments and informing news directly on the web site. Further, we developed a new approach to stimulate store owners motivations for participating in the web site. And we also mention about an attractive and interactive web design using twitters to get opinions of users. By developing the new web site, the number of visitors of “At Osu” has increased rapidly. Many articles about this new approach to activate shotengai with a web site were published in newspapers or magazines and we have receives many inquiries.

Keywords: visual information, interactive services, activation web sites, database processing, industry-academic cooperation

1. Introduction

This paper aims to activate a large scale shopping district (shotengai) using Internet technique and collaborations between industry and academia. We attempted to construct a new system for visualization of information with internet on developing the official web site of Osu Shotengai, called “At Osu.” We show the new system of visualization of information on web site in this paper.

We focused on 4 aims to construct the web site.

1. Identification and visualization of information freshness
2. Information management and integration by using RSS
3. Method to stimulate competition of store exposure
4. Construction of attractive design and web site

Shotengai is a typical Japanese shopping district in cites and towns. Recently, decline of shotengai is considered as a serious problem because of development of large shopping centers. According to the investigation by Ministry of Economy, Trade and Industry in Japan, 70.3% shotengai stores say “decline” or “no growth, but likely to decline” (Fig. 1) [1]. To solve this problem, other studies have concluded from sociology and economics [2], [3]. We used 4 remarkable features which had not been mentioned in earlier literatures and made them as the foundation for constructing the system. At first, the information of 400 stores in the Osu Shotengai was collected. We constructed the system to distinguish the freshness of information and visu-

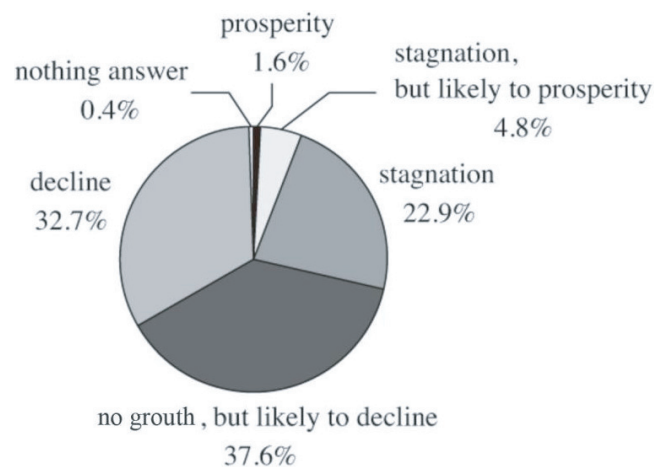


Fig. 1 Shotengai Investigation of actual conditions.

alize it, then process the database. Next, we created “Comment Upload System” which outputs the information from store owners with RSS (RDF Site Summary) in a unified method. To rise motivation of the store owners in shotengai to participate the web site, we established the method to compete the speed of update new information of each store. For the last, to consider the attractive design of web site as an important factor, we took the approach of improving the website through use of header, buttons, contents of letters and so on. And also, We have analyzed the Google Analytics continuously and used the results as feedback to improve the performance of the web site.

The Osu Shotengai (Naka-ku, Nagoya, Aichi, Japan) is one of the most famous shotengai (shopping district) in Nagoya,

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Aichi Japan, which locates in the center of Nagoya. It is a Japanese temple town called Osu Kannon and is 600 meters from east to west \times 400 meters south to north area, and many busy roads. The Osu Shotengai consists of 8 groups which are called Banshoji-dori shotengai, Osu-shintench-dori shotengai, Nagoya-Osu-Higashi-nioumon-dori shotengai, Osunioumon-dori shotengai, Osu-kannon-dori shotengai, Osu-monzenmachi shotengai, Osu hon-dori shotengai and Akamon-myouou-dori shotengai. Most of the part of Osu are shopping arcades and they are daily and familiar wide large shopping district which have unique and various stores inside. There are about 400 shops in the Osu Shotengai, and about 1,100 shops around the area. This area is always thronged with people because of many attractive items. After the war, the Osu Shotengai has declined gradually. The shotengai planed some events such as “Osu street Performer Festival” since 1978 to activate the area. Young people started to gather at Osu to wear unique clothes. Lately, the stores of old-clothes, accessories, and miscellaneous goods stand 70% of all. Osu was crowded and also was a gathering town around young people who are from teens to twenties. But business conditions worsened along with poorer economic conditions in Japan since 2008 and this also effected the Osu area. Under these conditions, we renewed the official web site of the Osu Shotengai, called “At Osu” [4], using a system to visualize information to activate shotengai. We aimed to construct a web site for a large scale shopping district by using an experimental approach, a web site constructing techniques, and revolutionary idea and design.

2. To Activate Shotengai with Web Site

Digital communication techniques made rapid progress as popularization of personal computer. People can communicate with world in real-time. They can send and receive a lot of contents in a second for example texts, images, sounds, movies, and so on. Then they build the meta-universe where they can act out roles economically and socially. Those big revolutions have changed our hole society right now.

Most of large scale shopping malls have high quality web sites. The ability to attract customers or advertisement method of the



Fig. 2 The Osu shotengai (Oiran festival).

web sites are much bigger comparing with the one of shotengai. But it is difficult for shotengai to develop such a high quality web site, because of the financial deficiency or aging problem, etc.

To solve this problem, we try to construct a web site which an university laboratory leads the operation [5], [6], [7]. As a result, we succeeded to create a web site for a large scale shopping district full of novel and new ideas and design.

Collaboration between business and industry has the goal of mutual use of ideas that make the most of their best features. We try to bring out the best of academic field and use the collaborations between industry and academia to complement what academic field cannot provide.

To construct the official web site “At Osu” is related deeply to the studies of usability and findability of information. And it may stimulate the communication ability of students in university as a practical education. We do not have the problem of cost or limit of time in the study of academia, so we are able to redesign the web site as many times we need. Actually, we spent 2 years and modified the site by analyzing the number of access several times. This is the core behind the “At Osu” concept which is under continuous development through modifications and new ideas.

3. Analysis and Adjustment of the Web Site from Installation

The renewed official web site of the Osu Shotengai, “At Osu,” has started on May 1, 2009. Before renewal, the number of visits to the site had been 200 to 300 per a day. Right after the renewal site started, the access count was continuously more than 1,800 per a day for about a week. But the number of visits has dropped and stabled around 900 on average. Total number of visits in May was 28,526 (Figs. 4, 5, Table 1).

We have analyzed the Google Analytics continuously and feed back the results to improve the performance of the web site. We paid most attention to the change of time on site, which means how long a visiter stay on the site in average, and the numbers of pageviews with the increase of news contents. It was only 3 new contents in a month when the site was opened. But 2 years later, the number of new contents increased to 58 in a month. And also, the number of pageviews had increased from 1.84 to 5.24, and it was same to the time on site from 1:44 to 4:13. In inverse of these increases, bounce rate, which means the proportion of the number of session which users assess only one page, had decreased from 57.37% to 31.09%. The number of the visits, which is considered as the most important indicator to measure the popularity of the site, had increased from 28,526 to 31,293. From this evidence, it is clear that the amount of new contents in the site is related and proportional to the number of visits, time on site, and the number of pageviews (Table 1).



Fig. 3 “At Osu” header design.

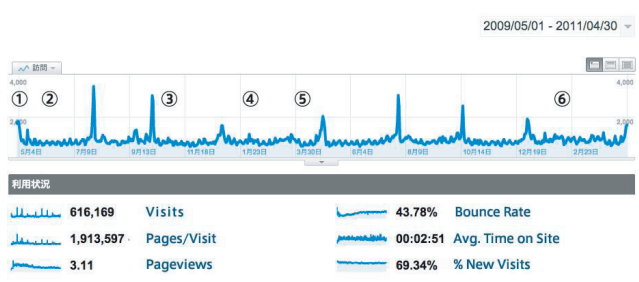


Fig. 4 The number of visits from May 2009 to Jan. 2011.

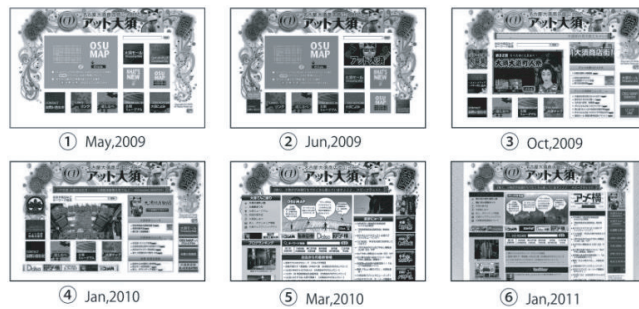


Fig. 5 Design transitions from May 2009 to Mar. 2011.

Table 1 Relationship between improvement points and result.

Date	Visits	Bounce Rate	Time on Site	Pageviews	News Contents
① May,2009	28,526	57.37	1:44	1.84	2
Improvement Points			Results		
Be born new "At Osu"			The number of the sessions on the first day were more than 1,500, but Bounce rate was still high.		
② Jun,2009	20,773	27.97	3:11	4.39	3
Improvement Points			Results		
Put the banner by Flash for advertisement on top page.			Bounce rate has decreased. Time on site and Pageviews has increase.		
③ Oct,2009	29,154	34.08	3:04	3.79	15
Improvement Points			Results		
Change the "Main Window" from the link of Osu Map to the news of season.			Visits had increase. Add "Marquee", but time onsite has changeless.		
④ Jan,2010	26,284	44.65	3:51	3.59	4
Improvement Points			Results		
"Osu marquee" which displays four of the latest information up-loaded.			Time onsite has increased because the motivation of the store owners was up.		
⑤ Mar,2010	27,793	33.58	4:02	4.45	38
Improvement Points			Results		
Renewal the web site. Introducing blog system and increasing the number of the contents.			Marquee update has getting higher because the motivation of the store owners was up. Time onsite and page views has increase.		
⑥ Jan,2011	31,293	31.09	4:13	5.24	58
Improvement Points			Results		
Renewal of the site. Introducing Twitter and "Osu Gourmet" site. Increasing the number of the news and enriching the quality of the contents.			The renewal speed of each blog of the store was getting faster and the number of the session was the highest.		

In June, banners with Flash and "How to use Osu Map" page were installed to put some movement on the web site. Although the total number of sessions to the web page went down by 8,000, the bounce rate was dropped from 57.37% to 27.97%. It is important to watch bounce rate because it shows the quality of the session. Time on site was increased from 1:44 to 3.11 minutes, and so as the number of pageviews from 1.84 to 4.39 (Figs. 4, 5, Table 1 ②).

From July to September, we kept revised arrangement or contents of the web page, but the number of visits and time on site had been dropped down. From October, we put the large image

to show the events in the Osu Shotengai on the top page. We also put the latest news and tried to enrich the contents of the text information. The number of visits increased to 29,154 and time on site went back to 3 minutes (Figs. 4, 5, Table 1 ③).

In January 2010, we limited the number of marquee (the scrolling text advertisement) to the top 4, since the number of update of information had been stagnated. We tried it to rise the motivation of the store owners. In the result, the number of visits increased again to 29,793. Before putting the limitation for marquee, the average number to update the web page was 8 per a day. After the revision of the rule, the number of updating web page had been increased step by step. At the end of the month, 18 new marquee per a day were flowed on the page in average. We need to think about to enhance the motivation of the store owners to participate in the web site, because the more the store owners interested in it, the more often they update the web site (Figs. 4, 5, Table 1 ④).

In March, we renewed the web page by introducing a web log (blog) system. It is the system to make 400 blogs of stores in the Osu Shotengai and to put the latest information and image of them on the top page. After introducing this system, the information and items of each store were exposed and some users sent positive opinions by e-mail which rated the web page high. Time on site increased to 4:02 comparing from 3:51 in former month, and the number of session grew to 27,793 (1,500 up from former month) (Figs. 4, 5, Table 1 ⑤).

In January 2011, we newly installed Twitter and "Osu Gourmet" page. 58 informations were up on "What's new" page in a month. The number of visits was rapidly up to 31,293, and bounce rate was dropped to 31.09%. Time on site increased to 4:13 and the page view count was up to 5.24 (It was 1.84 2 years ago). We considered this is the foundation for an ideal shotengai web site (Figs. 4, 5, Table 1 ⑥).

4. Visualization of Information in Web Site

We focused on 4 aims to construct the web site.

1. Identification and visualization of Information freshness
 2. Information management and integration by using RSS
 3. Method to stimulate competition of store exposure
 4. Construction of attractive design and web site
- We explain the 4 features as the follows.

4.1 Identification and Visualization of Information Freshness

"Osu Map" system regulates the information by using RSS 1.0 generated by CMS. The upload information is efficiently released with providing the list of indexes and titles of document.

"Osu Map" system is controlled by Flash to provide images with movements. Although it takes time from loading to showing, Flash is most suitable as a method of visualization with movements. If a user clicks a point of the map, it will move to the enlarged mode. To enlarge, the system uses the function as following. Xmouse ymouse are an x-coordinate and a y-coordinate when a user clicks the point (the origin is left top), swidth and sheight are the width and height of the stage, and scaleup is magnification of enlargement. To modify the user interface, mouse

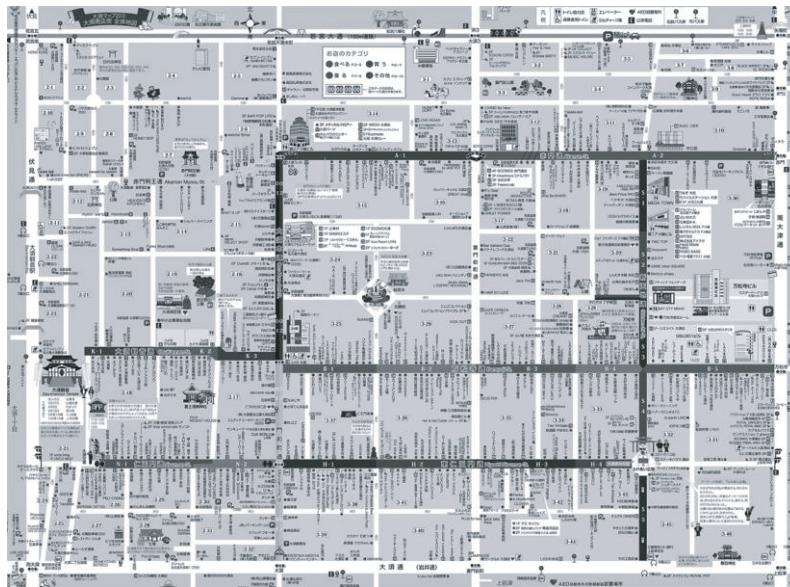


Fig. 6 “Osu map” which is the core of the Information Visualization System, showing 400 shopping stores.

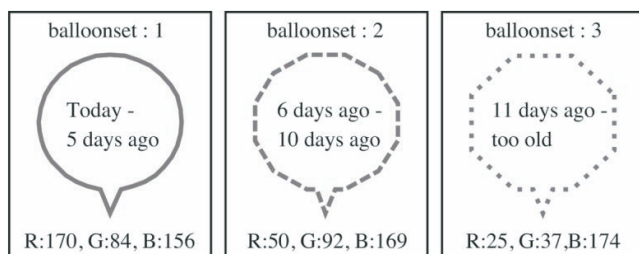


Fig. 7 The balloon with shape and color which express freshness.

control is considered as important. When a user clicks a marker (pin) on “Osu map,” an extracting RSS data function is called from ActionScript. Then store RSS which is output with CMS and recognized by unique ID is loaded on ActionScript. The pixel value from the starting point to the location of a pin where a user clicks on the map is calculated.

The comments will be shown up in the balloon on the main window and the update time is used to choose the kinds of balloons. We tried to show the freshness of comments by the movements, colors, and shapes of the balloons. The combination of rapid movement of the animation, vivid color, and round shape of the balloons gives fresh image to visitors. The balloon becomes darker and more rugged as the comment gets older (Fig. 7).

4.2 Information Management and Integration by Using RSS

We developed a “Comment Upload System,” where store owners can upload their comments and informing news directly on the web site. Each store owner has his own user name and password. It is a large scale web system and all data can be controlled collectively (Fig. 8). In general, a large scale web system uses CMS (Contents Management System) to generate dynamic contents. Instead of using CMS, we adopted “XOOPS” (GNU general public license) as the system to control all information.

We registered unique IDs, user names and passwords of stores and assigned permission to access using user registration func-

tion. After that, we provided independent blog systems to the registered users. RSS1.0 is written by Extensible Markup language (XML) [8]. And it provides more systematic format environment because the Resource Description Framework (RDF). RDF is a framework which divides information into subject, predicates and object, and expresses text file as directed graph. XML is a language for meta-data which structures data effectively. Figure 8 shows the flow of processing.

4.3 Method to Stimulate Competition of Store Exposure

It is important and can be a decisive factor for users visiting the site again to keep updating and providing the newest information continually. We should raise the motivation of the store owners to update their blog frequently. The amount of latest information concerning the web site is proportional to the number of accesses of users. We provided “Osu Marquee (the lettering advertisement scrolling from left to right)” which displays seven of the latest information uploaded by owners on top page. To control update date and time, we use Flash control system by unique ID which is output by RSS1.0. Right after we introduced this system, store owners updated a lot of information, but it decreased gradually and the average update number was 5 per day.

In January 2010, we limited the number of advertisements placeable on the marquee from 7 to 4 in order to encourage store owners to make updates. As a result, the average number of updates increased to 14 and a new comment showed on marquee about every 50 minutes. Many users access to top page first, so the advertising on marquee brings a lot of benefits. The store owners rushed into contribute the new information on the web page because of the benefits.

4.4 Construction of Attractive Design and Web Site

Visual quality is one of the most important factors of web site [9]. Instead of researching different websites in Japan, we consulted Chinese Internet shopping mall and aimed to create energetic design like them to activate shotengai. Those

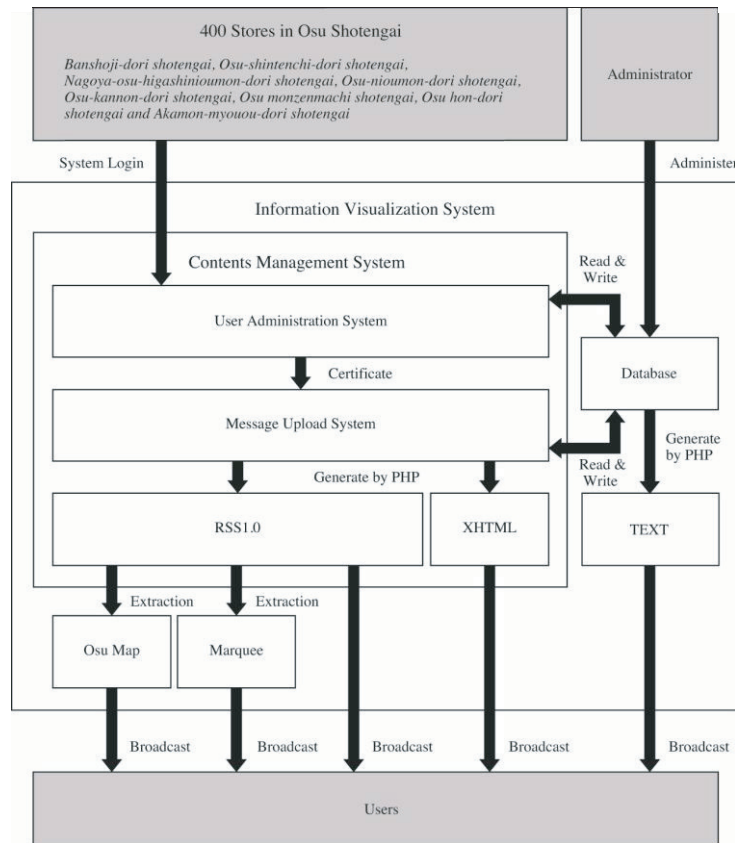


Fig. 8 Information Visualization System workflow.

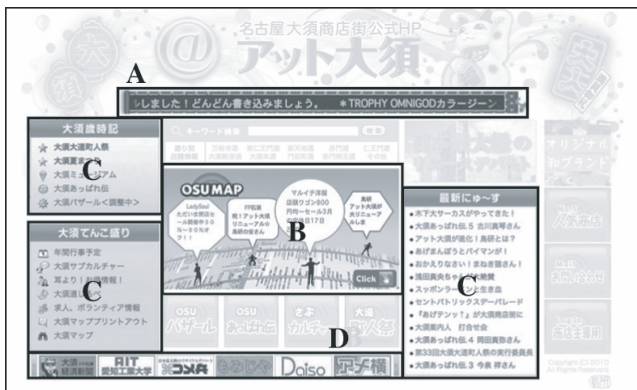


Fig. 9 A is “Osu Marquee” which we explain in 4.3. B is “Main Window” which we explain in 4.3. C means web composition shifting from image base to text base. D means screen with movement using Ajax.

Chinese internet shopping malls such as Taobao “http://www.taobao.com/,” dangdang “http://www.dangdang.com/,” joy (amazon) “http://www.amazon.cn/,” Paipai “http://www.paipai.com/,” and so on, which have flourished with the rapid growth of GDP in China, have great power to stimulate the purchase desire of 384 million net users in the country. We studied into the details of those Chinese Internet malls and found some common characteristics of them and used it to activate “At Osu.”

We tried to catch users attention with a method of “Screen with movement using Ajax and Flash.” To chase moving things is one of our instincts. Moving text from left to right, or multiple movements will be effective to create cheery atmosphere of the site. Those movements catch the user’s attention and thrill them.

Also header is on the head of the top page and has a role as an attraction. The design of header is important because it will influence total design of a web site. We carefully created header design to show power and attractiveness of shotengai. The color scheme has a lot of meaning on a web site. The color has value, chroma and hue. When we see specific color, it will stimulate our memory and create many emotions or impressions. Those feelings may change depending on the era or circumstances of the life. On Chinese internet shopping malls, they use many primary bright colors. The combination of orange and blue in particular really stands out. This color design is new and remarkable. In color psychology, orange means energy, liveliness, familiarity, health, security, and gathering and blue means cleanliness, freshness, calmness, confidence, stability, and sincerity. Although they have different images, the combination of orange and blue has good color harmony [10].

To take attentions of users, we summarized text contents (text link) on the top page in 15 letters. Users can choose one of them which they want to know the detailed information. This method is adopted to the topics of Yahoo. On January 2011, 58 notes of new information were uploaded on “What’s New.” The more information was updated, the more users visited the web site, and the number of session was increased tremendously to 29,293. The shapes and design of buttons to switch pages are unified. We analyzed reactions of users for size, location and number of buttons and changed the position and design flexibly. The number of menu buttons which located on the left side of web page were limited to 7. We changed the details of the web site several times

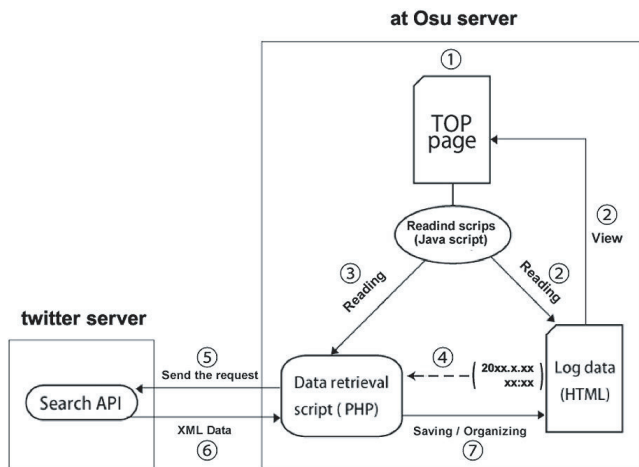


Fig. 10 Mechanism to obtain and display a timeline of twitter.

because those changes would make the site more attractive.

5. The System to Provide Topics in Real Time

To provide hot topics of the Osu Shotengai, Twitter was introduced. Instead of using an existing web service, we created an original system to maintain the quality of the design of top page. We discuss about the details in below.

By applying Twitter API, new 20 items in Twitter are searched, each of which includes the keyword “Osu,” among Twitter public time lines. The searched items are shown on the top of the home page of “At Osu” in real time. When the top page of “At Osu” is opened, PHP script is called first by using JavaScript and data on the obtained time line is compared with those stored before. When the time line is gotten within 10 minutes, there are no processing in the twitters. When more than 10 minutes are passed, data on new Twitter time lines is obtained. By sending request of the keywords and their twitter numbers to the searched API, the searched items are obtained in XML data, necessary information is extracted and is re-transformed to stored HTML forms. The HTML file is used as the latest renewed data, which is embedded on the top home page in JavaScript. There is no user waiting time during these operations whose flow is shown in Fig. 10.

- ① A user accesses to the top page of “At Osu”
- ② Loading the log file that has already saved with JavaScript and putting it on the top page
- ③ PHP is called from JavaScript
- ④ Checking the date and time of the log file and shutting down the process if less than 10 minutes has passed since the last update
- ⑤ Sending a request to Twitter Search API
- ⑥ Obtaining XML data of the search result
- ⑦ Shaping XML into HTML and writing it on the log file

The store owners cannot provide enough information of the news with Comment Upload System because of the limitation of the number of letters. At first we tried to include all home pages of 400 stores, but it is difficult to control update and so on. Then we provided blog to every store and put the image and title of each of them on the top page to stimulate the store owners to compete to show up. In the Comment Upload System for the store owner, the 9 database different from CMS as stated before are

used. The uploaded message is output to three RSS1.0 (Osu map, marquee, and direct output) and a XHTML (comment uploaded list). Moreover, users obtain a text data from the database directly and use it for the system supplement of “Osu map” (individual output of unique ID). The information is delivered systematically using RSS1.0.

To provide the fresh information continuously, we put the top newest comments of store owners on marquee and balloon. This system lead a competition among store owners to upload their information. In January 2010, we limited the number of the comments on marquee in 4, and it motivated the store owners even more. The number of session increased to 29,793 and store owners became to make positive efforts to access to “At Osu.”

Some of them made it as a daily task to put new comments. The rate of upload has increased. One of the boutiques in Osu shotengai kept uploading information of the special offer “Buy a jacket and get a corsage to match!” and made it on the top page at all the times. As a result, the sales for that day consequently increased 10 to 15%. Because the advertisement showed on the top page continuously, it might stimulate users desire to buy clothes on that store.

We studied much in the design which pursued findability of web site to increase the number of visit, the length of the time to stay and the number of page viewer. We made the top page which has attractive color, text links and movement and pursued a novel and unique design.

We concerned about not only design but also usability. “At Osu” is a the remarkable web site which keeps changing and improving and users will be fascinated with the fresh and active informations. We succeeded in showing real time information which changes from one moment to another to express vivid shotengai itself. Users of this web site became customers or visitors of Osu Shotengai.

Also, even shop owners with little knowledge of a computer can easily maintain a website. “At Osu” which uses the method to visualize the newest information took attention of the media and became widely [11], [12], [13] known. We have received many inquiries from shotengai in many places in Japan. In fact, this system was adopted by Ohkaido shotengai in Matsuyama and has achieved a lot of good results. We hope this system will give a life to shotengai in all over Japan and revitalize them.

6. Conclusions

In this paper, we developed a Visualization Information System which includes database processing, mainly focusing on activation of shotengai using internet technique. By achieving a collaboration between industry and academia, we also studied the method to activate a large scale shopping street by using internet technique. We adopted many cutting-edge web technologies and modified the system several times. Using many experimental approaches provided a lot of success of this study. This collaboration achieved good results because students and other people from outside the area now visit this shopping area bringing it new life.

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