Doğuş Üniversitesi Dergisi, 10 (1) 2009, 88-101

AN EMPIRICAL APPROACH TO DETERMINE THE RELATIONSHIP STRENGTH BETWEEN INTERNET MEDIA AND ONLINE READERSHIP

İNTERNET MEDYASI İLE OKUR ARASINDAKİ İLİŞKİYİ SAPTAMAYA YÖNELİK GÖZLEME DAYALI BİR YAKLAŞIM

Kutluk ÖZGÜVEN Yasemin ATILGAN

Doğuş University, Faculty of Engineering kozgoven@dogus.edu.tr Doğuş University, Faculty of Engineering yatilgan@dogus.edu.tr Mitat UYSAL Doğuş University, Faculty of Engineering muysal@dogus.edu.tr

ABSTRACT: Web content in the context of online news is growing at a rapid speed where traditional news reading habits shift in favour of the Internet version. At the same time readership behaviour also changes from print paper readers to more selective online users, who expect news services follow general trends of the online media such as dynamic customised content and personalisation. In an environment where users are often reluctant to fill forms or reveal their preferences in news content, this entails that the online news Web site has to track the behaviour of the reader and serve the reader the content that fits his or her requirements. In this study online readership preferences are observed to produce personalised content, types of news articles that are more relevant to the reader's preferred categories. The problem is then reduced to determining the strength of the relationship between the reader node and the news category nodes, at which a relationship metric is borrowed from Customer Relationship Management studies.

Keywords: Online Journalism ; Web Content Management ; Personalization ; Customer Relationship Management **JEL Classifications**: M15 ; M31 ; M37

ÖZET: İnternet gazeteciliğinin gelişimiyle birlikte Web üzerindeki içerik sürekli artmakta, medya hizmetlerinin odağı medyatör ile hızlı biçimde kendisini ilgilendiren haberlere erişmek isteyen okur arasındaki ilişkiye kaymaktadır. Bu isteğin gerçekleştirilmesi, daha önce okurun düzensiz davranışlarına göre kişiselleştirilmiş Web içeriğinin oluşturulmasına dayalıdır. Bu çalışmada İnternet gazetesi okurlarının kendi istedikleri tür haber yazılarına hızlı ulaşımında elverişli sonuçlar elde edebilmek amacıyla kişiselleştirmede daha ileri gidebilmek için okurların tercihleri incelenmektedir. Tercih davranışlarını saptayabilmek amacıyla ilişki yönetimi ölçüm teknikleri, özellikle de RFM yaklaşımı, CRM çalışmalarından ödünç alınmış ve okur ile içerik türleri arasındaki ilişkiye uyarlanmıştır.

Anahtar kelimeler: İnternet Gazeteciliği, Web İçerik Yönetimi ; Kişiselleştirme ; Müşteri İlişki Yönetimi JEL Sınıflaması: M15 ; M31 ; M37

1. Introduction

This communication is based on a study predicting the interest of online news Web site readership on categorized daily news reports after calculating the relationship between each reader and each news category over a period when category selections are tracked through the dynamic Web site. Readers are more interested in their

preferred news categories of interest and the Web site must feed the specific reader more stories belonging to that category. Our hypothesis in this study is that we can use relationship measurement techniques used in marketing science to assess the tracked Web site visitor behaviour and feed personalised content on that assessment.

For this study key areas of interest are Online Journalism or Web-based news broadcasting, content management systems (CMS), where published Web information is determined dynamically and managed according to certain rules, relationship or customer relationship management (CRM) and the methods to calculate the relationships according to history of interactions and personalization, content and relationship management at individual reader level.

1.1. Online Journalism

Looking at scholarly and trade journals today, it sometimes seems that to talk about the impact of the internet on journalism is the most popular topic among journalists and media scholars alike - second only to concerns about commercialism and money (Deuze & Dimoudi, 2002). Online newspapers can be defined as periodical and digital publications which are formed by a group of eminent editors and observers by forming news, essays articles and analysis according to certain standards (Valauskas, 2000). Online Journalism has more opportunities than traditional one in various areas: it is possible to add sound and animated effects besides texts and pictures; the reader can be guided by graphics and pictures; international interaction is possible; information delivery is faster; other electronic information can be reached with interconnections on the Web; easiness and enrichment in researches can be supplied; different dimensions have been presented to the reader; the editors has a chance to have discussion via mails (Ackerman & Simonaetes, 1999). Readers' are not only given choices to read but also supplied with icons instead of letters, photographs instead of words and texts and pictures all of which form on effective presentation (Meyer, 2002).

Primary reasons for traditional newspapers moving towards Online Journalism are, according to a survey conducted at the turn of the millennium, reaching a global readership (57%), efficiency in production (27%) and reading quality in multimedia (15%)(Peng, Them & Xiaoming, 1999). Online Journalism has the advantages of being interactive, multimedia, of providing internal and external networks and offering selection functions, the possibility of regular updates, access to archives, rapid access to a large number of newspapers, and being paperless (Nueberger, Tonnemacher, Biebl & Duck 1998).

1.2. Content Management

Recently the digital contents service industry has grown rapidly in the form of online game, mobile contents, e-book, e-learning, internet broadcasting, and e-music. This is mainly due to the advancement in infrastructure of information system and the development of Internet (Joo & Sohn, 2006). Internet uses pictures, photographs, animations, videos, voices, in addition to writing, and because of that reason it is called a hybrid medium (Birsen, 2003). The Internet provides more and various news content than that every day and most of it is free. Beyond that, online news outlets can provide and archive as much information as possible (Şanlıer & Tağ, 2005). The amount of content available over the Internet is growing very fast on a daily basis and its maintenance determines a difficult task. To provide actuality, availability, accuracy and interactivity, Content Management Systems (CMS) has been developed as a result of growing content on the Internet, to better manage and maintain Web sites and to give better services to visitors. CMS determine valuable means to simplify the creation, maintenance, and distribution of content (Gartner, 2001). Depending on the relational characteristics of visitors, content management decisions are executed, including aggregation decisions such as content provider information supply standards or dissemination decisions such as content storage on distributed server networks. A content dissemination service enables delivery of information from information sources to numerous users across a wide area network. The major set of tasks for a CMS consists of versioning, access control, transparent data storage and mechanism enabling collaborative work. During the last few years a set of new frameworks have been developed focusing specifically on content management for the Web, like Zope (Zope, 2002) or Cocoon (Cocoon, 2002).

Some authors use the term push service to denote that the content is actively pushed to subscribers as opposed to the user-initiated pull model. The main service task is the timely delivery of possibly large amounts of information to many subscribers. The service involves two types of entities: publishers and subscribers. Publishers are content sources that group and send data through channels. Subscribers are content destinations that subscribe to a channel and receive the corresponding data (Podnar, Hauswirth & Jazayeri, 2002).

1.3. Relationship Management

Studies show traditional, mass marketing companies, as opposed to one-to-one relationship companies, are insufficiently equipped to meet converging consumer needs, tastes, and preferences in developed economies (Ohmae, 1989; Hickens, 2000). An understanding of how to manage customer relationships effectively has therefore become an important topic for both academics and practitioners in recent years. Although the concept of relationship marketing is not new, organizations have recently started to focus on identifying and retaining profitable long-term customers (Burez & Poel, 2007)[°] Effective Customer Relationship Management (CRM) is about acquiring, analyzing and sharing knowledge about and with the customers (Jutla, Craig & Bodorik, 2001) and it can encourage customer loyalty and the development of long-lasting profitable relationships for the provider (King, 2007).

CRM is a synthesis of many existing principles from relationship marketing (Jancic & Zabkar, 2002; Sheth, Sisodia, & Sharma, 2000; Morgan & Hunt, 1994), and the broader issue of customer-focused management. CRM systems provide the infrastructure that facilitates long-term relationship building with customers. Some examples of the functionality of CRM systems are sales force automation, data warehousing, data mining, decision support, and reporting tools (Katz, 2002; Suresh, 2004).

1.4. Relationship Metrics

A traditional method of measuring relationship taken as basis in CRM studies is the RFM (stands for recentness, frequency and monetary) approach, which depends on the past behavior of a client with respect to service providers. Using RFM approach Web user behavior can be analyzed real time and online media services can be

conducted accordingly on one-to-one basis both in terms of content structure and content storage.

RFM is based on three simple customer attributes: recentness of the interaction, the closer to the present the better; frequency, the number and distribution of interactions, the homogenous and often the better; and monetary or the amount involved or the intensity of the interaction. RFM analysis is based on the following simple observations that have been made over again across multiple industries: Customers who purchase recently are likely to respond better to messages and they are also more likely to purchase again, compared to someone who has not purchased for a long time; frequent buyers, i.e., customers who purchase often, are more likely to buy again than infrequent buyers; big spenders often respond better than low spenders.

As mentioned in (Bult & Wansbeek, 1996) point out that RFM is most commonly used for selection or segmentation analysis in direct marketing; through RFM, marketer can sort out target customers from a huge list of customers for its marketing activity. Non-Transformed RFM values used by (Sung & Sang, 2000) directly as input variable for model building and then categorize customers into groups using cluster analysis where different marketing strategies may be formulated for different customer clusters. As (Goddman, 2002) holds that RFM analysis helps avoid waste of time and energy on cultivating low-profit customers and generate better return on capital by investing more marketing resources on higher profit customer segments.

Using RFM approach Web user behavior can be analyzed real time and online media services can be conducted accordingly on one-to-one basis both in terms of content structure and content storage. The results of RFM analysis may give a clear idea about customers' profiles, read readers profiles here, and their interest on specified subject categories.

1.5. Personalisation

In order to understand the impact of new media on journalism, it is important to look at the transformation of storytelling, new tools for newsgathering, redefined audiences, removed boundaries and reinvented relationships. These interactive features of online journalism allow new relationships transforming from one-way discourse to a dialogue that in democracy will be better served (Pavlik, 2001).

Personalization is the shift from "one size fits all" to an individual and personal "one to one" treatment of customers. The development of support for creating personalized multimedia content pertains to this effort (Boll, 2003). Personalized selection of information is part of several tasks, e.g. determining what programs to record, ordering and filtering electronic program guide (EPG) data and ordering and filtering search results. Personalized selection consists of predicting the level of interest a user will have in a piece of information; adapting the information based on those predictions, such as re-ordering and/or filtering the set of information (Setten, Veenstra & Nijholt, 2002).

Visitor-site relationship also determine personalization decisions including online advertising content that is fed to visitor or priority of subject headlines on Internet news media. However, as in typical clustering systems (Carpenter & Grossberg,

1987; Kaski, Honkela, Lagus & Kohonen, 1996; Kohonen, 1988) users have very little control on how the information are organized and the information clusters generated may not match the users' requirement (Tan, 2002).

2. Methodology

There are different ways to gather data to use in Web site personalisation. These can be grouped into two major areas: visitor's explicitly indicated own choices and the Web site's analyses based on visitor behaviour. In the former group, it is often requested from the visitor to fill some forms or, to reduce the burden, make selections when needed at separate times. In online news these can be regarding language, style, region, page mark-up, news categories and so on. The latter group requires an analytical approach to decide a behavioural pattern and therefore has to track the visitor history of the actions on that Web site. In e-commerce sites the most important action is what the visitor purchases, so that items that might be of interest can be shown to the visitor so as to make him or her buy more. The most significant action in an online news site is selecting the news stories and in that case our aim must be to feed news that is more relevant to the visitors interest so that he or she finds more interesting articles and reads more.

The problem, in the tracking-based option, then becomes both how to analyse monitored actions and how to act upon the gathered information. We propose in this study that we do not analyse the interest of the visitor to individual stories but to entire categories such as politics or sports. When we decide how attached the visitor is to the news category, we can feed more or less news to the visitor in that category. This does not mean that less interesting categories are never to be fed, a person obsessed with sports and with little interest in world affairs might still be interested in a war in a nearby region.

In this study we discuss the accuracy and validity of the approach that is proposed by means of a simulation of readership visits and hit behaviour for an Internet journalism Web site, with different behavioural characteristics of the readership, and then propose a general approach for online news providers' content management and personalization. In the simulation part several readers with different visiting and hit behaviours are defined as actors, each of which having different relationship characteristics. Access times of visitors are stored within this time interval. Then the homogeneity of the accesses of each actor is specified. As a result by combining access homogeneity, frequency and monetary attributes the general approach is proposed. The study then proposes a generalized method for online media, in particular Internet news services, where to store static content for optimum access, how dynamic content must be shaped with respect to each individual readers and online advertisement value of each reader for the Web site's advertisers.

2.1. Experiment and the Web site

Online Journalism Web sites provide news separated into various categories so that readers can access them according to their subject interests in a faster manner. These news categories are shown in the main Web page and other neighbourhood pages either at the top or at the left side, such as world news, politics, local news, business, sports, life style, entertainment, finance, technology, science etc. Apart from the news in categories, often there is a 'top news' category with news titles and some part of content or a summary and a picture appearing with the title. The 'top news' is often category independent, importance of the news being determined for a universal readership by Website managers.

The problem is that not all readers are interested in the same 'top news'. Online newspaper readership preference is personal and based on personal interest to different categories. A particle physics discovery may not have universal news significance nor may a celebrity marriage. To overcome this problem, leading international news portals propose solutions such as geographic interest. The BBC or the CNN wants readers specify what version they are interested, national or international, although solving the question in some part, does not address it fully.

We, on the other hand, propose a methodology here in for online journalism to feed news to the readership in a personalised manner based on the strength of the relationship between the reader and the news category. An experimental online news site with seven categories of news is composed with news aggregated from existing news sites to be daily read by twenty readers every working day. The news site has a 'top news' titles on the main page and seven categories can be reached in the neighbourhood pages that are reached by clicking the right hand side bar.

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Agdress http://www3.dogus.edu.tr/journal														
İnternet Gazetesi Web Sayfası														
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Güncel	nedeniyle 'Türk düşmanı' diye lanse edildi,	verildi. 'Bari hak edelim' diyerek çevreci	hızının yüzde 2.5 değil, 7.8 olduğunu açıkladı.	barajların aktif doluluk oranının yüzde 25										
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Figure 1. Experimental Online Journalism Website

2.2. Web site dynamics and visitors in the experiment

In this study the results of modified RFM approach helps to personalize a Web page according to visitors' interests. For the discussion of accuracy and validity of the proposed approach an Online Journalism Website is prepared. This new Web site is published on Doğuş University's Local Area Network. News categories are included on the site and for each category a link is given on the left side of the page. On the main part of the site randomly selected news are placed (Fig. 1).

The Web site consists of 7 categories. These categories are a reduced number based on the well established news categories. In the home page there are 12 top news stories. The stories are put up in the home page based on the calculated value of relevance of the news. When news articles are input into the dynamic site to appear, a number of importance is also entered. Despite this being a subjective value, our decisions are as reasonable as a daily news site worker's. In the long run, misplaced attributions of value to events do not play a significant role. The calculation is made according to the importance of the news in general and interest of the reader to the news category and the top 12 stories in terms of the weighted calculation make it to the list. A low interest category news with low importance factor is almost certain not to appear on the home page while a high interest category with high importance is highly likely to be fed to the visitor.

Here the Web site was designed deliberately minimalistic to reduce interference of other factors. Also the group of visitors are requested just to concentrate on the news. The visitors are selected from academic staff, mostly research assistants and junior faculty. They have been selected from a variety of departments and schools out of Dogus University's 5 faculties and schools with a balanced gender distribution. They are requested to check the experimental Web site first thing of their arrival before reading any other online news.

The visitor can always go the specialised category neighbourhood pages by clicking on the category and seeing all news in that category. In that case all news in that category are displayed without any calculation of interest. The stories are listed in the order of the news provider inserted importance factors.

In the beginning as the readership behaviour is not known beforehand, all news categories are considered equal. This means that the homepage displayed news with no personalisation. But as days go and the experiment advances, visitor behaviour is much better known and the site displays on the home page stories in a more personalised order.



Figure 2. Description of the system

The main page of the site includes 12 news articles for each day. Seven categories are selected by searching the topics on already published online journalism and news

sites. 20 volunteers are selected from the university staff to visit the site everyday. When selecting the volunteers, it was important that the selected person is a user of Internet journalism Web sites regularly as it is important for the test of the approach. The selected volunteers visited the site regularly for 20 days and read the news they are interested. The improved Web site is personalized to keep the track of visitor behaviour in the past period. In this study it is important to track visitor selections of news categories. Each time the volunteer opens the page and clicks on any of the news, the category of that news it belongs and the day the volunteer reads the news is recorded. For each visitor, the total number of visits for each category is stored daily.

2.3. Personalization Part of the Experiment

This experiment is done to test the accuracy, validity and efficiency of the proposed RFM approach for content management and especially for the personalization of the websites. The topics included on the website are given in Tab. 1. Observing visitors for a period and recording their category selections, the news Web site will be personalized and redesigned according to each visitor's category of choices.

The next step of the experiment is to observe the visitors visiting habits on their personalized sites for another period. On the personalized websites, the news categories of the visitor's highest interest will be placed in the main page. The standard seven categories will remain as before. It is expected that the reading rates of the news on the main part of the site will increase. The changes will simply be observed by finding the percentage of news read from the main part of the website over the total news read by the visitor.

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Categories in Turkish	Categories corresponding to traditional categories in English									
Siyaset	Politics (National)									
Dış Haberler	International News									
Güncel	General News									
Ekonomi	Business and Finance									
Spor	Sports News									
Yaşam	Daily Life, Arts and Celebrities									
Bilim Teknik	Science and Technology									

Table 1. Topics in the Web Site

2.4. Relationship Metrics Approach

After 20 days of observation the data stored is analyzed with the proposed RFM approach to identify the visitor-site relationship. The approach is based on RFM attributes classically used in customer relationship management studies. But the classical RFM approach is modified for the content management and personalization of the web sites. In the classical RFM approach only the most recent visit data of the customer is recorded and taken into consideration. For the measurement of the relationship between the visitor and the site, it is not accurate only to get the most recent visit of the user and ignore all other visits. Instead of getting only the most recent visit to a page, the distance of every visit with the last observed time is identified for each visitor and for every category. Also the time intervals between two consecutive accesses are taken into consideration in the algorithm. This is done to find out about the visiting habits of a visitor for every category. If the time interval is wide between two consecutive visit, then this shows that the visitor is not

that often interested with the subject in that category. This also provides information about the reading habits of a user for the specific type of subject. If the user reads news about a subject regularly, then this should be considered as bound with him/her and the subject, and in his/her personalized web page this subject should be included. Frequency attribute will remain the same as in the traditional RFM relationship approach (the number of visits for each user for each subject everyday). Monetary attribute is ignored in this study for the simplicity of the algorithm.

The RFM approach proposed in this study is given in the following formula:

$$\sum_{i=1}^{i=20} (r_{xi} - r_{x(i-1)})^{-2} \sum_{i=1}^{i=20} f_{ci} (t_{last} - t_{r_{xi}})^2$$

i denotes the days of observation (i = 1, 2, ..., 19, 20) x denotes the observed vistors (x = 1, 2, ..., 19, 20) r_{xi} denotes the visit of x visitor on day i f is the number of total visit c denotes the category of the news read t_{last} denotes the last observation day (20)

The formula is applied individually for each visitor for the seven subjects on the Web site separately. The results show the relationship between the visitor and the news category.



Figure 3. Comparison charts of two users

Fig. 3 shows the reading habits of visitor 2 and visitor 3 for category 1, which is national politics. It is clearly seen that visitor 2 is more interested on national politics then visitor 3. The reading rates of visitor 2 are much higher then the reading rates of

visitor about national politics news. Visitor 2 reads about national politics everyday and he/she reads in high rates. But visitor 3 is not interested about national politics and he/she does not read about the news not regularly. Within the 20 days of observation he/she did not even look at the news about national politics for 11 days. The number of news he/she reads the news about this category in one day is maximum 2. So, when personalizing the visitor 2's website his/her interest on national politics should be taken into consideration. While personalizing visitor 3's website it is also be considered that he/she is not that interested on national politics.

3. Results

Table 3 shows overall data and the necessary calculations for 20 volunteers, within 20 days of observation and as all data cannot fit this paper it shows one category. The visitors' most interested categories of news are determined according to the results given in tab. 1. As a result of these calculations the volunteers' most interested 3 categories are determined and the personalized Web sites are redesigned according to these categories. The news on the main page of the site is not selected randomly anymore but from top categories of interest.

rubie 21 Result Comparison												
Period of Study	Main Page Selection / Total Selection (average results from 20 people)											
At the start of the first phase	0.26											
During the first phase (20 day average)	0.37											
At the start of the second phase	0.68											
During the second phase (20 day average)	0.79											

Table 2. Result Comparison

The result of the study can be summarized in comparing just two numbers in Tab. 2. The first number is the average participant's average ratio of finding the right news he or she is interested in the main page, 0.26. This means that three out of four news reports the participant reads come from further clicking the subcategories in the neighbourhood pages. The second number is 0.79, which is again the same ratio of main page selections to the total selections, but this time in the second, personalized phase. This means that four out of five news selections come from the main page.

The large difference between 1/4 and 4/5 ratios is highly significant. Such a ratio is beyond our expectations. This must show that once the reader realizes that the news comes personalized according to his or her interests, a kind of trust emerges between the reader and the news provider that his or her priorities are taken into consideration.

Therefore, according to the result, visitors prefer not to go further into specialized neighbourhood pages and trust that their interests are represented in the home page without having to go to the category pages. It also shows that the RFM formula we have adopted for this study is a promising instrument of personalisation.

It must be considered that there can be factors that may have influenced data negatively. One factor can be losing interest in the experiment by visitors and after a quick read they might have proceeded to their online news site of choice. Yet, the data shows that they have clicked on news stories to read as in the beginning.

1 1	Days	P1	r	rf	Т	Tf	P2	r	rf	Т	Tf	P3	r	rf	Т	Tf	P4	r	rf	Т	Tf	P5	r	rf	Т	Tf	
2 0	1	2	1	1	361	722	4	1	1	361	1444	1	1	1	361	361	0	0	0	0	0	5	1	1	361	1805	
3 1 1 2 2 2 2 3 1 1 2 2 3 1 1 2 2 3 1 2 1 1 2 1 1 2 1	2	0	0	0	0	0	5	1	1	324	1620	0	0	0	0	0	0	0	0	0	0	6	1	1	324	1944	
4 5 1	3	1	2	0,25	289	289	3	1	1	289	867	0	0	0	0	0	0	0	0	0	0	4	1	1	289	1156	
5 0	4	3	1	1	256	768	4	1	1	256	1024	1	3	0,11	256	256	4	3	0	256	1024	3	1	1	256	768	
6 7 2 1	5	0	0	0	0	0	3	1	1	225	675	0	0	0	0	0	5	1	1	225	1125	6	1	1	225	1350	
j i	6	2	2	0,25	196	392	2	1	1	196	392	2	2	0,25	196	392	5	1	1	196	588	7	1	1	196	13/2	
0 0	/ 9	2	1	1	109	144	3	1	1	109	576	1	1	1	109	144	4	1	1	109	720	5	1	1	144	843	
10 2 2 0 0 0 0 0 0 0 0 0 1	0	0	1	0	0	0	3	1	1	144	363	0	1	0	0	0	6	1	1	144	726	7	1	1	144	847	
11 1	10	2	2	0.25	100	200	3	1	1	100	300	0	0	0	0	0	3	1	1	100	300	5	1	1	100	500	
12 1 1 1 4 1 1 4 2 1 1 6 10 1 1 16 64 0 <td>11</td> <td>3</td> <td>-</td> <td>1</td> <td>81</td> <td>243</td> <td>4</td> <td>1</td> <td>1</td> <td>81</td> <td>324</td> <td>1</td> <td>3</td> <td>0.11</td> <td>81</td> <td>81</td> <td>5</td> <td>1</td> <td>1</td> <td>81</td> <td>405</td> <td>6</td> <td>1</td> <td>1</td> <td>81</td> <td>486</td>	11	3	-	1	81	243	4	1	1	81	324	1	3	0.11	81	81	5	1	1	81	405	6	1	1	81	486	
11 1	12	4	1	1	64	256	5	1	1	64	320	2	1	1	64	128	4	1	1	64	256	4	1	1	64	256	
14 2 1<	13	1	1	1	49	49	2	1	1	49	98	0	0	0	0	0	0	0	0	0	0	5	1	1	49	245	
1 1 1 2 2 4 1 3 1 3 5 5 3 0 3 1	14	2	1	1	36	72	3	1	1	36	108	0	0	0	0	0	0	0	0	0	0	3	1	1	36	108	
10 0	15	1	1	1	25	25	4	1	1	25	100	1	3	0,11	25	25	5	3	0	25	125	6	1	1	25	150	
17 2 2 0<	16	0	0	0	0	0	4	1	1	16	64	0	0	0	0	0	3	1	1	16	48	7	1	1	16	112	
1 1 1 4 4 2 1 1 4 8 0 0 0 0 2 1 1 4 4 1 1 1 200 2 1 <th1< th=""> 1 1 1</th1<>	17	2	2	0,25	9	18	3	1	1	9	27	0	0	0	0	0	4	1	1	9	36	4	1	1	9	36	
10 0	18	1	1	1	4	4	2	1	1	4	8	0	0	0	0	0	2	1	1	4	8	5	1	1	4	20	
20 2 1 1 0 0 1 1 0 0 1 1 0	19	0	0	0	0	0	3	1	1	1	3	0	0	0	0	0	4	1	1	1	4	3	1	1	1	3	
read y 1 1 1 4 1 <td>20</td> <td>2</td> <td>1</td> <td>1</td> <td>0</td> <td>0</td> <td>2</td> <td>1</td> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>5</td> <td>0,04</td> <td>0</td> <td>0</td> <td>3</td> <td>1</td> <td>1</td> <td>0</td> <td>0</td> <td>6</td> <td>1</td> <td>1</td> <td>0</td> <td>0</td>	20	2	1	1	0	0	2	1	1	0	0	1	5	0,04	0	0	3	1	1	0	0	6	1	1	0	0	
Int I Int I <t< td=""><td>Totals</td><td>29</td><td></td><td>12</td><td>1783</td><td>3520</td><td>68</td><td></td><td>20</td><td>2470</td><td>9158</td><td>11</td><td></td><td>4,62</td><td>1296</td><td>1556</td><td>60</td><td></td><td>13</td><td>1411</td><td>6041</td><td>103</td><td></td><td>20</td><td>2470</td><td>12867</td></t<>	Totals	29		12	1783	3520	68		20	2470	9158	11		4,62	1296	1556	60		13	1411	6041	103		20	2470	12867	
constrain constrain <thconstrain< th=""> <thconstrain< th=""> <th< td=""><td>TI = 11 = rf * (1/TA =</td><td>_</td><td></td><td>42240</td><td></td><td></td><td>_</td><td></td><td>185160</td><td></td><td></td><td>┣—</td><td></td><td>/193,91</td><td></td><td></td><td><u> </u></td><td></td><td>0.002180</td><td></td><td></td><td><u> </u></td><td></td><td>23/340</td><td></td><td></td></th<></thconstrain<></thconstrain<>	TI = 11 = rf * (1/TA =	_		42240			_		185160			┣—		/193,91			<u> </u>		0.002180			<u> </u>		23/340			
	Dave	P6	r	0,003409 rf	т	Tf	P 7	r	0,002184	т	Tf	рş	r	0,002971	т	Tf	ро	r	rf	Т	Tf	P10	r	0,001334	т	Tf	
2 0	1	0	0	0	0	0	3	1	1	361	1083	0	•	0	0	0	4	1	1	361	1444	2	1	1	361	722	
3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 200 200 5 1 1 200 200 1 1 200 55 1 1 200 1 1 200 1 1 1 200 1 1 1 200 1 1 1 200 1 1 1 200 1 1 1 200 1 1 1 200 1 <t< td=""><td>2</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>3</td><td>1</td><td>1</td><td>324</td><td>972</td><td>2</td><td>1</td><td>1</td><td>324</td><td>648</td><td>5</td><td>1</td><td>1</td><td>324</td><td>1620</td><td>2</td><td>1</td><td>1</td><td>324</td><td>648</td></t<>	2	0	0	0	0	0	3	1	1	324	972	2	1	1	324	648	5	1	1	324	1620	2	1	1	324	648	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	3	0	0	0	0	0	2	1	1	289	578	1	1	1	289	289	5	1	1	289	1445	2	1	1	289	578	
5 0 0 0 0 0 1	4	1	3	0,11111	256	256	2	1	1	256	512	2	1	1	256	512	6	1	1	256	1536	3	1	1	256	768	
6 1 2 0.25 19 19 19 19 18 1 1 19 196 18 1 1 10<	5	0	0	0	0	0	4	1	1	225	900	3	1	1	225	675	5	1	1	225	1125	2	1	1	225	450	
7 1 1 1 10 10 3 3 2 0 10 1 1 10 10 2 1 1 10 3 3 10 2 10 <	6	1	2	0,25	196	196	3	1	1	196	588	0	0	0	0	0	6	1	1	196	1176	1	1	1	196	196	
s 0	7	1	1	1	169	169	2	1	1	169	338	1	2	0,25	169	169	6	1	1	169	1014	2	1	1	169	338	
9 0	8	0	0	0	0	0	1	1	1	144	144	2	1	1	144	288	4	1	1	144	576	2	1	1	144	288	
10 1	9	0	0	0	0	0	2	1	1	121	242	4	1	1	121	484	0	0	0	0	0	0	0	0	0	0	
11 1<	10	1	3	0,1111	100	100	1	1	1	100	100	1	1	1	100	100	6	2	0	100	600	0	0	0	0	0	
12 0 0 0 0 0 0 0 0 0 0 0 1 1 0 1 1 0 0 0 0 0 1 1 0	11	1	1	1	81	81	2	1	1	81	162	0	0	0	0	0	7	1	1	81	567	2	3	0,11111	81	162	
13 0 0 0 0 0 0 1 1 49 98 5 1 1 49 25 1 1 1 49 98 5 1 1 49 98 5 1 1 49 98 5 1 1 1 49 98 5 1 1 1 49 98 5 1 <th1< th=""> 1 <th1< th=""></th1<></th1<>	12	0	0	0	0	0	3	1	1	64	192	0	0	0	0	0	6	1	1	64	384	1	1	1	64	64	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	13	0	0	0	0	0	2	1	1	49	98	2	5	0,11	49	98	5	1	1	49	245	2	1	1	49	98	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	14	2	5	0,1111	36	72	1	1	1	36	36	0	0	0 25	0	0	4	1	1	36	144	3	1	1	36	108	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	15	1	1	0	23	23	2	2	0.25	16	32	2	2	0,23	16	16	7	2	0	16	112	2	1	1	16	30	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10	1	2	0.25	9	9	1	2	0,25	9	9	2	1	1	9	18	6	2	1	9	54	1	1	1	9	9	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	18	0	0	0	0	0	2	1	1	4	8	0	0	0	0	0	4	1	1	4	16	2	1	1	4	8	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	19	1	2	0,25	1	1	1	1	1	1	1	2	2	0,25	1	2	5	1	1	1	5	3	1	1	1	3	
Totals 11 5,08333 873 909 39 18,25 244 5995 2 0 10,86 178 349 98 17 234 1203 3 17 234 1203 3 3 98 17 234 1203 3 17 12040 3 4 12040 3 3 98 17 <th17< th=""> 18 18</th17<>	20	1	1	1	0	0	2	1	1	0	0	1	1	1	0	0	7	1	1	0	0	2	1	1	0	0	
rf * Tr = b ····································	Totals	11		5,08333	873	909	39		18,25	2445	5995	26		10,86	1728	3349	98		17	2324	12063	36		17,11	2249	4522	
rf * (1/Tr) = ····································	rf * Tf =			4620,75			109408,75					36373,86							199039,50					77376,44			
Days P11 r rf P12 r rf P13 r rf P14 r rf P14 r rf P14 r rf P14 r rf P14 r rf T Tf P15 r rf T Tf P14 r rf T Tf P14 r rf T Tf P15 r T Tf P14 r T Tf P14 r T Tf P14 r T Tf P14 r T Tf P14 r T Tf P14 r T Tf P14 r T Tf P14 T T Tf P14 T T Tf P14 T T Tf P14 T T Tf P14 T T Tf P14 T T Tf P14 T T Tf <th< td=""><td>rf * (1/Tf) =</td><td></td><td></td><td>0,005592</td><td></td><td></td><td colspan="5">0,003044</td><td colspan="5">0,003243</td><td colspan="6">0,001367</td><td colspan="5">0,003783</td></th<>	rf * (1/Tf) =			0,005592			0,003044					0,003243					0,001367						0,003783				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Days	P11	r	rf	Т	Tf	P12	r	rf	Т	Tf	P13	r	rf	Т	Tf	P14	r	rf	Т	Tf	P15	r	rf	Т	Tf	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1	0	0	0	0	0	1	1	1	361	361	4	1	1	361	1444	7	1	1	361	2527	1	1	1	361	361	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	2	0	0	0	0	0	1	1	1	324	324	5	1	1	324	1620	9	1	1	324	2916	0	0	0	0	0	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	3	0	2	0	0	0	0	0	0.25	0	0	4	1	1	289	1156	8	1	1	289	2312	0	0	0	0	0	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	4	1	3	0,11111	230	230	1	2	0,25	230	230 450	5	1	1	230	1280	0	1	1	230	2048	2	4	0.0625	225	450	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	5	0	1	0	225	225	1	1	1	106	430	5	1	1	223 196	1125	9 7	1	1	106	1372	2	4	0,0025	106	430	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	7	0	0	0	0	0	0	0	0	0	0	4	1	1	169	676	6	1	1	169	1014	2	1	1	169	338	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8	0	0	0	0	0	0	0	0	0	0	5	1	1	144	720	8	1	1	144	1152	3	1	1	144	432	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	9	1	4	0,0625	121	121	1	3	0,11111	121	121	5	1	1	121	605	5	1	1	121	605	0	0	0	0	0	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10	1	1	1	100	100	0	0	0	0	0	6	1	1	100	600	4	1	1	100	400	1	2	0,25	100	100	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	11	2	1	1	81	162	1	2	0,25	81	81	6	1	1	81	486	8	1	1	81	648	1	1	1	81	81	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	12	0	0	0	0	0	0	0	0	0	0	5	1	1	64	320	9	1	1	64	576	2	1	1	64	128	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	13	1	2	0,25	49	49	1	2	0,25	49	49	4	1	1	49	196	5	1	1	49	245	0	0	0	0	0	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	14	0	0	0	0	0	2	1	1	36	72	4	1	1	36	144	6	1	1	36	216	1	2	0,25	36	36	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	15	0	0	0	0	0	1	1	1	25	25	5	1	1	25	125	5	1	1	25	125	2	1	1	25	50	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	16	0	0	0	0	0	1	1	1	16	16	5	1	1	16	80	4	1	1	16	64	1	1	1	16	16	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	17	1	4	0,0625	9	9	0	0	0	0	0	6	1	1	9	54	5	1	1	9	45	1	1	1	9	9	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	18	1	1	1	4	4	1	2	0,25	4	4	4	1	1	4	16	1	1	1	4	28	0	0	0	0	0	
Image: Second second	19	2	1	1	1	2	0	0	0	0	0	5	1	1	1	5	8	1	1	1	8	0	0	0	0	0	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	20 Totale	11	18	5 48611	846	928	14	18	8 11 11	1694	U 1955	200	1 20	20.00	2470	11879	0	1 20	20	2470	18326	18	17	9 5625	0	2107	
ff * (1/Tf) = 0,005911 0,004148 0,001690 0,001091 0,004352	rf * Tf =			5091.111111	0.10	/20		.0	15857 22	+		20	20	236560.00		. 1320		20	366520.00		. 0520	.0	• '	21008 81	20	2.71	
	rf * (1/Tf) =	* (1/Tf) = 0.005911							0,004148			1		0,001690					0,001091					0,004352			

Table 3. Overall data for one category (Science and Technology) out of seven

Days	P16	г	rf	Т	Tf	P17	r	rf	Т	Tf	P18	r	rf	Т	Tf	P19	г	rf	Т	Tf	P20	r	rf	Т	Tf
1	3	1	1	361	1083	6	1	1	361	2166	2	1	1	361	722	5	1	1	361	1805	0	0	0	0	0
2	2	1	1	324	648	5	1	1	324	1620	0	0	0	0	0	3	1	1	324	972	0	0	0	0	0
3	3	1	1	289	867	3	1	1	289	867	0	0	0	0	0	4	1	1	289	1156	1	2	0,25	289	289
4	4	1	1	256	1024	5	1	1	256	1280	0	0	0	0	0	3	1	1	256	768	1	1	1	256	256
5	2	1	1	225	450	0	0	0	0	0	1	4	0,06	225	225	2	1	1	225	450	0	0	0	0	0
6	3	1	1	196	588	2	2	0,25	196	392	0	0	0	0	0	5	1	1	196	980	1	2	0,25	196	196
7	2	1	1	169	338	4	1	1	169	676	0	0	0	0	0	3	1	1	169	507	2	1	1	169	338
8	3	1	1	144	432	5	1	1	144	720	1	3	0,11	144	144	2	1	1	144	288	1	1	1	144	144
9	3	1	1	121	363	3	1	1	121	363	1	1	1	121	121	0	0	0	0	0	1	1	1	121	121
10	2	1	1	100	200	6	1	1	100	600	0	0	0	0	0	2	2	0,25	100	200	0	0	0	0	0
11	4	1	1	81	324	1	1	1	81	81	0	0	0	0	0	0	0	0	0	0	2	2	0,25	81	162
12	1	1	1	64	64	4	1	1	64	256	0	0	0	0	0	1	2	0,25	64	64	1	1	1	64	64
13	2	1	1	49	98	0	0	0	0	0	2	4	0,06	49	98	5	1	1,00	49	245	1	1	1	49	49
14	4	1	1	36	144	2	2	0,25	36	72	1	1	1	36	36	2	1	1	36	72	0	0	0	0	0
15	2	1	1	25	50	3	1	1	25	75	1	1	1	25	25	3	1	1	25	75	1	2	0,25	25	25
16	1	1	1	16	16	3	1	1	16	48	0	0	0	0	0	4	1	1	16	64	2	1	1	16	32
17	3	1	1	9	27	2	1	1	9	18	1	1	1	9	9	2	1	1	9	18	0	0	0	0	0
18	1	1	1	4	4	4	1	1	4	16	0	0	0	0	0	1	1	1	4	4	1	2	0,25	4	4
19	2	1	1	1	2	2	1	1	1	2	0	0	0	0	0	2	1	1	1	2	2	1	1	1	2
20	2	1	1	0	0	3	1	1	0	0	1	3	0,11	0	0	3	1	1	0	0	1	1	1	0	0
Totals	49	20	20	2470	6722	63	20	16,5	2196	9252	11	19	5,35	970	1380	52	20	16,50	2268	7670	18	19	10,25	1415	1682
rf * Tf=			134440					152658					7379,16					126555,00					17240,5		
rf * (1/Tf) =) = 0,002975							0,001783					0,003874					0,002151			0,006093				
r=	(rx-i	xi)																						-	
rf=	(rx-i	xi) [:]	2																						
T=	(Tso	on-1	"rxi) ²																						
Tf=	T*P	i																							

Table 3. Continue

4. Conclusion

In this study we have prepared a dynamic temporary Web news site, conducted experiments for a small group of participants over two periods, one with general content management the other with personalized content management. Personalization was based on the tracking and in the first phase and interpreting data with techniques adopted from relationship management discipline. The results showed that there is dramatic difference of Web news reader behaviour to non-personalized and personalized content dissemination.

In the beginning, when personalisation effect was little, visitors were not satisfied with the home page and preferred to go the category pages of their interest. But towards the late stages of the experiment visitors applied less to the category pages and satisfied with the content of the personalised home page.

As a result of this study and repeating it for a larger and more representative sample space the natural way to go further is improving and determining personalization real time for a more detailed category structure and other parameters, while developing the relationship calculation techniques. Industrial application would be significant in that the news sites can feed the right content to the right people in a shorter time increasing efficiencies.

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