

Posting RFM Model for Evaluating the Member Loyalty in Social Network Sites

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Abstract

Recently, with the growing of social network sites, people's choice is also getting more and more. So the notion of loyalty has become an important construct within the Social Network framework because of member is easy switching on the social networking sites. Despite the increasing importance of social network sites loyalty question, there's very little research in this area.

In electronic commerce, the website loyalty development process is based on both website satisfaction and website trust toward the net-enabled business. But how to target the members with high or low loyalty in the social network sites is still a question. In this paper we propose one improved RFM model to evaluate the member loyalty to find the potential members for improving the service quality of the social network site. In addition, an empirical case study is performed to demonstrate how this procedure works. Moreover, further applications of this research are provided for improved social network sites experiences and how to use the model to practice.

Key Word: Social Network Sites, RFM Model, Loyalty

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1. Introduction

Today, individuals and organizations are founding Social Network Service based communities at a mind boggling pace. People are using the social network sites to find others with similar interests, to shop more efficiently, to learn about products and services, to vent about shoddy products and poor service, and to stay in touch with distant relatives and friends on the other side of the world [11]. But in addition to like facebook, twitter, my-space and several big social network sites, there are many little sites providing the social network service. People's choice is getting more and more. So the notion of loyalty has become an important construct within the Social Network framework because of member easy switching behavior on the social networking sites.

As a result, the importance of website loyalty has become a key issue for social network sites. Website loyalty is defined as a deeply held willingness and commitment to revisit the website consistently and desire to stay more at the website at each visit, thereby causing sticky and repetitively visits [15]. Studies have focused on customer loyalty toward commercial websites and the development process of this loyalty. However, the applications for

social network sites, i.e. content providers without business transactions, have increased noticeably. Thus, the question of how to evaluate the loyalty of social network sites members has increased in importance.

In order to provide the desired evaluation method for social network sites members, we proposed one member loyalty mining procedure based on the social network sites data. According to member using behavior, an improved loyalty evaluating process applying a recency, frequency, and monetary (RFM) analytic model can be implemented and posting RFM attributes. In order to verify the feasibility of the model, we used the real data from one social network sites to analysis the member loyalty and discussed the result.

2. Related Works

2.1 Website Loyalty

In order to acquire and retain customers and enhance customer value, customer relationship management is a critical success factor for businesses [16]. However, in a net-enabled competitive environment, it is essential to realize the characteristics of website visitors as potential customers. Because of the lower cost of retaining customers [11], it is possible to focus on strengthening customer loyalty.

Traditional offline loyalty was defined as having both behavior and attitudinal aspect [6, 15], but at the online environment, both the time visitors spend at a website and the frequency with which they return should be included into the operation of website loyalty [5]. Similarly, individuals may return to the same website, simply because there is no other alternative available. Although it can be seen as behavior loyalty, this repeat visit does not connote 'real' loyalty, but just a repeat behavior out of necessity [14]. The website loyalty was defined as: "a deeply held willingness and commitment to revisit the website consistently and desire to stay more at the website at each visit, thereby causing sticky and repetitive visits" [15].

Therefore, following this definition it can be argued that, "loyal members are those who are willing to visit a website repeatedly (revisits) and who want to stay there for a long time and post something to share with friends at each visit."

2.2 Social Network Sites

Social Network Sites (SNSs) are "web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other members with whom they share a connection, and (3) view and

traverse their list of connections and those made by others within the system" [2]. The first social network site was launched in 1997 and currently there are hundreds of social network sites across the globe, supporting a spectrum of practices, interests and members.

The studies of online communities have focused on two types of social system: information commons, where many individuals contribute to the construction of a small number of shared artifacts, and online discussion groups, where individuals exchange messages on a given topic [13]. Content contribution can be described through the interaction between these elements: the people who are involved, the content, artifacts they produce and share or engagement between people around content, and distribution, the way in which people discover and consume content.

Contributions of knowledge to electronic networks of practice seem paradoxical. Previous research argues that giving away knowledge eventually causes the possessor to lose his or her unique value relative to what others know and benefits all others except the contributor [18].

For a social network site, the success of the site is tied to the amount of contribution any one member's social contacts have produced, and outcome that is depen-

dent on the eventual participation of a large portion of the member base.

2.3 Loyalty for Social Network Sites

According to repurchasing behavior, loyalty can be divided into four classes: (1) undivided loyalty, (2) divided loyalty, (3) unstable loyalty, and (4) no loyalty [3]. In order to distinguish between true loyalty and untire loyalty, loyalty has been defined as “the preferential, attitudinal and behavioral response toward one or more brands in a product category expressed over a period of time by a consumer” [7]. As the business world moves toward online solutions, loyalty has also been defined as the customer’s “favorable attitude toward an electronic business resulting in repeat buying behavior” [1]. In this paper, we have revised the definition of loyalty for social network sites to “the favorable attitude toward an online service provider resulting in repeat posting behavior.”

2.4 RFM Model

To identify customer behavior, the well known method called recency, frequency and monetary (RFM) model is used to represent customer behavior characteristics [4, 9]. RFM models have been used in direct marketing for more than 30 years.

Given the low response rates in this industry (typically 2% or less), these models were developed to target marketing programs at specific customers with the objective to improve response rates. Prior to these models, companies typically used demographic profiles of customers for targeting purposes.

However, research strongly suggests that past purchases of consumers are better predictors of their future purchase behavior than demographics [8]. The basic assumption of using the RFM model is that future patterns of consumer trading resemble past and current patterns. The calculated RFM values are summarized to clarify customer behavior patterns. This study proposes using the following RFM variables [4] :

- Recency (R) : the latest purchase amount.
- Frequency (F) : the total number of purchases during a specific period.
- Monetary (M) : monetary value spent during one specific period.

3. Posting RFM Model for Social Network Sites

In this section, the proposed research model of this study and loyalty evaluating approaches based on the posting behavior toward social network sites are described and a

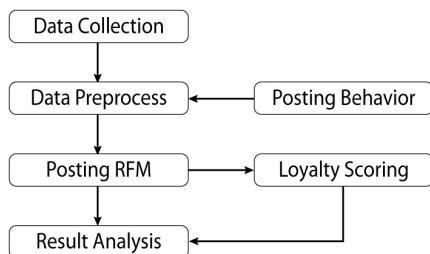
model constructed for evaluating loyalty according to the posting RFM attributes.

3.1 Research Model

[Fig. 3-1] illustrates the research model in this study. The member’s loyalty evaluating procedure can be divided into four processes.

1. Collecting the members’ records, the records include the members’ registering date, posting date/length, posting type etc. All of the records have no member privacy.
2. Select and preprocess the data, including to clear the data, and to make the connection of the records.
3. Extract the members’ posting recency, posting frequency and posting monetary according to posting behavior and score each member’s loyalty by definition.
4. Analyze the scoring results

Below, we explain the details of the proposed procedure.



[Fig. 3-1] Research Model

3.1.1 Data Collection

All of the member’s records are saved in the web server, but the records have no connection and lack to manage or analyze. In order to reduce data size and understand easily, only 1) member registering date, 2) member posting type, posting date, posting length are collected. But in posting type, there are four types of member posting behavior, photo, status, comment and message. Photo and status are very normal behavior in social network sites. Members always share their photos and status with their friends. And the other friends can give the comment about the photos and status publicly, or send the message about the photos and status secretly. In social network sites, all of the members posting behavior can be defined the four basic types.

3.1.2 Data Preprocessing

In the data collection step, we got all of the data from the first day to the last day of the website. But according to the analysis target we must choose the period of data analysis. And then we loaded the data to the database for analyzing.

3.1.3 Posting Behavior Definition

According the related work and our purpose of evaluating member’s loyalty in

social network sites, we expanded the domain of loyalty by posting behavior, with consists of posting recency, posting frequency, and posting monetary (Posting RFM). The posting RFM is defined as follows:

(1) Rp (Posting Recency)

Subtract the time at the end of the data record from the last posting time.

(2) Fp (Posting Frequency)

The times the social network site has been posted during the period of data analysis.

(3) Mp (Posting Monetary)

The total posts on the social network site during the period of data analysis.

The loyalty by the posting behavior is constructed of RP, FP and MP, and the meaning of the posting behavior as in <Tab. 3-1>.

<Tab. 3-1> The Meaning of Posting RFM

Posting RFM	The meaning of posting RFM
Rp	How long has it been since the member visited the social network site.
Fp	How often has the member visited the social network site.
Mp	How many has the member post on the social network site.

The <Tab. 3-2> shows the relation between customer value and website loyalty.

<Tab. 3-2> Customer Value and Loyalty

	Customer value	Member loyalty
R	Last purchasing time. The closer, the better	Last posting time. The closer, the better
F	Purchasing frequency The higher, the better	Posting frequency The higher, the better
M	Total purchasing amount The more, the better	Total posting length The longer, the better

The posting recency and posting frequency are been used widely as the RFM model, but the posting monetary is not been verified in the RFM model. As the relation work, the contribution of social network site is very important dimension for the website success. And for the traditional transaction, the customers purchase the goods and send money to company as the distribution for the company. So for the social network sites, the members post contents for the sites, as the distribution for sites, we can think that the members send the value to the social network sites.

Because the new members always use the service frequently, so we use one dimension of registering date to weight the posting frequency. The older members are been gave higher posting frequency score than new members.

And the other question is the types of member's posting behavior, photo, status, comment and message. We distinguished the four types for analyzing. Following the

strategy of the social network site, we can give the weight for the four types. If the site encourages members to post photos, we can give the photo high weight, if encourages members to discuss each other, we can give the message high weight.

3.1.4 Posting RFM Calculation

After the data collection and data pre-processing, according to the posting behavior definition, the posting RFM attributes of members can be calculated from the original data. As in <Tab. 3-3> :

<Tab. 3-3> The Posting RFM Example

Member	Rp Days	Fp Times	Mp Length
1	5	5	3photos+ 14 comments
2	1	1	1 photo
3	6	17	13 status + 20 messages
4	21	2	2 photos
5	9	19	1 status

3.1.5 Loyalty Scoring

Before scoring the loyalty, the posting RFM are normalized to eliminate the scale effect, posting recency, negatively correlated for loyalty, can be normalized as the following formula:

$$Rpi' = 1-(Rpi-Rpmin)/(Rpmax-Rpmin)$$

Posting frequency and posting monetary, positively correlated for loyalty, are normalized by following formula :

$$Xi' = (Xi-Xmin)/(Xman-Xmin)$$

With respect to the three variables in the original RFM model, Hughes regarded the three attributes as equally important [10]. Due to the different characteristics of industry, Stone indicated that the three attributes were of different importance [17]. We have also suggested that the weights of posting RFM should be tuned for the different considerations and characteristics of a website. However, in this study, we set the weights of posting RFM as identical since the difference in importance of these attributes was not in the scope of this research. Therefore, loyalty was evaluated by the following equation:

$$Loyalty = (Rp'+Fp'+Mp')/3 \times 100\%$$

3.1.6 Result Analysis

According to the loyalty scoring results, a relation between member behavior and member life cycle can then be analyzed.

4. Case Study and Discuss

For verifying the posting RFM model that we recommend, we used the real

members' data from H social network site. This website founded in 2007 and has 180,000 members till November 2010. Although we got all the data, but because we just verify the feasibility of the posting RFM model, so we just selected 1 month data from October 29~November 29, 2010.

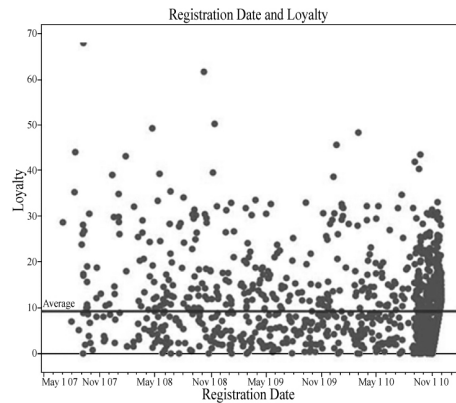
During the 31days, 1,782members logged in and posted on H website. On average this members last posted the website 12.57 days ago, posted the website 43.16 times, and posted 6,369.58 bytes words. The score of posting RFM is illustrated in <Tab. 4-1>.

<Tab. 4-1> Score of Posting RFM

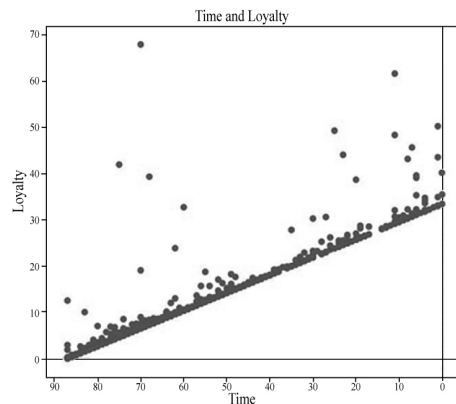
Score of Posting Behavior	Average
Rp	12.57(days)
Fp	43.16(times)
Mp	6369.58(bytes)
Rp-Score	0.59
Fp-Score	0.0035
Mp-Score	0.0075
Loyalty Score	20.05

Here we set the photo's size is 100, the meaning is that the weight of photo is 100.

As show in [Fig. 4-1], X-axis is the time of members used, from 0~30 days (to facilitate analysis, we divided one day into three parts). Y-axis is the loyalty of members, we can see that the loyalty is



[Fig. 4-1] Time and Loyalty



[Fig. 4-2] Loyalty VS Registration Date

steadily improving, but there are many members loyalty are higher than the members on corresponding time period, so that members are high value members and the website must research this members characteristics and needs to improve the website.

As above that the registration time is associated with loyalty, as [Fig. 4-2], there are many old members have high loyalty. Those members are the high

value members too. They used the website for a long time but have high loyalty still. But as the average line, the old members and the new members have the same average loyalty. So we can see that the H website stable and has a fixed member group.

5. Conclusion

This research presented a loyalty evaluating procedure for social network sites. According to member using behavior, an improved loyalty evaluating process applying a recency, frequency, and monetary (RFM) analytic model can be implemented and posting RFM attributes. In order to verify the feasibility of the model, we used the real data from one social network sites to analysis the members' loyalty and discussed the result. In the meantime, while website managers and development teams might be advised to listen to their users, our model has provided a way to target members with high or low loyalty with the website. By focusing on members with the highest loyalty, development teams can investigate the reasons for their loyalty to the website, and by examining members with a low loyalty rating they can look to improve those members' online experience.

The limitation of this research is the lack of multi-dimensional analysis. In social network sites, there are so many factors affect member loyalty. This research just discussed the posting behavior in social network sites. In the future, we will establish the multi-dimensional analysis model for analyzing the member's behavior in social network sites.

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소셜 네트워크 사이트 회원 충성도 평가를 위한 Posting RFM 모델

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요 약

최근 들어 소셜 네트워크 사이트가 많아지면서 사용자들은 선택의 폭이 넓어졌다. 그리하여 다른 소셜 네트워크 사이트로의 이동이 쉬워짐으로서 소셜 네트워크 프레임 구성하는데 충성도 개념이 중요하게 인식되기 시작하였다. 그러나 소셜 네트워크 분야에서 충성도의 연구는 아직 미묘한 수준이다.

전자상거래시대의 웹사이트 충성도는 사이트의 만족도와 신뢰성을 기반으로 개발되었다. 그러나 소셜 네트워크 사이트의 특성상 회원들의 충성도를 측정하기에는 어려움이 많다. 본 연구에서 우리는 소셜 네트워크 사이트의 서비스 품질 향상을 위한 잠재적인 회원을 찾을 수 있는 회원 충성도 평가 RFM모형을 제안하고자 한다. 그리고 개선된 RFM모형을 실제 사례에 적용하여 분석하고 그 일련의 과정을 기술하였다. 이는 연구 제안모형을 실제 비즈니스에서 적용할 수 있다는 것을 제시함으로써 논문의 실용성을 높이고자 하였다.

표제어: 소셜 네트워크 사이트, RFM모형, 충성도

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칭다오대학교에서 경영정보학 학사, 광운대학교 일반대학원에서 경영학 석사학위(경영정보 전공)를 취득하였다. 현재 광운대학교에서 경영정보학 전공으로 박사과정에 재학 중이다. 주요 관심분야는 비즈니스 인텔리전스, OLAP, 데이터웨어하우스 CRM, SNS 등이다.



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동국대학교 경제학 학사, 광운대학교 경영대학원 경영학 석사학위를 취득하였다. 현재 광운대학교 대학원에서 경영정보학 전공으로 박사과정에 재학 중이다. 주요 관심분야는 비즈니스 인텔리전스, CRM, SNA 등이다.