Team 50094

How to assess public web-chat accounts

Abstract

The main purpose of our paper is to build mathematical models to predict the growth trend of public accounts corresponding to different fields, and to evaluate whether Web-Chat operate their platforms effectively.

Task 1. In order to predict the rising trend of Web-Chat in different fields. Firstly, we chose fours domains of public account information which are representative in public web-chat accounts, these areas are education, government, media and network. Secondly, we used the number information of those fields and handled them. Finally, on the basis of the model GM (1,1), we made some improvements and established the model DGM (2,1). What's more, we calculated error rationality C 0.43, 0.42, 0.53, 0.61 and the error probability P 0.89, 0.86, 0.75, 0.88 respectively in four different fields. We find the model DGM(2,1) is better than GM(1,1) in forecasting rising trend of Web-Chat in different fields.

Task 2. In order to evaluate whether Web-Chat users operate their platforms effectively, we set up the model which combines the structure equation with comprehensive evaluation method to solve the problem. We pick up five different fields, namely, government, education, media, website and celebrity, to test the model. The result of the model shows that users in the fields of education and celebrity run their public web-chat accounts exceedingly effectively and the public accounts don't work well in other three fields.

Task 3. Connecting the results of task 1 and task 2 to the first part of task 3, we list some strategies to operate public web-chat account of mathematical models and find that number of people caring about web-chat issues meets the diffusion theory of innovation. In order to give the running strategies to run the account and predict the growth trend of users, first we position it as a subscription, then referring to the ideal operating results of the Web-Chat public education sector number scheme to develop our strategies: Send a message once a day; the way of sending are single graphic and multi-graphic and links to other websites of video; Push content respectively from the interactive activities, league, advertising, etc.;the custom menu is composed by multilevel menu; then we can draw a conclusion that the trend of Web-Chat's growth can be described by Innovation diffusion curve through the research about the growth pattern of Web-Chat's users. So we design a plan to predict how many people would have eyes on the forum of mathematical models based on the diffusion theory of innovation.

Key words: DGM(2,1) Structure Equation Comprehensive evaluation method diffusion theory of innovation

1 Introduction

1.1 Background

Web-chat is a mobile text and voice message communication service developed by Tencent in China, first released in January 2011. Up to August 2014, there have been 438 million active domestic users and 70 million foreign loggers.

It is worth noting that the users of public web-chat account allowed to send one message to common people everyday, but only a very few public accounts use the only chance to sent their group messages to common people. the majority of users of public account would send valuable news which they think worthy of attention and interesting messages which they think that audience may be interested in ,based on their own topics and target content.

It is important for the companies to analyze whether they operate their platforms effectively and whether they would have made better use of the public platforms since there are numerous public accounts in various fields.

1.2 Restatement of the Problem

We need to build mathematical models to solve the following questions:

1 Look for references to analyze the fields of Web-chat public accounts and model to predict the growth trend of public accounts corresponding to different fields.

2 set up a model to analyze whether public accounts in different fields are effectively run and explain the advantages and disadvantages of your model.

3 If you are given a Web-chat public account: mathematical modeling, demonstrate how to operate it in our own way and predict the growth trend of the amount of attention.

2 Problem analysis

Task 1:

We need to establish a mathematical model to predict the growth trend of public accounts corresponding to different fields. Because this prediction is a short-term prediction, and the data that we collected is limited. As we all know, results that the gray system forecast are relatively stable, the prediction is suitable for not only a large amount of data but also a handful of data. We made some improvements in the GM (1,1) and built DGM (2,1) model to forecast the number of public accounts. We chose

four different domains to test our model, that is , What's more, in the process of modeling, we need to calculate the error rationality C and the error probability to test the model, we calculate error rationalizations C 0.43, 0.42, 0.53, 0.61 respectively in four fields and the error probabilities P 0.89, 0.86, 0.75, 0.88. We find the DGM(2,1) model is better than GM(1,1) in forecasting rising trend of Web-chat in different fields.

Task 2:

In order to thoroughly evaluate the effectiveness of users' running strategies in a specific field, we need to consider the problem from the perspectives of account-users and common people. We think the number of fans, the times of being watched, the times of being collected and the times of transmissions as the common people's factors(external factors) and regard user's running strategies as users' factors(internal factors). We adopt the structure equation and comprehensive evaluation method to construct a combination to solve the problem. The result solved by the model we set up conforms to physical truth. Education and celebrity are the two fields that attract most web-chatters of mobile phone users-(young people).

Task 3:

This part needs coming up with a plan to manage public web-chat account for mathematical modeling and a method for predicting the number of people who will care about it. It' obviously seen that we need to give the feasible plans based on the results of task 1 and task 2. At the same time, this problem belongs to the opening category. In order to give the running strategies to run the account, we did lots of research and we learn from the most effective Web-Chat public channel's running strategies, first giving the position of "mathematical modeling"Web-channel, then we design the running strategies separately from the time and frequency, The way of sending, content and Custom Menu. To predict the growth trend of "mathematical modeling" public channel's users, we do lots of researches about the growth trend of Web-Chat's users.

3 Assumptions

(1)All data we collected is totally right and can reflect the truth.

(2)There exists a fair competition in the internal circle of different fields

(3)All users of public web-chat accounts wouldn't post the message to the fields that they don't belong to.

(4)Every user applies an only account in their own field and doesn't register another one in other fields.

(5) All users don't cancel their accounts.

4 Symbols and Definitions

Variable Symbols	Definition
$\dot{X}_k^{(0)}$	The time-series number of web-chat accounts fans
a_k b_k	The coefficients of gray system
X	User's managerial tactics
ξ	The running value(internal value)
Y	Reflect the effectiveness score of user's managing
w	The weight factor
s	The score determined by common people factors
v	The effectiveness value
$N(t)$	The number of people scanning mathematical model account
m	The potential people scanning the account

5 Models

5.1 Task 1

5.1.1 The Preparation And Establishment of Model in Task 1

In order to predict the growth trend of number of media, government, education, network public account registrations, we chose 8 consecutive months of public accounts in each field on 2012 September as the original sequence, and constructed the forecasting model DGM (2,1)[1].

（1）Each field of the original sequence $\dot{X}_k^{(0)}$ is as follows：

Table 1- 1 The registered amount of media, government, education, network

	2012.09.04	2012.09.05	2012.09.06	2012.09.07	2012.09.08	2012.09.09	2012.09.10	2012.09.11
Media	209	285	364	653	799	1107	2579	3107
Government	227	116	142	318	364	525	727	1013
Education	215	256	264	241	422	486	502	574
Website	221	416	685	1022	955	1337	2254	2130

$$\overset{\bullet}{X}_k^{(0)} = \left\{ x_k{}^{(0)}(1), x_k{}^{(0)}(2), ..., x_k{}^{(0)}(n) \right\}, k = 1,2,3,4$$

To weaken the fluctuation and randomness of sequences, we accumulated the original sequence and got the new data sequence $X_K{}^{(1)}$:

$$\overset{\bullet}{X}_k^{(1)} = \left\{ x_k{}^{(1)}(1), x_k{}^{(1)}(2), ..., x_k{}^{(1)}(n) \right\}, k = 1,2,3,4$$

Then the differential equation DGM(1.1)is obtained:

$$\frac{d^2 x_k^{(1)}}{dt^2} + a_k \frac{dx_k^{(1)}}{dt} = b_k, k = 1,2,3,4 \tag{5-1}$$

$\boldsymbol{a}, \boldsymbol{b}$ are determined parameters

(3)Discrete the formula(5-4),we got:

$$B_k = \begin{bmatrix} -x^{(0)}(2) & 1 \\ -x^{(0)}(3) & 1 \\ \cdots & \cdots \\ -x^{(0)}(n) & 1 \end{bmatrix} Y_k = \begin{bmatrix} \alpha^{(1)} x_k{}^{(0)}(2) \\ \alpha^{(1)} x_k{}^{(0)}(3) \\ \cdots \\ \alpha^{(1)} x_k{}^{(0)}(n) \end{bmatrix} = \begin{bmatrix} x_k{}^{(0)}(2) - x_k{}^{(0)}(1) \\ x_k{}^{(0)}(3) - x_k{}^{(0)}(2) \\ \cdots \\ x_k{}^{(0)}(n) - x_k{}^{(0)}(n-1) \end{bmatrix}$$

Where, k=1,2,3,4

(4)We calculated gray parameters $\hat{a}_k$ by the least square method:

$$\hat{a}_k = [a,b]^T = (B^T B)^{-1} B^T Y, k = 1,2,3,4 \tag{5-2}$$

Table 1- 2 gray parameters

fields gray parameters	Media	Government	Education	Website
a_k	-0.3265	-0.3567	-0.2054	-0.1562
b_k	-0.8384	-51.0186	-29.2440	76.3842

(5)Taking a_k， b_k into (5-4),we got $\hat{X}_k^{(1)}$:

$$\hat{x}_k^{(1)}(t+1) = \left(\frac{b_k}{a_k{}^2} - \frac{x_k{}^{(0)}(1)}{a_k}\right) e^{-a_k t} + \frac{b_k}{a_k}(t+1) + \left(x_k{}^{(0)}(1) - \frac{b_k}{a_k}\right) \frac{1+a_k}{a_k} \tag{5-3}$$

Where, k=1,2,3,4

(6)Discrete $\hat{x}_k^{(1)}(t+1)$ and $\hat{X}_k^{(1)}(t)$， we got $\hat{X}_k^{(0)}(t+1)$ as follows：

$$\hat{x}_k^{(0)}(t+1)=\alpha_k^{(1)}\hat{x}_k^{(1)}(t+1)=\hat{x}_k^{(1)}(t+1)-\hat{x}_k^{(1)}(t)$$

Where, k=1,2,3,4

Table 1- 3 Approximate registrations in government, education, media network

Time Fields	2012.09.04	2012.09.05	2012.09.06	2012.09.07	2012.09.08	2012.09.09	2012.09.10	2012.09.11
Media	207	244	339	469	650	901	1249	1732
Government	85	101	144	206	294	421	601	858
Education	73	81	99	122	149	183	225	276
Website	710	769	899	1050	1228	1436	1678	1962

(7)To test the gray model, the steps are as follows：

①Calculating $e_k^{(0)}(t)$ between $\hat{X}_k^{(0)}$ and $\hat{X}_k^{(0)}(t)$.

$$E_k=[e^0{}_k(1),e_k^0(2),\cdots,e_k^0(n)]=X_k^{(0)}-\hat{X}_k^{(0)}$$

$$e_k^{(0)}(t)=x^{(0)}(t)-\hat{x}^{(0)}(t),t=1,...,n;k=1,2,3,4;$$

②Calculating the mean and variance $S_{1,k}^2$ of the original series $\hat{X}_k^{(0)}$:

$$S_{1,k}^2=\frac{1}{n}\sum_{t=1}^{n}[x_k^{(0)}(t)-\overline{x}_k]^2;S_{2,k}^2=\frac{1}{n}\sum_{t=1}^{n}[e_k(t)-\overline{e}_k]^2 \tag{5-4}$$

$$\overline{x}_k=\frac{1}{n}\sum_{t=1}^{n}x_k^{(0)}(t),\overline{e}_k=\frac{1}{n}\sum_{t=1}^{n}e_k(t);k=1,2,3,4 \tag{5-5}$$

③Calculate variance ratio： $C_k=S_{2,k}/S_{1,k}$;$k=1,2,3,4$

④Calculate small error probability: $p_k=P\{|e_k(t)-\overline{e}_k|<0.6745S_{1,k}\}$;

Table 1- 4 Variance ratio C_k and small error probability p_k

fields gray parameters	Media	Government	Education	Website
C_k	0.5304	0.1868	0.5349	0.4514
p_k	0.7500	1	0.8750	0.8750

⑤Grey model precision test table as follows:

Table 1- 5 Precision inspection class reference list

Model accuracy gradehttp://fanyi.baidu.com/translate - ##	Variance ratio C	Small error probability P
One-level（good）	C<=0.35	0.95<=P
Two-level（qualified）	0.35<C<=0.5	0.80<=P<0.95
Three-level（general）	0.5<C<=0.65	0.70<=P<0.80
Four-level（unqualified）	0.65<C	P<0.70

⑥Comparing with the precision test table, we got the prediction effect in media, government, education, network as follows：

Table 1- 6 The prediction effect in media, government, education, network

gray parameters	Media	Government	Education	Website
$Class_k$	third	first	third	second

(8)Using DGM (2,1) model to predict the Micro message public account in four fields for the next ten days ：

Table 1- 7 The prediction of Micro message public account in four fields for the next ten days

	2012.09.12	2012.09.13	2012.09.14	2012.09.15	2012.09.16	2012.09.17	2012.09.18	2012.09.19	2012.09.20	2012.09.21
Media	2400	3327	4611	6391	8859	12279	17020	23591	32700	45326
Government	1225	1750	2500	3527	5102	7289	10412	14874	21248	30355
Education	340	417	512	629	772	948	1164	1429	1754	2154
Website	2294	2681	3134	3664	4284	5008	5854	6844	8001	9353

(9)The overall trend graph in government, education, media ,network registration ：

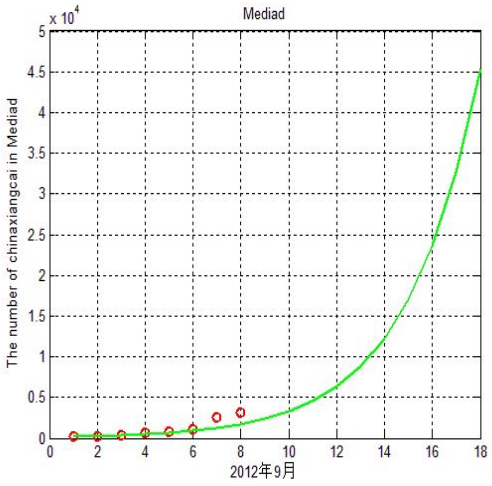
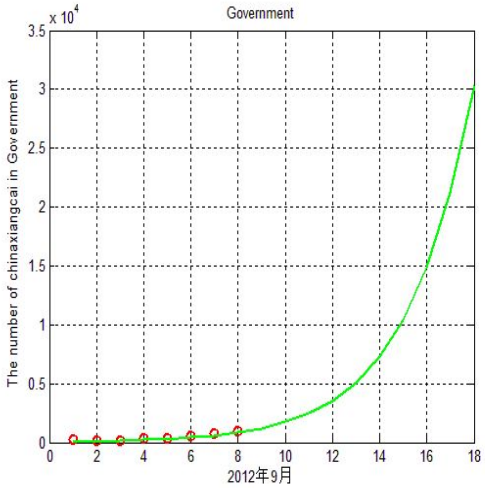


Figure 1- 1



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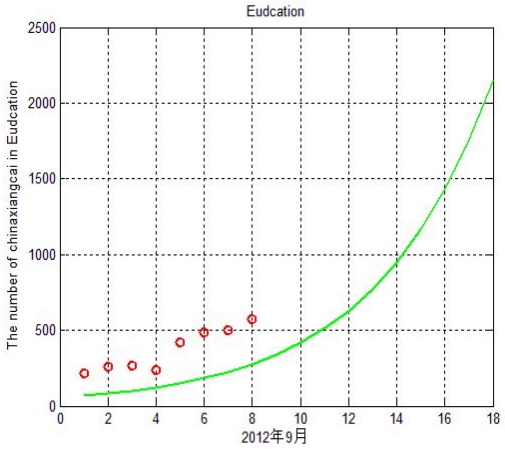

Figure 1- 3

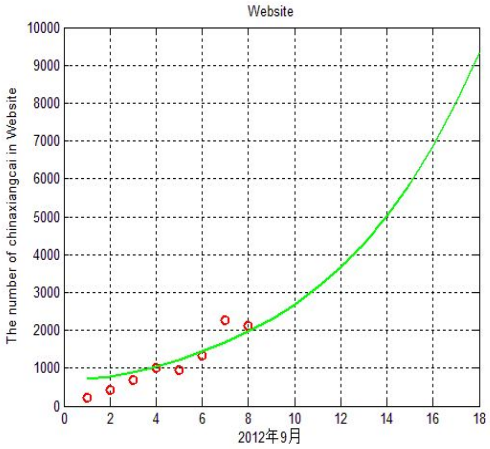

Figure 1- 4

5.2 Task 2

5.2.1 Establishment of Model in Task 2

Take the six factors expressed by “True” and “False” in the data table to regard as the users’ running strategies. And covert the “True” and “False” into the binary value “1” and “0” respectively.

is showed in the table

Table 2- 1 The way of converting managerial tactics into binary value

Whether the temporary logger watch out the user	X_1
Whether someone is allowed to send me private messages	X_2

Whether there is some geological information on the account	X_3
Whether the account is authenticated by web-chat	X_4
Whether all people are allowed to comment on my web-chat	X_5
Whether the user watch out the temporary logger	X_6

Table 2- 2

Running strategies	X_1	X_2	X_3	X_4	X_5	X_6
State	False	False	True	True	True	False
Binary value	0	0	1	1	1	0

Through referring to material[2] and discussing， the importance order the six running strategies are listed as following： $X_5 > X_4 > X_2 > X_3 > X_6 > X_1$

So define the running value of the public web-chat account:

$$\xi = X_5 X_4 X_2 X_3 X_6 X_1$$

The running value of table 2-2 $\xi = (110100)_2 = (52)_{10}$

The running value would have influence on the number of fans Y_1, the times of being watched out Y_2 , the times of being collected Y_3 and the times of being transmitted Y_4 .

Regard ξ as latent variable and Y_1, Y_2, Y_3 and Y_4 as manifest variables

Construct the measurable equations[3]

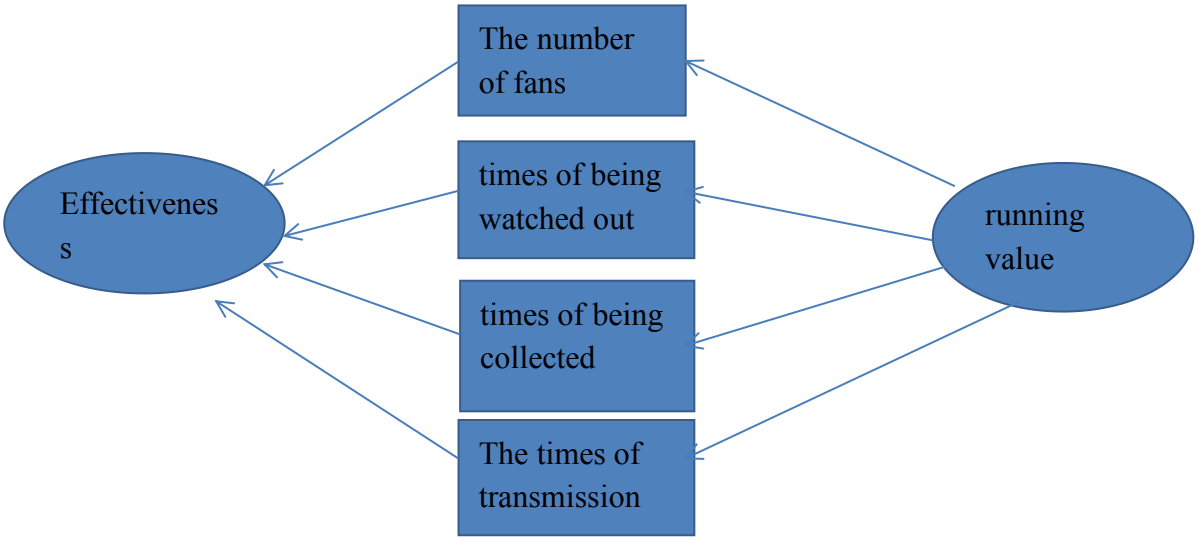

Chart 2-1

Adopt the method of "max-min" to eliminate the magnitude differences of data:

$$Y_{i,j}^{*} = \frac{Y_{i,j} - \min_{j}\{Y_{i,j}\}}{\max_{j}\{Y_{i,j}\} - \min_{j}\{Y_{i,j}\}} \tag{5-6}$$

the measurable equation is established as below

$$Y_i = \lambda_i \xi + \delta_i \ (i = 1,2,3,4) \tag{5-7}$$

δ is an error, which is not associate with Y and ξ, λ is the Correlation coefficient, which means to what degree the latent variable would influence the manifest variables.

In this paper, effectiveness was assessed from the the manifest variables and the comprehensive evaluation model was set up to solve the problem.

weight w_i is determined by λ_i

$$w_i = \frac{\lambda_i}{\sum_{i=1}^{4} \lambda_i}$$

The scores determined by manifest variables:

$$s = \sum_{i=1}^{4} w_i \sum_{j=1}^{1000} Y_{i,j} \tag{5-8}$$

Effective Managerial Value of Public Web-chat Account:

$$v = \frac{s}{\sum_{j=1}^{1000} \xi_j} \tag{5-9}$$

if $v > 0.5$， the running strategies of the users in specific field are effective in the public web-chat account[4].

If $v < 0.5$， the running strategies of the users in specific field are ineffective in the public web-chat account.

5.2.2 The Solution of Model And Test Analysis

In virtue of MATLAB, results of managerial effectiveness of public web-chat accounts were got through coding according to the mathematical model. And there are five fields that are chosen in this paper, respectively , Government, Education, Website, Media, Celebrity.

Table 2- 3 Five fields

	Government	Education	Website	Media	Celebrity
v	0.3828	0.6366	0.1761	0.1491	0.5991
Yes or No	No	Yes	No	No	Yes

The table shows that in the educational field and celebrities' field, the public web-chat accounts' running are pretty successful and effective.

Analysis of Results:

(1)education field: From the table, we could found that the education field was the most effective to run the public web-chat account. Because in china, more and more people attach importance to educational field and think knowledge will be more and more important. From the chart 2-1, it's clearly to be seen that the enrollment rates of junior school, senior school and university are rising year by year.

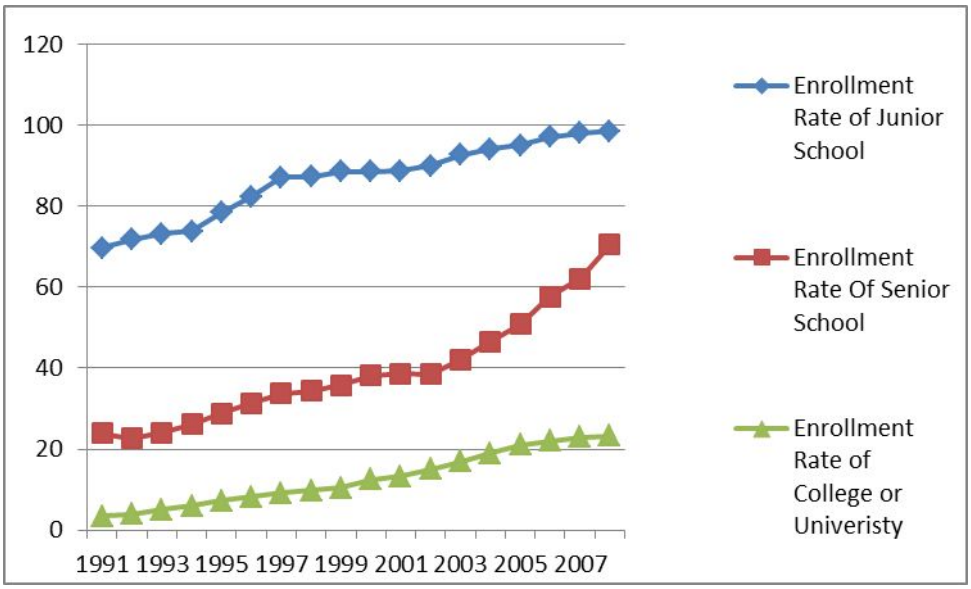

Figure 2- 1

Another reason why the education was the most effective field was that most public web-chat accounts would allow people to comment and reveal their locations

and have a registered account. And nowadays, almost every contemporary student has a mobile phone and likes to share their ideas about educational systems by using mobile phone. So the platform of public web-chat accounts runs effectively in education field.

(2) celebrity field: Celebrity is another effective field. Because in the contemporary society, the star craze is around everywhere. The most users of web-chat public account are young people, however, young people like to pay much attention to celebrities, especially some famous singer stars and movie stars. Meanwhile, most celebrities are willing to communicate with their fans through web-chat account.

(3) government field: The reasons why the public web-chat accounts didn't run effectively in government field are that government departments create web-chat account just to issue some policies and notices and they don't allow anyone to comment on their words on public accounts or reveal their location information or communicate with common people. If the web-chat accounts are wanted to run effectively in government field, some authorities have to change their managerial strategies. Such as, interacting more with fans and allowing fans to make legal comments on their blogs.

(4) website and media field:Website and media mainly utilize the Internet to attract common people and their strong points are internet , television, newspapers and radio-broadcast, which mean they can't effectively run the public accounts. Besides, they did the same as what the government did, not allowing others to comment and having less communications with blog-watchers. The web-chat was originally served to mobile phone, not internet or others. And it can't easily run effectively in these two fields.

5.2.3 Advantages and Disadvantages of the model

The combined method of structure equation and comprehensive evaluation method absorbs the both merits and eliminates respective defects. It can achieve a balance between objectivity and subjectivity and judge effectiveness thoroughly and get a fair resolution to the problem.When choosing the endogenous and indigenous factors, it's easy for judges to make mistakes and be confused with some ambiguous factors. fixing the thresh value totally depends on statistics data, which could neglect the judges' opinions.

5.3 Task3

5.3.1 our strategies of running the platform

From the second part, we can find that the among web-chat public channels the channels about education run most successfully. Mathematical Modeling channel is

one of them. So we take successful some experiences of these educational web-chat channels to make following plans.

1. Position of mathematical modeling web-chat channel

According to position of effective public education channels, we would like to define our channel to a subscription. Subscription is a kind of counts a type of public platform, which provides information and news for users and can send a message to user every day. The messages will be displayed in the user's subscription document folders.

2. Time and frequency

According to the operations of most operators which are more successful Web-chat public channel in education, we decide to push a message every day.

3. The way of sending

To send information to the users, we choose two forms, which is single and multi-graphic. There are also links to other websites of video sending.

4. Content

(1)Interactive activities

We will occasionally hold small-scale activities to close followers and increase interaction, and have a discussion on the topic of algorithms, models or procedures; and we can also hold some small games such as information retrieval contest.

(2)League

With free training as well as strong team modulus intelligence group to attract users to join the Society of mathematical modeling, such as the training of various commonly-used software in mathematical modeling, mathematical models and mathematical modeling thesis writing and so on.

(3)Advertisement

Invite others to pay attention to the group through various websites, mathematical modeling or school qq groups with an interesting two-dimensional code. Publish articles or screen link with a two-dimensional code, too.

(4) The introduction of various mathematical modeling contests

Push the time of various mathematical modeling and game time. Before the game, push the countdown to remind participants of getting fully prepared. And basic training of mathematical model before the game is for the participants' convenience.

(5)Something else

Invite the winners of Mathematical modeling competition to do lessons about their experiences. Share good articles and experience with others.Launch all activities listed in table 5-1 and answer the scanners' questions carefully and timely.

5. Custom Menu

The users will achieve the custom menu after the certificating of Web-chat. Through this menu, such sub-menu like group introduction, public account's establishment, purpose, welfare, activities etc. could be custom by this menu. According to these different categories, the secondary menu could be set under the sub-menu, such as Micro-community, Activities.

Micro-community: company community could be applied by the official website. Theusers could join in the topic post and discuss through lower function “post”, which provides a platform to these topics, increasing the interface and interest such as the discussion of some innovative algorithm.

5.3.2 The method of predicting the growth trends

Based on the analysis of users of Web-chat, most of them are students, it is stated that the focus development degree of Web-chat could be applied to analyze the increase focus number of the “Mathematical Modeling” account.

1. The increasing trend of Web-chat User meets the curve of innovation diffusion theory.

Tencent published its free instant communication application – Web-chat on 21st Jan, 2011. 433 days after published, its users’ number was over 100 million.

15th, Aug, 2013. Web-chat confirmed its user number over 300 million and has been the largest communication software in the numbers of users

on the same day, the number of registered users of Web-chat overseas version is over 100 million, thousands of users register every month.

24th Oct, 2013. The number of Web-chat user has grown over 600 million and 100 million user accounts are activated.

The year 2013 means a lot to Web-chat, not only its rapid development, but also the functions update , user numbers, users’ dependency etc.

Up to Jan, 2014, China has had totally 838 million internet users, 67.8% of users have access to mobile internet service and in total, 133 million Gb flows are generated by these users, which increases 46.9% and has an average of 165.1 Mb per user. Web-chat has over 600 million users .

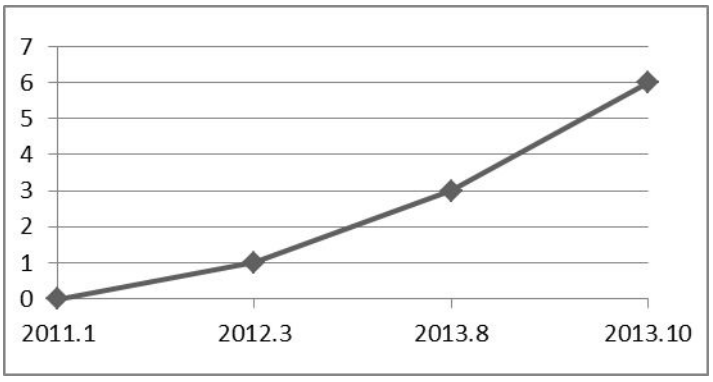

Figure 3- 1

Chart: the growth of Web-chat users

From the figure above, it shows that the increasing number of Web-chat user is very close to the S Curve of innovation diffusion theory. In addition, Web-chat is in takeoff phase.

2. Curve of innovation diffusion theory and prediction of Mathematical

Modeling we-chat users' growth

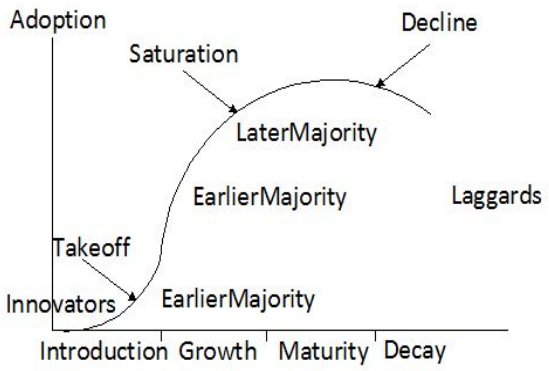

Figure 3-2: the S-Curve Model of Diffusion Process

Innovation diffusion theory is one of the classical theories of propagation effects studied by the American scholar Everett Rogers (Rogers, 1983), who raised the theory that persuade people to accept new ideas, new things and new products through the media in the 1960s, focusing on the social impact of the mass media and culture.The elements of innovation diffusion are: characteristics of the innovation, communication channels and time. The theory shows that an innovation diffusion process consists of at least the following components: awareness, persuasion, decision, implementation and OK. Rogers adopts five categories: innovators, early adopters, early followers, followers of the late, retarded. Public communication and interpersonal communication at all stages of the innovation diffusion plays a different role, combination with public media and interpersonal communication is the dissemination of new ideas and the most effective way to convince people is to take advantage of these innovations. Rogers believes that the diffusion of innovation always starts slowly, and then when the person reaches a certain number of uses (i.e., "critical mass"), it suddenly accelerates the diffusion process (i.e., off stage), this process continues until the system is likely to reach saturation point, the diffusion rate would gradually slow down[4]. The number of those who adopt innovations over time shows the trajectory shape, as shown. From this we can infer that the amount of "Mathematical Modeling"Web-chat public numbers would be so trends.

the mathematical model of the chart above could be described as the following discrete equation[5][6]:

$$N(t+1)-N(t)=pm+(q-p)N(t)-\frac{q}{m}N^2(t) \tag{5-10}$$

The symbol $N(t)$ means the accumulated number of people who care about the public web-chat account at time *t*. *m* represents the biggest potential factor of market share, in this paper, means the potential number people who would care about the platform. *P*and *q* are respectively external and internal factors. *P* usually depends on the managerial strategies and *q* depends on the people's acceptable degree.

We devise a survey sheet to get the value of *m*.

(1) Post the survey sheet the public web-chat channel of mathematical modeling.

Table 3- 1

question	answer
① Are you a novice in mathematical modeling?	(Yes/No)
② Have you ever taken part in any competition of mathematical modeling ?	(Yes/No)
③ Do you think mathematical modeling is helpful ?	(Yes/No)
④ Do you like mathematical modeling?	(Yes/No)
⑤ Are you willing to stay up for three days and nights if you know you can't get any prize?	(Yes/No)

(2) keep the survey sheet on the account for a while, then analyze data to get the value of m in the same way in model 2. The importance order is ⑤④②③①.

As for the values of p and q, we need some short-term data to fit them and then continuously update them by more and more statistics data.

6 Strength and Weakness

6.1 Strengths :

Task 1 we calculated error rationality C and the error probability P respectively in four different fields, and finding the model we built has good prediction effect.

Task 2 The combined method of structure equation and comprehensive evaluation method absorbs the both merits and eliminates respective defects. It can achieve a balance between objectivity and subjectivity and judge effectiveness thoroughly and get a fair resolution to the problem.

Task 3 the model can achieve the dynamic prediction based on the real-time data and it's applicable in many different fields where public web-chat channels are created.

6.2 Weakness :

Task 1 Because the collected data is limited, so our model can only predict the growth trend of public accounts corresponding to different fields in a short time.

Task2 When choosing the endogenous and indigenous factors, it's easy for judges to make mistakes and be confused with some ambiguous factors. fixing the thresh value totally depends on statistics data, which could neglect the judges' opinions.

Task 3 when there is no potential market for this sort of new thing, the prediction may be partially wrong with the accuracy of results.

7 References

[1]Zeng Bo. Gray System and Prediction. Beijing: Science Express, Jun 2014: 170-172.

[2] H.R .Kells. The assessment of managerial effectiveness at universities in developing countries[J]. International Institute for Educational Planning, Nov 1991, the sixth volume, page 9-18.

[3] Fred Luthans. A Descriptive Model of Managerial Effectiveness[J]. Group & Organization Studies, June 1988, the 13th edition, page 3-9.

[4] Vijay Mahajan. Innovation Diffusion Models of New Product Acceptance: A Reexamination in Innovation Diffusion Models of New Models of New Product Acceptance[M]. Cambridge, MA：Ballinger Publishing Company, 1986.

[5] Ettan Muller. Innovation Diffusion and New Product Growth Models in Marketing [J]. Journal of Marketing, 1979.

[6] Kuang Wenbo.Research on the development of Web-Chat[J]. Chinese Journal of Journalism & Communication, May 2014, the 5th edition, page 147-156.

8 Appendix

Task 1：MATLAB CODE1

Task 2：MATLAB CODE2