

Social Networks Message Posting Support Module

Aleksandr A. Chumak, Sergei S. Ukustov, Alla G. Kravets and Juriy F. Voronin

Volgograd State Technical University, Volgograd, Russia

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Abstract: The paper describes the development of the social networks messages posting support module. The study aimed to increase the social networks users' involvement, using intelligent approach to the message posting timing. The paper investigates the subject area and analyzes the necessary data, chooses a method of data collection. We examined existing methods for finding such time intervals at which the posted messages would have the most views. During research we chose the method of finding the time to publish posts. A comparative analysis of existing systems of social networks messages posting support, identified weaknesses of each system. Based on the system analysis we built developed module model. We propose our own messages posting support module.

Key words: Module • The social network • Posting messages • Posting support

INTRODUCTION

Social networks have linked a lot of people around the world and combined them according to various criteria, whether it be high school friends, sports cars, football, entertainment programs, etc.

Although the peak of the registration in the social networks came in the 2007-2009 year, they also actively develop and attract new users and to present days. In our time, social networks have become something essential for the majority of mankind and especially the youth. According to statistics, almost half of users (52%) visit social networks [1].

The typical user of social networks in Russia is 18-24-year-old (75%), with a high level of education (57%) and financial situation (65%). 3% reported that they stopped using social networks. 35% have never attended such resources, while 8% did not know what it is [2].

Internet has already become one of the centers of business, this online shopping, freelancing and other sources of revenue-generating. It is also not passed social networking, this is where people gather from around the world visit these sites more than once a day, give them publicity and news from around the internet. Not less than popular are communities in social networks that bring people to their interests.

These communities are maintained by community administrators who are its creators. The administrators aim is to attract more people in their community, thereby showing increase of posts in the community and attract new customers.

The main problem of such communities is a huge waste of time and effort on the placement and publishes new posts, as well as their placement in a convenient time for the user.

After analyzing the existing system for the automatic deferred postings for social network "VKontakte" (Table 1), it was concluded that none of these systems can be used to solve the identified problem [3]. None of the systems has produced automatically collect user attendance data for communities. On the basis of these data we have set an aim of this work: increase the involvement of the social networks users with the use of intellectual approach to the message posting timing.

Subject Area Analysis: Social networks play an important role in modern life. It is here that man began to spend more time than in reality. There is also a huge selection of entertainment and the possibility of earning with your own designs and then their implementation in social networks [4, 5]. One of these social networks is "VKontakte".

Table 1: Comparison of automatic systems of deferred posting.

System name	Is it paid?	automatic posting at a specified time	Automatic posting through the established schedule	Automatic posting on the community analysis	Ergonomics	Analysis of community attendance
BuzzLike	No	Yes	Yes	No	Yes	No
NovaPress Publisher	Yes	Yes	Yes	No	No	No
Sociate	Yes	Yes	No	No	No	No
Feedman	No	Yes	No	No	No	No
Jerardo	Yes	No	No	No	Yes	Yes
Time2Post	No	Yes	No	No	Yes	No
EcoTime	No	Yes	No	No	No	No

Table 2: Data collection for the community «ifeed» (fragment)

Group id	Post id	Posting time	Number of likes	Number of comments	Time of the request to obtain statistics
26858816	215458	2013-06-01 20:15:00	15	0	2013-06-01 20:18:09
			43	3	2013-06-01 20:22:58
			89	9	2013-06-01 20:28:01
			103	9	2013-06-01 20:33:03
			248	15	2013-06-01 20:37:57
			326	27	2013-06-01 20:42:54
			399	34	2013-06-01 20:47:42
			472	39	2013-06-01 20:53:07
			546	51	2013-06-01 20:58:20
			680	63	2013-06-01 21:04:06

"Vkontakte" -the largest in RuNet social network, the first most popular site on the territory of Belarus and Ukraine, the second - in Russia, the fourth-in Kazakhstan, 20th-in the world. The resource was originally positioned itself as a social network of students and graduates of Russian universities, later called himself a "modern, fast and attractive way to communicate on the network." As of February 2013 the daily audience of "VKontakte"-more than 43 million people [6]. The main features of the social network is-finding friends, classmates, relatives, you can find a group of people supporting your opinion, find old and make new friends, share updates, photos, audio tracks and video recordings.

The Software of Social Networks Message Posting Support Module: Social network "VKontakte" gives developers access to any user data through the methods of API «VKontakte." Using these techniques, you can get information about the user and communities, available to the user. Thus, the method request «groups.get» returns the community in which the user is a member and by specifying a filter (filter) is equal to «admin», the method returns a list of groups administered by the user.

Using the method of «wall.get», you can get a list of records from the user wall or a selected community. This method returns only the last 100 records from the wall, something to get the next 100 records; you must specify the method parameters shift (offset).

Thus, by combining these two methods, finding the user community in which he is an administrator for a list

of records of this community, we get the result as a JSON response from the server "VKontakte" [7, 8].

Using the method of API «VKontakte» «wall.post» you can place text, image, video or audio on the user's wall or the community, it is necessary for this method to specify the parameter «owner_id» equal to the id of the user that published a post located on the user's wall, id or community with the sign "-" in order that the post would be placed in the selected community.

In case of correct query, the server "VKontakte" will return JSON response in the form of:

Response: {post_id: 1 },

where in the answer «post_id» - is a post number after placing it on the user wall or on the wall of the published user community. Otherwise, the server "VKontakte" will return an error code if the request was malformed or another error occurred when placing the post.

After reviewing the resulting JSON response from the server "VKontakte", you will notice that each record is:

- Date-the full time of post publication on the community wall.
- Likes-the number of users who click the "Like" button, thus showing that they like the record.
- Reposts-the number of users who click the "Tell a Friend", thereby copying the post to your wall.

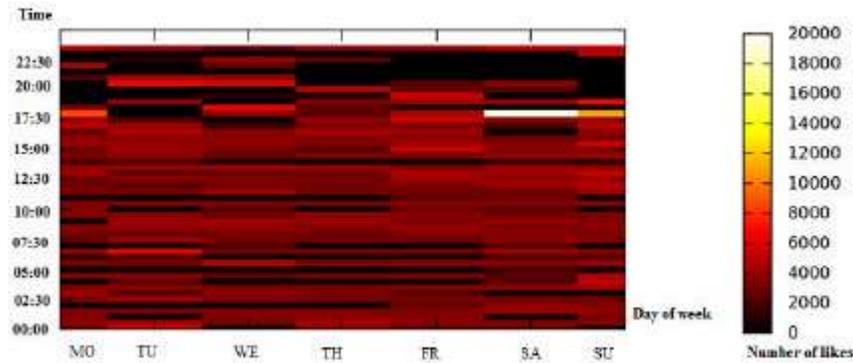


Fig. 1: Community «ifed» heat map

Each new query returns a new selected community data. Receive updated values every time in a given period of time is impossible, so you can get the new values every 15 minutes and store them in a database, then you can create a table with data (Table 2).

Transforming the data into a heat map, you will notice that the data is differing by days of the week and time of the current group (Fig. 1).

Mathematical Software of Social Networks Message Posting Support Module: The Levenberg-Marquardt algorithm well combines the Newton method (using the quadratic model to accelerate the search function minimum) and the method of steepest descent (minimization along a gradient) [9,10].

In this method, the search direction is determined as the solution of equations of the form:

$$(J_k^T J_k + \lambda_k I) p_k = -J_k^T f_k \quad (4)$$

where λ_k - a non-negative number. In this method, a step along the p_k unit always relies, ie, the next point X_{k+1} will be $X_k + p_k$. It can be shown that the p_k is a solution of the relative minimum of the form:

$$\text{to find } \min_{p \in \mathbb{R}^n} \frac{1}{2} p_k^T J_k p_k + f_k^T p_k \quad (5)$$

under restriction $\|f_k\|_2^2 \leq \Delta$,

where Δ -parameter associated with the λ_k . Thus, Levenberg-Marquardt method belongs to a class of confidential surroundings methods. Monotonically decreasing function to be minimized is achieved it by choosing the "good" values λ_k . When λ_k is zero, p_k

will be the direction of the Gauss-Newton when the λ_k tends to infinity, the rate $\|p_k\|$ approaches zero and vector p_k in the limit becomes parallel antigradient. Consequently, the inequality $F(x_k + p_k) < F_k$ always be guaranteed by choosing λ_k large enough [10, 13].

We denote $p_{LM}(\lambda_k)$ as a solution of system (4) with some x_k and positive λ_k . Turns out that if a matrix J_k have a rank defect, in general, regardless of the $\|Q(x_k)\|$ and λ_k will have the relation:

$$\frac{\|p_N - (\lambda_k)\|}{\|p_N\|} = 0(1) \quad (6)$$

The Method of Finding the Posting Time: The purpose of this method is in finding time intervals at which the messages in the publication would have the greatest chance to achieve the highest number of views. In this case, we are interested in not absolute popularity value [11, 12], but only for messages within the same day.

For the day characteristic we use 6th degree polynomial. Preliminary analysis reveals that it is the maximum degree at which a characteristic pattern of two peaks and there is no overfitting.

To find this polynomial we use the Levenberg-Marquardt method discussed above. Knowing the day profile, expressed by a polynomial found it is possible to determine the best time for posting. Mathematically, the problem can be formulated as follows:

$$\max_{t_i} \sum_i \text{reaction}(t_i),$$

$$\forall_i (\text{tick}_i - \text{tick}_{i+1}) > \text{period}$$

where the period-the minimum time between consecutive posts.

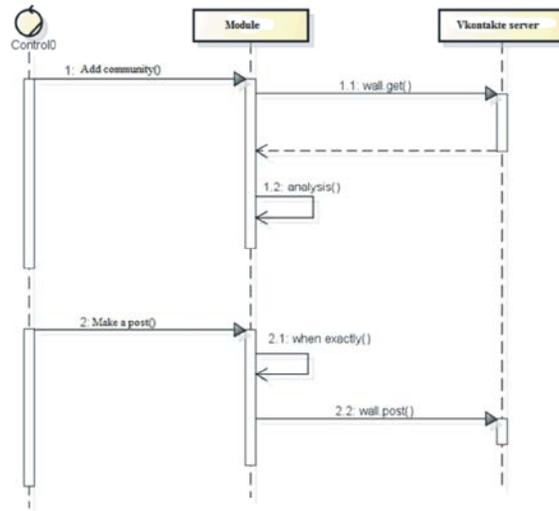


Fig. 2: Sequence diagram of social networks message posting support module

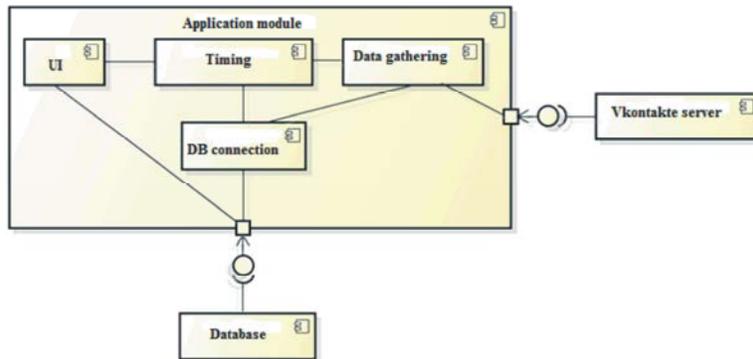


Fig. 3: Social networks message posting support module architecture



Fig. 4: Posts queue on posting in community

The solution to this problem is the particular interest but insignificant in the present work.

Social Networks Message Posting Support Module: The module processes the data available for the selected community, calculates

the publication post time and in received from the calculations time publishes record in the community. Fig. 2 shows a sequence diagram of the module.

The architecture of the module (Figure 3) consists of three main components:

- Vkontakte server-which yields information about the community and the users;
- Database-stores the information about the community;
- Application module-consists of a graphical user interface, model linking the collection of data from the contacts database, publication time calculation for each post.

The model produces the posts queue for each Community. Posts are issued on time, calculated for each message (Figure 4)

CONCLUSION

Before starting work, the author set a goal to increase the social networks users' involvement, using intelligent approach to the timing of the messages posting. To achieve this goal the data collection was carried out from the social network VKontakte, their analysis has been performed. Data collection is produced in the developed within this work system. The response of people during the day depending on the day of the week has a characteristic pattern. We examined existing methods for finding such periods of time in which the posted messages would have the most views and we chose method of finding the time to publish posts. To implement the method we developed social networks message posting support module.

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