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# Microblog Internet Public Opinion Characteristics and Propagation

## Mechanisms Analysis—A Case Study on Jiaxin Yao Trial

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**Abstract:** With its rapid development in recent years, microblog has gradually become the storm center of public opinion and one of the mainstream media. However, behind its flourish, microblog also brings hidden problems such as rumor and defraud, pressing for governance and supervision. With content analysis, this paper studies the heated discussion concerning Jiaxin Yao trial on March 23th, 2011 on Sina microblog. We make sampling analysis of the relevant information on microblog, establish three analytical unit—netizen characteristics, information characteristics and propagation characteristics, and do data statistics after coding. Based on data statistics, an multiple linear regression equation is found to describe the degree of transmission of the topic on microblog, thus outlining a preliminary transmission mechanism of public opinion on microblog. Some suggestions on how to use, supervise and guide the internet public opinion are also included in this paper.

Key words : internet public opinion; microblog; content analysis; transmission mechanism

### 1. Introduction

In December of 2011, People's network public opinion monitoring room released 2011 China Internet Public Opinion Analysis Report, which pointed out that hot event in 2011 mainly involved crowding and discussion about public emergency, such as “carelessly photographed save begging children” and “Guo Meimei” event on microblog, showing citizen’s strong desire for social justice. The popularity of an event is largely determined by the thread number on the microblog, which becomes a main carrier of internet public opinion.

Jiaxin Yao event was one of the top 10 internet hot event in 2011. The case detail was very clear | | Jiaxin Yao killed a pedestrian named Miao Zhang to cover up a hit-and-run accident, however it caused sensation throughout the country. This is a typical case to study internet public opinion. It was sudden, the internet became a tool for netizens to let emotion out, and different opinions and emotions accumulated, posing opinion pressure on the final trial result. It is an extremely urgent issue to decide how to deal with the sudden public event and manage and control public opinion.

This paper focused on the wholly new characteristic of microblog, analyzed the Jiaxin Yao Murder Case , described the public opinion spreading on the internet, and the characteristics of communication subjects. Furthermore, we infer the intention. attitude and emotion of communication subjects, and the generation and the trend of public opinion. Besides, based on data analysis, we study the factors that influence the transmission degree of public opinion.

### 2. Relevant study

In recent years, with the rapid development of microblog, the problems of public opinion have become more and more exposed and drawn more and more attention from researchers. Relevant research includes basic concept, formation and spreading process, and management and control of public opinion, supporting technology, and the findings of internet public opinion hot event, which involve journalism and communication, information, sociology, public relation management, and so on. Research on microblog is mostly exploratory research, including microblog’s rising reason, communication forms, marketing pattern, characteristic, application, prospect, etc.

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There is some case study among the research about internet public sentiment at home, while very little is qualitative analysis. Yaqin Xu(2010)<sup>[1]</sup> studied the case of whirlwind driving accident in HangZhou, Li Li(2010)<sup>[2]</sup> studied Seismic Event in Shanxi at the beginning of this year, and Tianlin Chen(2009)<sup>[3]</sup> studied government measures after Xiamen PX incident. However, all these case studies are qualitative descriptions about the characteristic, communication mechanism, monitoring measures of internet public sentiment. Biao Li(2009)<sup>[4]</sup> studied fire at CCTV new station site using content analysis. There is some empirical study abroad about twitter and SNS, such as Arceneaux(2010)<sup>[5]</sup> studied how top 500 businesses use popular social networking sites to establish online relationship, using content analysis of sample obtained by random sampling. Based on framing theory. Muralidharan(2011)<sup>[6]</sup> studied disaster, financial and personnel huge loss brought by Haiti earthquake. Ksenia(2011)<sup>[7]</sup> used Grounded theory to discuss how to use social website to produce social capital with different benefit.

Content analysis plays a vital role in internet public sentiment analysis. Many scholars discussed how to use content analysis, such as Yi Liu(2006)<sup>[8]</sup>, Xin Xu(2008)<sup>[9]</sup>, Ruiying Sun(2008)<sup>[10]</sup> and so on point out that content analysis is an important method to study internet public opinion, which help to hint on users' personal style, distinguish public opinion characteristic, reflect attitude, interest, and focus of masses and effectively predict the transmission effectiveness and trend of public opinion.

### 3. Research method

#### 3.1 Sample

In this paper, we study the case of Yao Jiaxing murder incident trial from March 23, 2011 to April 18, then conclude public opinion regular pattern of growth and its spreading mechanism. According to the microblog's different periods of growth cycle, we use hierarchical sampling. Based on the amount of daily information of microblog, the growth cycle of information spread as shown below:

We collected a total of 500 samples, 100 samples from March 23 to 30, 300 samples from March 31 to April 8, 100 samples from April 9 to 18. We use a random number generator generates random numbers to select the daily information.

#### 3.2 Construct categories

In order to describe the microblog public opinion, we construct three units of analysis: user characteristics, information feature and spreading feature. According to the sampling information that can be obtained, we construct analysis categories as below (for example March 23, p48, 7th microblog when the searching keyword is "Jiaxing Yao")

**Table 1. Construct categories**

Analysis units	Context categories	Code	Example
Microblog users characteristics	Area	(According to the 27th China Internet Development Statistics Report about internet penetration by province)1=Beijing, 2=Shanghai, 3=Guangdong, 4=Zhejiang, ..., 31=Guizhou, 32=Hong Kong, 33=Macau, 34=Taiwan, 5=Overseas, 6=other	Shanghai
	The approach to surf the net	1=Internet, 2=Phone	Internet
	The users type	1=Ordinary people, 2=Celebrities(Real-name certification who has influence), 3=Group	Ordinary people
	Fans, attention, the number of issued microblog	Numbers of statistics	63, 110, 594
Microblog information feature	Users emotional type	1=Sympathetic pity, 2=Condemn and hating, 3=Doubt, 4= thinking about society and education or others, 5=no emotions	Cat can't walk lin: "Jiaxing Yao' s father is not good, after

	Users dissatisfied type	1= Dissatisfied with Jiaying Yao and Relatives, 2= Dissatisfied with correlation analysis by experts or CCTV, 3= Dissatisfied with laws, 4= Dissatisfied with education, 5= Dissatisfied with society, 6=no dissatisfied;	demobilization, has no fixed job, the mother laid off in 2008 and only has six or seven hundred laid-off wages : : ”
	Focused topic type	1=The topic of whether the death penalty of Yao, 2=The topic of the case discussion, 3= The topic of the loss of education, 4= The topic of the law, 5= The topic of society system, 6= The topic of expert analysis, 7= The topic of related cases discussion;	
Spread feature	Microblog spread type	1= Self-insight, 2= Forward views, 3= Vote;	Self-insight
	Daily microblog number	Number of changes, Spread cycle	March 23 17:36
	The number of comments and forwards	Data statistics	Comments 2 Forwards 0

### 3.3 Coding and statistics

In this study, the coding process is finished by two people together. Before the formal coding, coders communicate and coordinate the analysis categories for many times. After the coding, we take a random 100 microblogs from entire samples, one of coders as an independent coder to test the reliability; the Krippendorff Alpha value shows that reliability average value between two coders is 96.7%. The data analysis uses the SPSS for Windows 17.0. Analysis methods are frequency analysis, correlation analysis and multiple regression analysis. Microblog information using software ROST CM 6 (ShenYang, Wuhan University professor developed) for word frequency and semantic network analysis.

## 4. Findings

### 4.1 Public opinion spreading users analysis

#### 4.1.1 Statistic analysis about regional distribution and surfing pattern

It has practical implication to investigate netizen comment distribution, netizen distribution and initiative in different regions for monitoring and managing pertinent public sentiment.

Microblog users in Beijing show relatively high passion to take part into hot topic, which account for one third of all microblog users. Next are Guangdong, Shanghai, and Zhejiang, suggesting that microblog participation has relatively higher correlation with local economic and cultural standard and internet adoption rate. To better describe the correlation between regional distribution of microblog users and internet adoption rate, we do correlation analysis, and the Pearson's coefficient 0.668( $p < 0.04$ ), which shows that regional distribution is positively related to internet adoption rate.

With the rapid development of mobile internet, mobile phone netizens are able to surf internet whenever and wherever possible, check news and express self opinion, thus studying their activity has practical implications for public opinion monitoring. Our samples are 112 mobile phone netizens, accounting for about 1/5(22%). The 27th China Network development Statistics report published by CNNIC<sup>[11]</sup> in January 2011 showed that 66.2% netizens surf internet by mobile phone; mobile phone netizens' growing rate is more than traditional internet netizens; mobile phone netizens have become important participants of internet public opinion and their influence will be more and more significant.

#### 4.1.2 Correlation analysis of attention, fans and microblog

We investigate microblog users' characteristics by correlation analysis of "attention, fans, microblog" with spss software. Through analysis, the Pearson coefficient's 0.769, which shows correlation is significant, i.e. the more attention users paid to others, the easier they will be paid attention to by others. Furthermore, with the increasing number of microblog users' fans, they are more willing to pay attention to other users. For attention

rate and number of microblog, the Pearson coefficient is 0.571, which are moderate positively related, the more attention users paid to others doesn't definitely stimulate users' more passion to update their microblog. For fan number and number of microblogs, the Pearson coefficient's 0.769, which shows fan number is significantly positive related to microblog released, suggesting that with more and more fans, the microblog user is more passionate to update microblog related to self. Just as the result Sysomos investigate twitter: with fans increasing, Twitter users are more willing to update their tweet.

#### 4.1.3 Grassroots opinion leaders

The concept of idea leader is first created by Lazarsfeld in 1940s, which refers to minority people who are influential and active during information delivery and interpersonal communication. In traditional media time, discourse right is owned by some media authority elite, while grassroots' voices are annihilated. However, in internet wide spreading time, information communication application gradually becomes the main carrier of public opinion, breaking the domain utterance power owned by traditional media, and grassroots' opinion transmission span is expanding. On this new microblog platform, grassroots' opinions' influence is more and more powerful, gradually forming a group of grassroots opinion leaders. For some hot social issues, we no longer hear the voice of authority or elite, grassroots' voices can also be spread in the microblog platform, forming a group of grassroots opinion leaders, and they are miniature of grassroots' microblog.

This paper selects one opinion leader of grassroots microblog to analyze microblog in Jiaxin Yao Event.

*Ranxiang(fans number: 109139, Microblog number: 986) The fascinating red vest chairwoman and the most sharp commendation Iron lady who writes high quality comment for high quality concern.*

Ranxiang microblog is one of grassroots microblog representatives, from which we always hear her different views about social hot issues. The topic of characteristics of opinion leaders is also a hot spot studied by many scholars in recent years. Katz<sup>[12]</sup> proposed "personality, ability and social status" which influence opinion leaders. Rogers<sup>[13]</sup> studies characteristics of the opinion leaders from social background, media, demographic characteristics and personality. This paper argues that first grassroots leaders represent the interest of "grassroots"--justice and fairness; secondly grassroots have their own unique insights and ideas which can develop others' new ideas. During the process of monitoring public opinion, government should pay attention to interaction among opinion leaders, so that the management can correctly guide netizen opinion.

## 4.2 Microblog information analysis

### 4.2.1 Words frequency and semantic network analysis

For words frequency and semantic network analysis, we can explain public opinion monitoring, find hotspot of public opinion and trend, and have a general grasp of the current public opinion, thus proposing important practical implication.

500 samples will be organized into a document and imported into ROST CM 6 for words frequency analysis. The words frequency statistics result is as follows. There are six words whose frequency is more than 100, "murder," "passion," "death penalty", "law" "China", and "CCTV" respectively. After analysis, we can conclude that public opinion suggest that Jiaxin Yao should be sentenced to death, while CCTV's related reports make netizens target at its "kill of passion theory" and the direction of how to judge Jiaxin Yao. In addition, words frequency of two experts—"Meijin Li "and" Qingdong Kong"-is relatively high, suggesting that expert's opinion is also the accumulation point of internet public opinion outbreak.

Semantic network diagram's structure shows that core words are "killing, death penalty, passion and vote", and several close related nouns are "law, death penalty, expert, and CCTV". Besides, several pronouns close related to killing are "deliberately, irrefutably and necessarily" and peripheral expansion words are "Meijin Li,

Qingdong Kong, Media, Students, Life for a life", which deducts the agglomeration of users' issues and emotions. Issues focus on whether to sentence death penalty or not, and CCTV experts' analysis and advice, while for netizens' emotion, netizens, whose extreme emotions of condemnation and hatred for Jiaxin Yao are enough to guide the development of public opinion, unanimously demand that Jiaxin Yao be sentenced to death.

#### 4.2.2 Descriptive statistical analysis of the type of microblog users' emotion, dissatisfaction, and the topic

The frequency statistics of microblog users' mood, dissatisfaction and topic type can grasp the masses' mood orientation, discontent flashpoint and the critical concern for hot topics. When one hot event of public opinion breaks out, microblog users show "the benevolent see benevolence and the wise see wisdom" responses for the message. Therefore, understanding their concerns in different directions is essential to solve the incident.

##### 1. Statistical analysis of microblog users' emotion category

74% of the sample show hatred, 14% show heavy reflection, 9% show questioned mood, and only 3% show sympathy to Jiaxin Yao. From this distribution, we can see netizen's moods are relatively simple, and they generally show consistent condemnation and hatred for Jiaxin Yao Event. Yuanyuan Li proposed group polarization effect during the formation process of microblog public opinion, the so-called group polarization means that people are easier to bias to a certain extreme in group decision-making, departure from the optimum decisions, than in individual decision.

##### 2. Statistical analysis of microblog users' dissatisfaction category

46% people are dissatisfied with Jiaxin Yao, his family and friends, 31% are dissatisfied with the views of the relevant analysis (such as CCTV and Meijin Li, or lawyer's analysis), 10% are dissatisfied with the social system and the ethical standards, and dissatisfaction with the legal system and the education system are 7% and 6% respectively. From the above statistics, we can deduct that netizens' anger for Jiaxin Yao Event itself triggered the outbreak of internet public opinion, and media coverage and expert analysis make users quickly align with the relevant analysis, leading network public opinion to reach its peak. However, netizens don't form a cluster of views on the social issues and the problems of legal education behind the event. Therefore, the media and experts' reports on public events play an important role in guiding public opinion, which need to be careful considered in many aspects.

##### 3. Statistical analysis of microblog topic type

The topic on whether Jiaxin Yao should be sentenced to death accounts for 27 percent, the topic on case discussion 24 percent, the topic on relevant analysis 27%, the topic on related cases discussion 11%, the topic on doubt of social system and moral level, on the education system and on the legal system are 5%, 4% and 2% respectively. This analysis is just good fit to the word frequency analysis.

#### 4.2.3 The features of microblog dissemination

From the data, we can see the entire development process of the event, from occurring to climax and then to decline, from which we can find the growth law of formation and dissemination of internet public opinion. Different researchers have different views on the growth cycle of internet public opinion. Following the order of the unconventional emergencies—"brewing-outbreak-evolution", its entire process can be designated into three stages—"prior, during and after" <sup>[14]</sup>. Or the internet public opinion experiences a process of formation: "high-volatility-the final fading" <sup>[15]</sup>. According to the charts of daily microblog number, this paper divides the growth cycle of internet public opinion into three stages: formation, peak period, and a period of recession. The formation of the event phase is from March 23th to March 30th, beginning to accumulate. From March 31 to April 8th, it comes to the peak. From April 9th to April 18th, it starts to decline. Internet public opinion has growth cycles in the dissemination, if grasp the right time to intervene, half the work will bring double results.

Microblog users can forward others' microblog, combining his/her own opinion or express his/her own information to create an independent one. In order to describe the propagation process of microblog, we analyze the source of microblog in three ways--"create, forward, and vote" to get the frequency statistics. A majority of source of microblog is forwarding, accounting of 58%, and it indicates that the information of most microblog users is formed by the influence of others, at which time the leader's role is highlighted. People participated in the vote of account for 29%, it indicates that the topic is very hot, and people attending to the vote show great interest to the topic to express their views.

### 4.3 Multiple linear regression analysis

#### 4.3.1 Define the variable

1. Microblog users' characteristics: this means the impact of microblog users' characteristics on the information spread. The users' characteristics value depends on three factors fans, attention, and the number of issued microblog. The weight of three factors is determined by Coefficient of Variation. After the calculated, the weight value of fans, attention, and the number of issued microblog is 0.74, 0.13, and 0.13.

The coefficient of variation formula shows in equation (1).

$$V_i = \frac{\sigma_i}{\bar{X}_i} \quad i = (1, 2, 3 : ) \quad (1)$$

$V_i$  is the coefficient of variation of the  $i$  item, also called standard deviation coefficient;  $\sigma_i$  is the standard deviation of the  $i$  item;  $\bar{X}_i$  is the average of the  $i$  item.

The weight of three factors formula shows in equation (2), then the result of microblog users' characteristics shows in equation (3).

$$W_i = \frac{V_i}{\sum_{i=1}^n V_i} \quad i = (1, 2, 3 : ) \quad (2)$$

Microblog users characteristics=

$$0.74 * \text{Fans} + 0.13 * \text{Attention} + 0.13 * \text{The number of issued microblog} \quad (3)$$

2. Area: this means the impact of area difference on the information spread. Users whose areas have higher level of economic and material basis than other areas will pay more attention to the topic. This paper use percentage that internet penetration of three areas (Beijing, Shanghai, Guangdong) of the user quantity proportion in the total number of users in the one day.

3. Time: this means the impact of the time on the information spread. Its value is the reciprocal of the absolute difference value between the post microblog time now and post microblog time at a peak of microblog numbers. The microblog information spread has growth cycle. Before the climax, the microblog spread number gradually increasing with the increasing of time, after the climax, the microblog spread number gradually reducing with the increasing of time. We choose one day as the peak of climax, this day as the basic period  $t_0$ . The time value equals the reciprocal of the absolute difference value between the post microblog time now and  $t_0$ .

4. Topic sensitivity: this means topic sensitivity in current moment. Its value is the percentage that forward microblog and vote microblog in the total microblog number.

5. Microblog actual spread degree: this means the topic in the current moment has been reached extent of spread. It depends on three factors microblog total number, comments and forwards, this three factors weight is also determined by Coefficient of Variation, after the calculated, the weight value of microblog total number, comments and forwards is 0.32, 0.33, and 0.35. Microblog actual spread degree's equation shows in (4).

$$\text{Microblog actual spread degree} = 0.32 * \text{microblog total number} + 0.33 * \text{comments} + 0.35 * \text{forwards} \tag{4}$$

### 4.3.2 Multiple linear regression analysis

As the different dimensions of the different variables, before multiple linear regression analysis, each of the variable data should be normalized. Normalized formula uses the following formula (5).

$$y_i = \frac{x_i - \min(x_i)}{\max(x_i) - \min(x_i)} \tag{5}$$

The normalized data takes into SPSS, using multiple linear regression analysis, the actual spread degree is a dependent variable, microblog users’ characteristics, area, time and topic sensitivity is independent variables. The multiple linear regression analysis result shows the regression coefficients and the model goodness of fit. R square is 0.773, goodness of fit is 77.3%, the regression modal fit good. The effects of random error - residual squares sum is 0.369, it is the total squares sum of 0.23. The random error effect is small.

**Table 2. Modal Summary**

**Table 3. Anova**

modal	R	R square	adjust R square	Standard error of estimate	modal	square sum	Sig.
1	.879a	.773	.732	.12954694	regression	1.260	.000 <sup>a</sup>
					residuals	.369	
					total	1.629	

a. independent variables: (constant) microblog users characteristics, area, and time and topic sensitivity b. dependent variable: the actual spread degree

The standardized multiple linear regression equation shows in equation (6).

$$Y = 0.104X_1 + 0.277X_2 + 0.556X_3 + 0.341X_4 - 0.229 \tag{6}$$

Y is dependent variable; it shows the topic spread degree in microblog at current moment. X<sub>1</sub> is microblog users’ characteristics, X<sub>2</sub> is area value, X<sub>3</sub> is time value, and X<sub>4</sub> is topic sensitivity. X<sub>1</sub> and X<sub>2</sub> goodness of fit of the model is not good; the cause maybe is that sample is not enough to describe the overall situation. Regression coefficient is larger, which the impact that the independent variable on the dependent variable is greater. We knows that time has the greatest impact on the actual spread degree, followed by the topic sensitivity, area and microblog users characteristics. During the public opinion supervision and management control process, managers should be concerned about topic forwards situation and identify hot public opinion spots just in time, catch the right opportunity to control and guide the public opinion.

## 5. Summary

This paper describes microblog users’ regional distribution, mobile phone users’ vitality, the correlation analysis between attention gained by users, fans and microblog released, and microblog’s grassroots opinion leaders. Based on the description, we introduce the general characteristics of the users. Microblog participation has relatively higher correlation with local economic and cultural standard and internet popularizing rate, the management should focus on monitoring the key areas. Mobile phone users has quickly responded to the heated topic, so the activity of mobile phone users is an important indicator of whether an event can develop into public opinion. Grassroots opinion leaders’ influence is powerful to lead the people’s opinion, the management should use the grassroots leaders’ impact to guide the public opinion.

We also study the tendency of users’ emotional attitude in internet public opinion, generation and trends of network public opinion information, and examine the influence of characteristics of the user, time, geographical



distribution, sensitivity of the topic on microblog messages amount by multiple linear regression analysis. We know that time has the greatest impact on the actual spread degree, followed by the topic sensitivity, area and microblog users characteristics. The formation of internet public opinion has a growth cycle, to grasp the appropriate time to intervention, will play a multiplier role. In the process of monitoring public opinion, the management institutions should pay attention to the communication with the opinion leaders, celebrities and media, so the management can guide public opinion in time. Internet public opinion can be forecast, warning. Management institutions should establish a management mechanism to form the early warning, intervention, guidance and evacuation systems.

However, there are still some limitations in this study. First is the limited sample size, due to huge amount of information, there is some difficulty in collecting data, so there is bias to the general description; secondly, due to limitations of research methods, this study just makes data statistics of a specific microblog case during a certain period of time, so it can't fully reflect communication mechanisms of microblog network public opinion, and relevant conclusions need further demonstration by follow-up study.

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