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Research on Information Self-organization Complex Computer Simulation of Network Affairs

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Abstract: Study on the transmission of network advocacy information in the forming of network affairs is hard to carry out, complicated factors and lack of dynamic data strictly limited the quantitative study on network advocacy evolution. This paper takes this study standing on the complexity theory. Firstly, presume the advocacy evolution in the network affair is essentially a self-organization process and then build a model on the advocacy through complex mini world network model, study quantitatively the advocacy information self-organization process by use of analog simulation.

Key words: Network advocacy information, network affair, self-organization

INTRODUCTION

According to China Internet Information center statistic report, until 2010. Chinese netizen figure reaches 0.42 billion, blog users figure amounts to 0.16 billion, network coverage rate reaches 31.8% (CNNIC, 2010). With the popularity of the internet and magnitude of netizen number, netizens give their opinions on all kinds of issues of social life by various way as post, comment, repaste, leave message and discussion etc. In a short period, accumulating consensus, stir up emotions, trigger actions, a common criminal case, a social strife evolve into a striking network affair nationwide through network advocacy transmission. For example, Deng Yujiao event successively draws large scale of public attention via the internet platform. The spread of advocacy on the affair is depending on netizen's spontaneous post, comment, repaste, leave message etc not systematically organized by website or institution. How the network advocacy information self-organizes, self-generates, self-evolves, automatically turns from disorder to order and finally comes to a network affair? What is the formation premise of advocacy information expansion self-organization in network affairs? What is the internal driving force? These are important issues in mass communication and sociology studies.

This study takes the advocacy evolutive process of network affairs as complex system self-organization process, puts effort to set up basic analytic frame given as a complex network and construct related theory model, then takes advantage of computer simulation results to validate the related issues.

SELF- ORGANIZATION OF NETWORK AFFAIRS

Advocacy information self-organization process of network affairs: According to complexity theory, self-organization (Xu, 2009; Theile and Jansen, 2010) is referring to without the outward instructions to self-generate and self-evolve, that is, spontaneously acts from disorder to order. During the process, the system will successively break original order, through creative action to look after more development. There are 4 stages in the advocacy information evolution from generation to extinction of the network affairs: starting phase, growing phase, mature phase and diminishing phase. The starting phase of the advocacy information self-organization in the network affairs is induced from trigger affairs, netizens start to involve in the posts, leaving message, comments, reviews in the network forum, blogs, discuss on the trigger affairs, express respective attitudes, the leading force to push the development is mainly some outward variables.

In the growing phase of network advocacy, the number of participating the affair discussion of netizens dramatically increased, happened attraction effect, respondent network media, paper media comments on the trigger event and deep reviews., flexibility plus specialization and knowledge overflow phenomena appear in the cluster, shows the rapid increase of association and connection in the participant netizens group. At this point, the leading force of network advocacy gradually turns from exogenous variable to ingenerate variable, namely, netizens group self innovation ability, special cooperation mode, reactive mechanism to outward

environment and unique group culture and so on. netizens group on the whole unfold active is the basis to start a new system. In the case of Deng Yu-jiao affair, to rescue the chaste girl is the popular advocacy of netizens, a netizen nicknamed “butcher” takes real action by being the spokesman of massive netizens, he publicized himself and his daughter’s identification card and passport codes on the internet as the testimony to call for the donation from netizens for his action fee, he alone headed to Badong county and together with lawyer Xia Lin, Xia Nan from Beijing Huayi Law Office to rescue Deng Yu-jiao. In the internet, netizens show their empathy and compliment to the criminal suspect; criticize the casualty official anomic and question the impartiality of the police handling the case.

Comparing to the former two phases, the mature phase commonly refers to entering into the rather stable state. This stability according to traditional viewpoint mainly refers to the less variable change of the netizen number of concerning the affairs, thus it is perceived as a relative balanced stage. But given the complex network, the netizen group is regarded as being imbalanced state, mainly showed on the expansion of the joint itself and its optimization of connections. Although, the whole volume of netizen group increases relatively slow, in this phase the netizen group after the former phases of development, netizens made different changes, change drives change, the “opinion leader” starts to appear. They are good at anatomizing and comparing the deep intrinsic value and meaning from present apparent information and deeply resolve the issue, generate their own opinion and make an expression, take the role on the secondary transmission “opinion leader” and netizens continuously optimal their contact and communication, to look for the environment advantage more effectively taking advantage of network media and traditional media.

Self-organization analysis of network affairs: The advocacy evolution of network affairs is essential a system self-organization process from complex theory point, how the process carries on is the core issue of the study. Targeted on this issue, combining self-organization theory, to the network affairs information self-organization conduct three issues are put forward:

- **Proposition 1:** In the process of advocacy information self-organization of network affairs, the netizens take advantage of rapidity and efficiency, low cost of network, on forum, BBS, blogs and mini-blogs etc., contact with other netizens, learn on this platform and build up rather stable communication circle (virtual community)

- **Proposition 2:** Given different ability of each netizen (such as information understanding ability), the attitude of the netizens influenced by other netizens, opinion leader, network media and government in different degree. But the netizens’ values and benefit demand in the network affair advocacy information self-organization process will gradually converge
- **Proposition 3:** The network affairs advocacy information self-organization process is the netizens demanding on this affair spontaneously develops from disorder to order, among the netizens, network media and information of trigger event shows a compatible and gradual stable tendency

The common propositions are: the first, they are all targeting at network affairs advocacy information evolutive dynamic process, it needs enough time span to validate; the second, they are all taking the network affairs advocacy information evolution as objective, it needs large sample data to study. This brings difficulty in quantitative study which embodies on one side in the collection of data, on the other side in concerned construction and selection of specific indices. Traditional research method and model is describing netizens’ specific transmission behavior by a series of definite differential equation, it cannot hold the whole development of network affair advocacy information evolution, the transmission and formation of network advocacy in fact is a complex system’s evolution process, it is hard to be taken on study with traditional from top to bottom mathematic model. As for these defects, this paper draws lessons from the idea of complex theory, tries to analyze the network affair advocacy information self-organization process from the stand point of complex network. This modeling method is: Set up some rules for the system, let the system spontaneous evolve in certain environment, then inspect the several characteristics arising in the evolution process. The most important character of this method is it builds up a bridge between micro individual and macro general, that is, on certain point it represents the behavior of a specific netizen, also it can predict the general tendency of advocacy information development.

MINI WORLD MODEL OF NETWORK ADVOCACY

Mini world network (Wang *et al.*, 2007) is proposed by Watts and Strogatz (1998) of modeling based on human society network, this network both has larger cluster coefficient similar to regular network and has smaller average distance similar to stochastic network,

both the two characters combined together is called “mini world effect”. Mini world model has already been applied in many areas. Namely, internet control, computer virus transmission, infection transmission predict and so on. This paper uses mini world network studying network advocacy transmission model.

The agent of network advocacy transmission is netizens, they can communicate with other agents, through “learning” and “accumulating experience” changing own ideas and behaviors, this is the basis of system evolution and development. Netizen agent has two qualities: principle ideology and attitude to network affairs. The government and network media are environment variables, the government’s quality and behavior law is: attitude to network affairs and disclosing related information.

This study made following simplified presumptions on transmission modeling:

- Presume netizens have three claims to network affairs $I(i = 1, 2, \dots, N)$: support, neutral and opponent, represented each with $\theta_i = 1$ (support), 0 (neutral), -1 (opponent). Besides, each individual has fixed ideology or merit background with time, represented as $\alpha_i = 1$ (left)0(medium), -1(right). It is ideology that decided the individual’s original attitude to the matters, presuming having known the individual’s ideology
- Take the number, opinions and influence coverage of network media as outward known conditions, each media j has three choices: support, neutral and opponent, represented by $m_j = 1$ (support), 0 (neutral), -1(opponent), the influence of network media to netizens is stochastic
- Take government’s attitude and disclosure of related affair information as the outward known conditions, represented by function β
- In each circle of evolution, each time pace presuming netizen individual changes his/her attitude influenced by “opinion leader”, other netizens and network media working together at probability q
- The principle of netizens changing attitudes is comparing present individual and stochastic element and media attitude, including itself, adopting the minor obeying to the major principle

Presuming at time t , netizen spotted at (a, b) , attitude represented with $A(a, b, t)$, factors influencing the attitude represented with action scope $I(a, b, t)$. $I(a, b, t) = \{A(a, b, t), N(a, b, t), M(a, b, t), \beta\}$, $N(a, n, t)$ represents the long distance connection convergence at time t , spot (a, b) , the element in the convergence keeps constant with time but the value

of the element i.e., the status is changing with time; $M(a, b, t)$ represents at time t influencing the individual at spot (a, b) the cluster of all network media, the element in this cluster and its value is changing with time; \hat{a} represents disclosed certain information by government. At time $t+1$, spot (a, b) , the status of the individual is decided by following probability:

- The number of elements valued 1 in $P\{A(a, b, t+1) = 1\} = I(a, b, t) / I(a, b, t)$
- The number of elements valued -1 in $P\{a[a, b, t+1] = -1\} = I[a, b, t]$
- $P\{A(a, b, t+1) = 0\} = 1 - P\{A(a, b, t+1) = 1\} - \{A(a, b, t+1) = -1\}$

When format of modeling, individual original attitude is assigned stochastically according to individual ideology data, then individual attitude spontaneously iteratively evolves according to given rules.

SIMULATION RREALIZATIONS AND RESULT ANALYSIS

The simulation result is output in time curve and column diagram, the vertical axis represents column diagram at some time, the evolution ratio of individual different attitude, the horizontal axis represents time curve from start time to present time, the evolution process and tendency of individual different attitude. The results validated the above three propositions and some inspirations are gained .

Group polarization phenomenon of network information transmission: Seen from simulation graph, during the information transmission, when holding some opinion takes the lead, standing on neutral opinion will draw close to certain opinion soon, forming distinct group polarization phenomenon.

When arising the bursty trigger event in reality, the information transmitted to the internet, netizens influenced by own background, ideology and psychological factors have different understanding to the information, netizens communicate through forums, blogs platforms with other netizens, at the same time, influenced by “opinion leader” and network media advocacy, when netizens holding certain opinion take the lead, it will have important effect on majority netizens’ recognition on the event, the majority netizens’ attitude will affect the neutral opinion netizens to close to them soon, thus the direction of network advocacy evolution is affected. Because netizen’ values benefit demand in the process of advocacy information self-organization of network affair will

gradually come into homoplasy, forming the group polarization phenomenon.

Thus knowing in the process of network advocacy evolution and formation, majority people will generate what kind of opinion tendency in the end that is easy to be affected by opinions of network media and “network leader”. The government in charge of society management and affair treatment, could depending on situations, strengthen communication with network media and “opinion leader” and conduct the advocacy close to better solving the problem.

The sooner the government discloses the emergency information to the public: The sooner the government discloses the emergency information to the public, the faster the transmission steps into stable. The values of other effect factors keep constant, only change the value of β , that is, the speed of the government disclosing the real bursty common emergency information, the larger of the value β represents the earlier having opened the true information. The result shows the sooner the information opened, the earlier the information transmitted, the faster the network advocacy in stable, in the diagram, shows the different colored graphs step into stable.

Thus, the government should improve affair information opening transparency and opening speed, fully publicize the true information, it will reduce the fake information transmission scale, lead the network advocacy into stable soon.

CONCLUSIONS

The government should pay equal attention to the supervision and guidance to the network media and build up benign relationship with the network media, make fully use of the network media as the society common instrument, at the same time, strengthen its news and propagation induction and supervision, find the balance point of them. Secondary, to strengthen netizens rationality and self-discipline education, improve their information understanding and discerning ability.

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