

Expert Mining for Solving Social Harmony Problems

Jifa Gu^{1,3}, Wuqi Song², Zheng xiang Zhu², Yijun Liu^{3,4}

(1. Academy of Math. & Systems Science, Chinese Academy of Sciences;

2. Institute of Systems Engineering, Dalian University of Technology

3. The center for interdisciplinary studies of natural and social sciences, Chinese Academy of Sciences,

4. Institute of Policy and Management, Chinese Academy of Sciences)

jfgu@amss.ac.cn

Abstract: Social harmony problems are being existed in social system, which is an open giant complex system. For solving such kind of problems the Meta-synthesis system approach proposed by Qian XS et al will be applied. In this approach the data, information, knowledge, model, experience and wisdom should be integrated and synthesized. Data mining, text mining and web mining are good techniques for using data, information and knowledge. Model mining, psychology mining and expert mining are new techniques for mining the idea, opinions, experiences and wisdom. In this paper we will introduce the expert mining, which is based on mining the experiences, knowledge and wisdom directly from experts, managers and leaders.

Keywords: social harmony, meta-synthesis, expert mining

1. Introduction

Now in China with the growing of economic development the social harmony problems are become more crucial. From the point of views of system we may define following systems, which closely related with the social harmony system: (1) Nature-Resource-Environment system ;(2) Economy system ;(3) Social system. For coordination between system (1) and (2) our government had proposed the policy for sustainable development. Many scientific methods may help describe the sustainable development on the base of more clear qualitative and quantitative data and information.

In recent ten years with the development of economy the contradiction has emerged between the systems (2) and (3), such as corruption, an income gap between interior areas and coastal regions as well as between urban and rural population, unemployment, poverty, poor production safety and pollution etc.

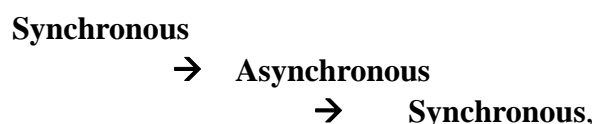
In order to establish the harmony society or coordinate the relationship between systems (1), (2) and (3), we have to use scientific methods both from social and natural sciences to describe the phenomena more deeply and widely.

From the channels of acquaintance of information and knowledge we may divide our society into three societies: formal and central society, informal society and network society. The first one no-doubtfully controls our society in dominant place; we may use most data resources and formal information from statistics, press and documents from authorities in different level of governments. But we may also find that another two societies have their own channels for obtaining information

and knowledge, which played some roles in our society also [1]. Considering the new features in the social harmony system we wish use Metasynthesis system approach proposed by Qian XS et al. [2], some new techniques and methods, such as 6 mining (Data mining, Text mining, Web mining, Psychology mining, Model mining and Expert mining)[3]. Here we will emphasize the expert mining.

2. Meta-synthesis system approach

Meta-synthesis approach is trying to integrate various data, information, and model, experiences, wisdom and computer capacity to solve the complex system problems. For realizing this system approach one team consisted of Institute of Systems Science, Shanghai Jiao tong University, Xian Jiaotong University and Beijing Normal University in a major project supported by National Natural Science Foundation of China had designed a flowchart:



or



And a series of theory, methods, modeling paradigms and computer software and platforms are developed, and had been applied to some macroeconomic problems, e.g. forecasting the GDP growth rate and the one under the impact of SARS, and some general complex economic systems [4, 5]

For solving social problem mental factors instead of physical factors play more important roles in the aspect of social decision making. Then psychological factors testing and social behavior modeling will be taken in consideration to expose some attitudes towards some concerned problems based on psychological investigation. Internet is now another carrier of public opinions. Although there are official channels to get information, but some prompt information and true public opinions may be easier emerged via unofficial channels. From technical point of views, more mining techniques, such as data mining, text mining, web mining and opinion mining, multi-media information mining should be applied to acquire further information from different media.

Both psychological tests and various technologies provide information from public via diverse channels, while it is still necessary to consider opinions from human expert directly.

Expert meeting is a usual way to collect opinions or even knowledge or wisdom toward difficult issues. Moreover, it is a way of collective problem solving. From another point of view, expert meeting could also serves as one kind of expert mining, i.e. to acquire more information from human experts by meeting. But expert mining wishes also to use other mining techniques, such as data mining, text mining web mining as pre-analyzed data and information. In expert mining we wishes to use new methods and computerized tools for group work; such as group argumentation environment (GAE) developed by Institute of Systems Science, and its new functions are needed to be explored [6,7].

3. Expert mining

Expert mining will not only collect expert's opinions expressed openly, but also their thoughts behind. Expression of expert's thoughts may be taken in following fashions: speak explicitly (language, word); speak implicitly-tacit; express by gesture (expression in eyes, gesticulation, tone); speak on Web; speak lie (speak insincerely, false intelligence, rumor).

We may propose some basic ideas for mining the thoughts: Netting globally, optimum seeking locally; 6 mining (Data mining, Text mining, Web mining, psychology mining, Model mining, Expert mining); from tacit knowledge to explicit knowledge (SECI model); combination of human and machine; spatial information analysis (GIS) etc.

Then we may synthesize the expert's opinions by text, meeting and interview.

(1) Meta-synthesis of opinions by text have three kinds: Simple survey (narrative); Meta-analysis; Qualitative Metasynthesis

(2) Meta-synthesis of opinions by meeting should consider the types of meeting and discussion, Ba, Facilitation, and Mediation.

There are three types for convening the expert meetings: 1) *brainstorming type* for collecting the vivid and frank opinions; 2) *studying type* for collecting and studying some opinions on the base of deep investigation; 3) *decision type* for concentrating the opinions and making decision directly. In order to obtain the consensus from experts we also studied different methods, tools for getting the consensus, such as DMTMC-system and PathMaker etc. [7]

There are a lot of discussion types, here we only wish mention some of them: 1). Syntegration (Beer); 2). Meeting on Web (WebScope) [8]; 3) Nominal Group meeting [7]

In order to run the meeting well we have to pay attention to the Ba proposed by Nonaka, which provides both physical and mental environments for improving the atmosphere in exchanging the idea and thoughts within experts [9]. Then facilitation and mediation are now often used in the organizing meeting efficiently and effectively [7]

(3) Meta-synthesis of opinions by interview (psychology mining) can help people to analyze the expert thinking behinds [10].

4. A scientific test on discussing the social harmony

In July of 2006 we had run a scientific test on discussing the social harmony by the expert mining, psychology mining and model mining in a MBA course attached to Graduate University, Chinese Academy of Sciences [11]. We divide all MBA students into six groups to attend the discussion on six selected topics separately: social corruption, housing problem, medicine reform, unemployment, emergent events and peasant workers, which we assumed very crucial in China nowadays. In each group we assign one facilitator using different discussion methods with some useful tools and methods, such as PathMaker, GAE, UciNet, GIS, interview and game theory. For example in the group 2 they discussed the housing problem with the help of Pathmaker, UciNet and GAE. Using the cause-effect graph in Pathmaker they may find the main causes, which attracted the rise of house prices. Applying the UciNet the relationship within the different

keywords, which students had used during the discussion, may be exhibited. Finally they used the help of GAE to trace all the discussion process by a set of visualized pictures on the computer and calculated the agreement and discrepancy degree within all participants. In this test the psychological test also was run for analyzing the attitudes to the social harmony problems from students. Finally in group 6 by using game theory they analyzed the conflict between peasant workers and their boss, and the good policies should be adopted by both sides. Most of MBA students satisfied such new scientific discussion test.

5. Conclusion

The investigation for social harmony system in China is just started in recent years. We will put a lot of efforts for running investigation, especially even if we can collect a lot of data and use many new techniques, the problem for metasynthesizing all concepts, methods, experience and tools, there still stands as a hard task for our Chinese scientists. The center for interdisciplinary studies of natural and social sciences has a strong academic research group under the leadership of Professor Niu Wenyuan. In this group they had also run a case study on surveying the Taxi driver behaviors in Beijing in July of 2006 year the psychology mining, model mining and expert mining had been used [15]

6. Acknowledgements

This paper has got support from the major program supported by NSFC, grant 79990583 and the center for interdisciplinary studies of natural and social sciences.

6. References

- [1] Gu J.F., Tang X. J. and Niu W.Y.: Meta-synthesis system approach for solving social complex Problems, *IFSR2005*, Kobe, November, 2005
- [2] Qian , X. S., Yu J. Y. and Dai R. W.: A new discipline of science- The study of open complex giant system and its methodology, *Nature Magazine*, Vol. 13, pp3-10, 1990 (in Chinese)
- [3] Gu J.F.: Expert mining for discussing the social complex problems, *MCS2006*, Beijing, September, 2006
- [4] Gu J.F., Tang X. J.: Meta-synthesis Approach to Complex System Modeling, *European Journal of Operational Research*, 166(3): pp597-614. 2005
- [5] Gu J.F., Tang X. J.: A Test on Meta-Synthesis System Approach to Forecasting the GDP Growth Rate in China, in the *Proceedings of 47th Annual Conference of the International Society for the Systems Sciences* (Wiley, J. & Allen, J. K. eds.), R093. 2003,
- [6] Tang X. J. and Liu Y. J.: A prototype environment for group argumentation. In Z. T. Wang et al eds., *Proceedings of the Third International Symposium on Knowledge and Systems Sciences*, Shanghai, pp252-256, 2002

- [7] Gu J.F.: On synthesizing the opinions-how can we reach a consensus, *J. Systems Engineering*, Vol.16, No.5, pp340-348, 2001(in Chinese)
- [8] Gu J.F.: Expert mining and the social complex problems, plenary speech in *14th Annual Conference of Systems Engineering Society of China*, Xiamen, China, Oct. 31-Nov.2, 2006 (in Chinese)
- [9] Nonaka I. ToyamaR. and N. Konno: SECI, Ba and Leadership: a Unified Model of Dynamic Knowledge Creation, *Long Range Planning*, 33 ,5-34(2000),
- [10] Zheng X.: Social psychology, Jinan University Press, 2004 (in Chinese)
- [11]Gu J.F. Tang X.J.: Meta-synthesis systems approach and knowledge science, *Information Technology and Decision Making*, 2007
- [12]. Gu J.F., Wierzbicki A.P.: Debating and Creativity Support, chapter 6 in book “Creative Environments: Issues of Creativity Support for the Knowledge Civilization Age”, Wierzbicki A.P. and Nakamori Y. editors, Springer Verlag, Berlin-Heidelberg (2007)
- [13]. Gu J.F., Liu Y.J., and Song W.Q., A scientific discussion test on some social harmony problems, Proceedings of the 51st meeting of the International Society for the Systems Sciences ISSS2007, August 5-10, Tokyo, 2007-56
- [14]. Zhang M.J. Tang X.J., Bai Q., Gu J.F.: Expert discovering and knowledge mining in complex multi-agent systems, *Journal of Systems Science and Systems Engineering*, 16 (2), 222-234(2007)
- [15] Liu Y.J., Niu W.Y., Gu J.F.: Exploring Computational Scheme of Complex Problem Solving based on Meta-synthesis Approach, Proceedings of the International Conference on Computational Science, 19-26 (2007),