

# Understanding College Students' Thought Toward Social Events by Qualitative Meta-Synthesis Technologies

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## ABSTRACT

*It is necessary to consider community opinions about social events and respond with proper actions. Support is needed to acquire a basic or rough idea of community opinions quickly. In this paper, the authors show how to elicit main points from community opinions with a simple word association test on college students about the highlighted social events in China in 2010. Two supporting technologies for qualitative meta-synthesis CorMap and iView are applied to analyze the opinions. Unlike basic descriptive statistical figures, CorMap/iView help identify the structures of opinions, which show the primary concerns of students or features of events, as a simple way to acquire a rough synthesis of public concerns rapidly.*

*Keywords: College Students, Community Opinions, CorMap, iView, Qualitative Meta-synthesis, Social Events*

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## 1. INTRODUCTION

Currently, diverse new media technologies (e.g., Twitter, Facebook, etc.) bring out tremendous growth of both size and speed of information sharing. Those new media are sources of extremely up-to-date information about what is happening in the world and capture the wisdom of community and cover a broad range of domains. Researchers started to use Twitter or Facebook to effectively track public concerns

about H1N1 flu and accurately follow real-time disease activity (Savage, 2011) after using Google search query to predict flu outbreaks (Ginsberg, et al. 2009) Local social events spread widely as those new on-line social media become so popular. In China, public opinions expressed via Internet are more of governmental and business concerns for different missions. It becomes a necessity to face the community opinions about the social events and response with proper actions to avoid worse situations for governmental officials at different levels in China. College students are regarded as a

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special group who hold specific visions toward social events. There are obvious difference between their cognition of risk and those from other groups by both age and profession (Tang, 2009). Their concerns reflect their cognition and responses toward those social events, if captured correctly in time may be helpful to make reasonable and timely interventions for better management and healthy growth of the youth. How to acquire a basic or rough image toward the college students' opinions is an important issue even quickly collecting those opinions is quite easy. Qualitative research taken in social and psychological studies analyzes the first-hand materials based on hypothesis, and conclusions may be affected by the experiences and judgments of the researchers. Rather than beginning with a hypothesis, grounded theory (GT), proposed by Glaser and Strauss in 1960s, investigates the actualities in the real world and analyses the data with no preconceived hypothesis. "GT data analysis involves searching out the concepts behind the actualities by looking for *codes*, then *concepts* and finally *categories*" (Allan, 2003). Grounded theory aims to generate theory from data, which may show a systemic vision toward the concerned problem and helpful for problem solving. Even with software, the process mainly relies on the analysts and is time consuming, which then has limitation to emergency response. Computerized support is needed not only for storing the results of each phase during the GT working process, but also better to help analysts generate concepts and categories. If we understand the process of grounded theory is a kind of qualitative meta-synthesis, we apply computing technologies to implement qualitative meta-synthesis to achieve the systemic vision of the concerned problem.

In this paper, we show how to elicit main points from community opinions with a simple word association test about the highlighted social events in or relevant to China among college students in 2010. We select "Expo 2010" and "Foxconn Suicides" and collect relevant associated words from both college students and graduates. With collection of those stu-

dents' quick thoughts toward those events, we apply two supporting technologies for qualitative meta-synthesis CorMap and iView to the analysis of their opinions toward two social events. Unlike basic descriptive figures from those opinions, we conduct exploratory analysis by CorMap/iView to identify the structures of opinions, which may show the primary concerns of students or features of events, just a simple way to acquire an image of public concerns rapidly during qualitative research.

At first, we introduce the supporting technologies for qualitative meta-synthesis.

## 2. QUALITATIVE META-SYNTHESIS SUPPORTING TECHNOLOGIES: CORMAP/IVIEW

Qualitative meta-synthesis is one type of meta-synthesis, which refers to either a system approach toward complex problem solving proposed by Chinese system scientist Qian Xuesen and his colleagues over 20 years ago (Qian, Yu, & Dai, 1990) or the results of meta-synthesis system practice. Another two types of meta-synthesis denote qualitative-quantitative meta-synthesis and meta-synthesis from qualitative understanding to quantitative validation, which actually indicates a working process of MSA to complex problem solving.

Gu and Tang (2005) discussed how to achieve three types of meta-synthesis by a synchronous-asynchronous-synchronous process while each type of meta-synthesis can be achieved at the respective phase. Activities held in Synchronous Stage I denote to achieve qualitative meta-synthesis, i.e., perspective development or hypothesis generation for meta-synthetic systems modeling. Divergent group thinking is the main way at that stage. Methods oriented to acquire constructs or ideas toward the concerned problems are regarded as qualitative meta-synthesis methods. Then many methods for a systemic vision of the concerned problem can fulfill qualitative meta-synthesis, such as

problem structuring methods (soft OR methods) (Rosenhead & Mingers, 2001) and grounded theory. Computing methods and technologies have been studied to support group argumentation problem structuring and sense making since 1990s, such as QuestMap (IBIS based, now as Compendium) for dialogue mapping approach to deal with social complexity (Conklin et al., 2001), Decision Explorer and Group Explorer based on strategic options development and analysis (SODA) (Eden & Ackermann, 2001) and Wisdom (Mackenzie, et al., 2006). As it enters into Web 2.0 era, more attentions go to advanced computerized support to facilitate, expand, or enhance one's ability to work with one or more kinds of knowledge, from which to make some senses, distill insights or gain knowing, etc. for better job of harnessing the vast collective intelligence potentially available. Kleinm and Iandol (2008) argued that current open-source/peer-production (OSPP) technology is not capable of collaborative deliberation, since the coverage of a topic is created bottom-up and then generally unsystematic. They addressed a study using Collaboratorium, a Web-enabled technology for collaborative deliberation. That kind of technology is more time-based, while collaborative deliberation requires logic-based postings, follows same logics as QuestMap. Such a study again tells the differences between two categories of support tools for group work addressed by Tang (2007). Those methods or relevant tools based on problem structuring methods or IBIS-methodology for collaborative work help to gain structures of the unstructured problems while sacrifice freedom of wild thinking and then may lead to loss of novel ideas, the typical disadvantages of consensus built top-down.

Thus, another category of support for structure detection and sense making or simply support qualitative meta-synthesis is studied. Not only it is beyond traditional recording wild thoughts, but conducts exploratory analysis. Both CorMap analysis and iView analysis are among this category. The meta-data structure for both technologies is  $\langle \text{topic}, \text{author}, \text{text},$

$\text{keywords}, \text{time} \rangle$ . Such metadata indicate the corresponding *author* submits one piece of *text* (e.g., one comment, one blog, the title of a paper, a reply to one question) with a set of *keywords* under the *topic* at the point of *time*. By word segmentation and filtered feature keywords used in text summarization, or human's processing, ideas and opinions can be transferred into the structured representation. The keywords for a blog may denote the labels or tags of that blog. The keywords are articulated as attributes of the *author* or the *text*.

## ESSENTIALS OF CORMAP AND IVIEW ANALYSIS

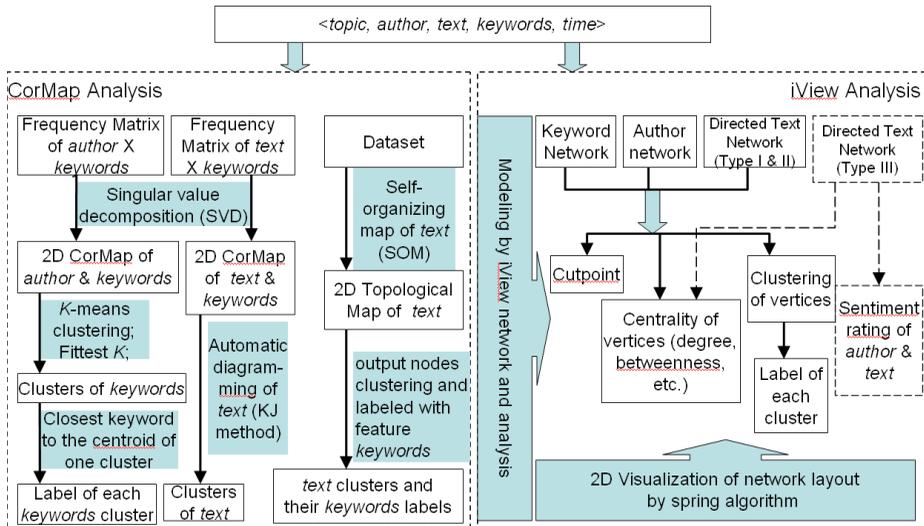
Tang (2008) and Tang, Zhang, and Wang (2008) has proposed the original ideas of analytics of CorMap and iView. The formal name of each computing technology is given by Tang (2010). Luo and Tang (2010) integrated self-organizing map into CorMap analysis. Figure 1 shows the essential analytics of both technologies.

## THE CORMAP ANALYSIS INCLUDING SOM CLUSTERING

The CorMap analysis denotes a technology of exploratory analysis of textual data. By conducting a series of algorithms, CorMap analysis actually helps to expose the group thinking structure from one perspective. Such kind of analysis can be applied to any combination of the concerned participants and may help to "drill down" into those community thoughts and detect some existing or emerging micro community. If applied to an individual user, CorMap analysis may help to unravel personal thinking structure.

Luo and Tang (2010) integrated self-organizing map into CorMap analysis and made performance comparisons among different clustering methods. The main steps of SOM includes SOM training, node clustering with labelled keywords and visualization.

Figure 1. The computing mechanisms of CorMap and iView analysis



## THE IVIEW NETWORK AND IVIEW ANALYSIS

The iView analysis exposes the group or individual thinking structure from another perspective. The central concept of the iView analysis is the iView network which denotes 3 kinds of topological networks, *keyword network*, *author network* and *text network*. In a keyword network for iView analysis, the link between the vertices (keywords) denotes the co-occurrence of keywords among all *texts*. Such a network is referred as an *idea map* contributed by all authors. This topological network is a weighted undirected network where the weight of edge denotes the frequency of co-keywords. In an author network, the link between vertices denotes keyword-sharing between authors. The strength between two authors indicates the number of different keywords or the total frequencies of all the keywords they share. Obviously co-author network is a special case of the author network.

All three types of text networks are directed networks. The directed link from text *j* to text *i* in Type I text network indicates text *j* cites keyword(s) which is originally referred in text *i*. In the text network Type II, the link denotes

to cite the closest text including the concerned keyword. In the text network Type III, the semantic meaning of link expands to a variety of attitudes, e.g., oppose, support, etc. instead of the citation of keywords in both Type I & II text networks, then the meta-data needs to include 2 more elements, i.e., *attitude* and *reference*. Text network may help to show how the ideas grow and spread. Different algorithms are applied to the text network Type III due to the different semantic meanings of the link. As a matter of fact, the iView network may be regarded as the different projections of a tripartite (text, users and keywords) network. After the projection, we get 1-mode network and apply methods of graph theory or social network analysis (SNA) to network analysis. The mechanism of those methods can be easily found in one book on graph theory or SNA.

## FEATURES OF CORMAP AND IVIEW ANALYSIS

Either CorMap or iView analysis shows different perspectives toward the same set of data based on different mechanisms with the same aim to acquire constructs of the concerned topic

from those textual data. Both technologies do not concentrate on the exact methods in each computing step, which may be a major issue for researchers at that domain. For example, the 1st step of CorMap analysis actually adopts correspondence analysis which provides a method of factoring categorical variables and displaying them in a property space which maps their association in 2 or more dimensions. This method has been widely used in many disciplines (Beh, 2004). To provide efficient support, the method to tell which number of clusters is better proposed by Sugar and James (2003). That helps to quickly get an appropriate clustering result. When conducting network clustering in iView analysis, the fast algorithm proposed by Newman (2004) was integrated. As a matter of fact, there is a great deal of research on network structure, while the goal of iView network analysis is not in this specific topic.

CorMap/iView analysis is to acquire a structure of the concerned topics or unstructured problems via a variety of exploratory analysis by adoption of a series of algorithms or methods so as to

- Give a rough image of the issue;
- Draw a scenario of the issue using clustering analysis to detect the structure; meanwhile, an optimal of clusters is achieved;
- Extract concepts from clusters of ideas. Thus, a category of concepts instead of a mess of diverse ideas may be acquired step by step.

Therefore, the structure may be exposed by CorMap/iView. Qualitative meta-synthesis is achieved by computing, not by a predefined framework, such as QuestMap. Moreover, the analyzing visualization facilitates man-machine interaction, human's understanding and sense-making along the structuring process. Both technologies can be applied to support qualitative meta-synthesis to wicked problem solving. Due to different mechanisms of each technology, one may perform more effective to human's understanding at one time. It is the analyst to

make appropriate use of each technology during the discovery process.

Next we apply CorMap and iView analysis to a word association test about social events by three groups of college students.

### 3. A WORD ASSOCIATE TEST OF SOCIAL EVENTS

In current times, people used to express our ideas publicly via the on-line social media. Here we do not consider on how to collect those public concerns from on-line social networking sites as it is a too big and broad issue. We concentrate on exhibiting structures generated from the supposed given textual data about those concerns by computing ways.

We use word association test among college students or graduates to collect opinions. Word association test is a very common way to acquire images and perceptions toward some dedicated topics, such as social risk. Questions such as "What comes to mind when you hear (or see) the word....?" are usually proposed to the people. Slovic, Layman, and Flynn (1990) depicted a general data processing toward word association test in social psychology, where word frequency is used to show the extent of concerns.

Here we just report our findings of word association tests with the selected three classes from management schools. Their majors belong to science and engineering. Two classes from one university, one is class of master degree students on operations research (OR) while another is one undergraduate class on logistics. The major of the third class is information systems (IS) from another university and the students actually had already got bachelor degrees for 2 years. Three classes of students were asked if they paid attention to some social events happened during that period of time. If yes, what their 1st thoughts toward those events were. As most words come from associations on two highlighted events, "Expo 2010" and "Foxconn Suicides", we concentrate on analyzing those two events in this paper.

Table 1. Basic figures of three classes at the word association test

|        | #  | Percentage |                          |    | Percentage |
|--------|----|------------|--------------------------|----|------------|
| Gender |    |            | Major                    | #  |            |
| M      | 33 | 33.7       | Information Systems (IS) | 30 | 30.6       |
| F      | 65 | 66.3       | Operations Research (OR) | 20 | 20.4       |
| Total  | 98 | 100        | Logistics                | 48 | 49.0       |

Table 2. Students paying attentions and having associate words during the test

|           | Expo 2010                             |  |         | Foxconn Suicides                      |   |         |
|-----------|---------------------------------------|--|---------|---------------------------------------|---|---------|
|           | Students paid attentions (percentage) | Students have as-sociations (percentage) | Words # | Students paid attentions (percentage) | Students have associations (percentage) | Words # |
| M         | 27 (81.8%)                            | 19 (57.6%)                               | 24      | 29 (87.9%)                            | 21 (63.6%)                              | 30      |
| F         | 61 (93.9%)                            | 33 (50.8%)                               | 26      | 59 (90.8%)                            | 36 (55.4%)                              | 46      |
| IS        | 27 (90.0%)                            | 17 (56.7%)                               | 27      | 28 (93.3%)                            | 22 (73.3%)                              | 34      |
| OR        | 19 (95.5%)                            | 14 (70.0%)                               | 15      | 19 (95.0%)                            | 12 (60.0%)                              | 19      |
| Logistics | 42 (87.5%)                            | 21 (43.8%)                               | 17      | 41 (85.4%)                            | 24 (50.0%)                              | 24      |
| Total     | 88 (89.8%)                            | 52 (53.1%)                               | 45      | 88 (89.8%)                            | 57 (58.2%)                              | 61      |

The word association tests were taken in June of 2010. Expo 2010, officially Expo 2010 Shanghai China was held in the city of Shanghai, China, from May 1 to October 31, 2010. Expo 2010 has been the everyday headlines of the major news in China mainland since April of 2010 and got a lot of public concerns. The famous "Foxconn Suicides" occurred 16 times between January and May, 2010, when 16 Foxconn employees attempted suicide with 12 deaths. The suicides drew media attention, and employment practices at Foxconn, a large contract manufacturer, were investigated by several of its customers, including Apple. Long working hours, discrimination of mainland Chinese workers by their Taiwanese coworkers, and a lack of working relationships have all been cited as potential causes at the later reports. Social psychologists have done research about both social events from different

aspects. For comparisons, we try to get a rough image toward two events with college students' concerns. Table 1 is the basic information of three classes. Table 2 list summaries on word association about "Expo 2010" and "Foxconn Suicides" respectively.

It is seen that above 50% of students at each class paid attention to each event. Even percentages of girls paid attentions to the social events are higher than those of boys, the percentages of girls contributed associate words are lower than those of boys. The most of associated words came from IS class as some of them had already worked. Undergraduate students contributed least number of associated words. Obviously, people with working experiences have more to say.

Next results of CorMap and iView analysis are addressed.

Figure 2. CorMap of all 52 persons with associated words on “Expo 2010”



#### 4. CORMAP AND IVIEW ANALYSIS OF WORD ASSOCIATION ABOUT “EXPO 2010” AND “FOXCONN SUICIDES”

After preparing the relevant data sets, the analytical process follows the steps as shown in Figure 1. Results on “Expo 2010” and “Foxconn Suicides” are addressed respectively.

#### CORMAP AND IVIEW ANALYSIS ON “EXPO 2010”

Figure 2 shows the CorMap of all students with word association on “Expo 2010”. It could be seen that most opinions locate at the right area and are mainly about “Expo 2010 Shanghai”, while several words, such as the left-located “Olympic Games” and bottom-positioned “69 Jihad”. The fittest number for words clustering is 8. The labels for each cluster are “69 Jihad”, gap of wealth, harmony, Korea-US joint military exercises, Olympic Games, sb, shanghaiense and The Internet of Things in Shanghai. We understand that almost all those words are

relevant to “Expo 2010” except “Korea-US joint military exercises”. Select the area of the majority of words located at the upper-right area for further exploration, we get Figure 3.

Still the fittest number for k-means clustering of words is 8. The labels for each cluster are culture review, Korea-US joint military exercises, sb, shanghaiense, spectacular, hints for Shandong, urban development and waste. Different foci could be sensed with different words. We may get the initial impressions of those students toward “Expo 2010” based on those clusters of words and their labels by k-means clustering.

We can get very special words, such as “hints for Shandong” and “Korea-US joint military exercises”. It is difficult to understand what they really thought. Most words are about the event itself, social or economic development and impacts in Shanghai area. Figure 4 is the idea map of iView network where one node denotes one word.

In the idea map, there are isolated nodes which are not connected with other nodes and may reflect specific thinking among the students toward “Expo 2010”. Some isolated words used

Figure 3. CorMap of selected associated words on “Expo 2010”

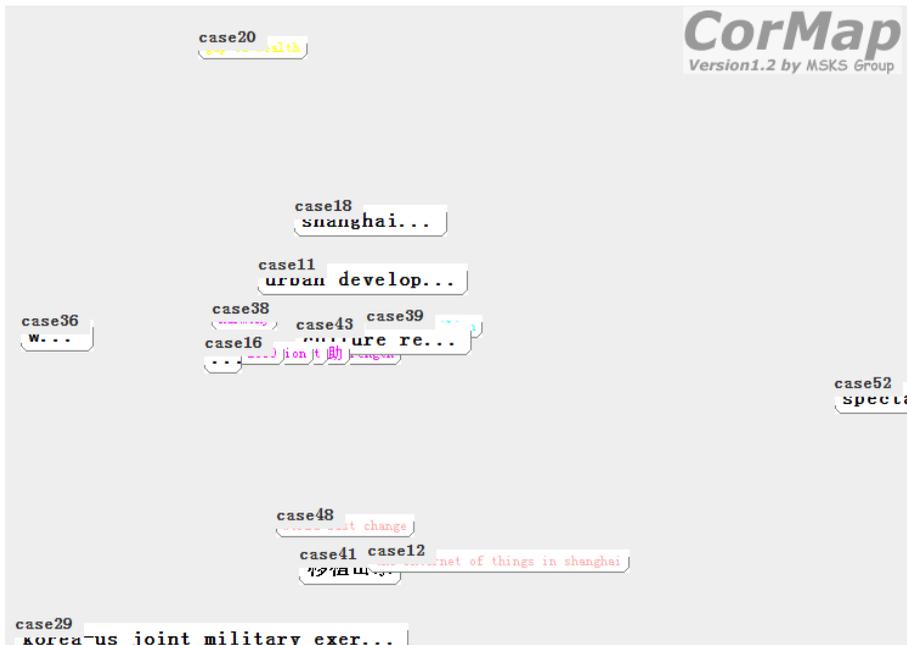
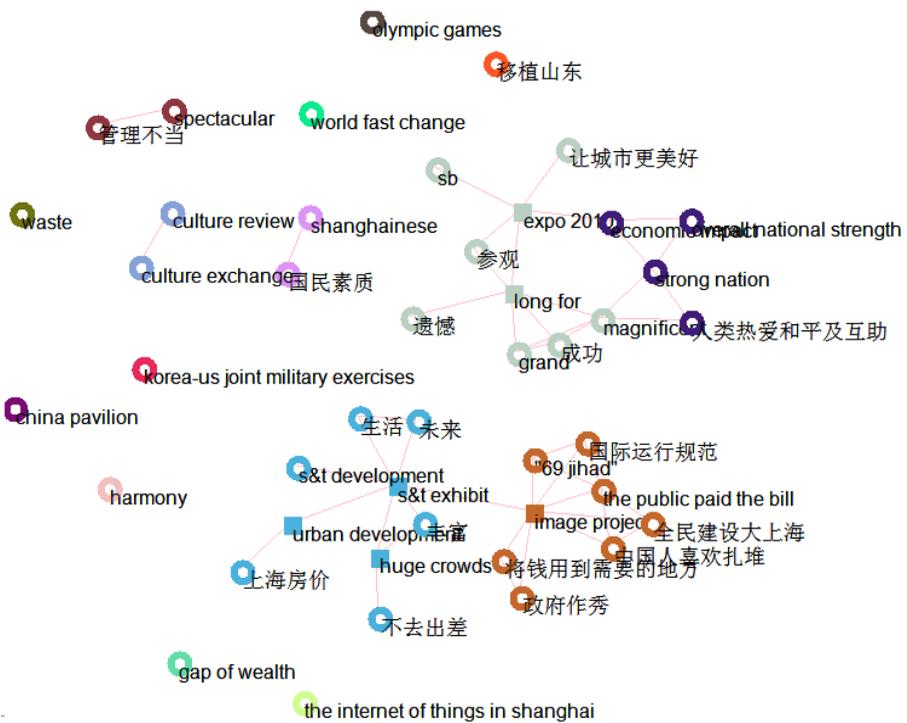


Figure 4. The iView network's idea map of word association on “Expo 2010”



as labels in CorMap analysis (Figures 2 and 3) are “gap of wealth”, “harmony”, “Korea-US joint military exercises”, “Olympic Games”, “spectacular”, “hints for Shandong”, “*The Internet of Things in Shanghai*” and “waste”. The whole network includes 16 clusters (Q=0.618 for largest value of modularity function). Except the 12 isolated nodes, 2 components include 4 clusters. If select the word with the largest value of betweenness centrality as label, we get “Science & Technology exhibit”, “long for”, “image project”, “strong nation”. Nine words with non-zero betweenness value are “S&T exhibit”, “image project”, “Expo 2010”, “long for”, “huge crowds”, “magnificent”, “urban development”, “economic impact”, “strong nation” by a decreasing order. Six cutpoints (square vertex), “image project”, “long for”, “Expo 2010”, “S&T exhibit”, “huge crowd” and “urban development”, are detected. Figure 5 shows the self-organizing map at a 5X5 square grid, the association texts are grouped into 11 nodes. Seven colors reflect 7 feature words for each cluster of nodes, which are “culture ex-

change”, “long for”, “S&T exhibit”, “strong nation”, “Expo 2010”, “economic impact” and “image project” (no text in that node).

Based on a variety of analysis, we may use 4 phrases, “Science & Technology exhibit”, “long for”, “image project” and “strong nation” to represent the whole words associated by the students. We say those 4 words may be regarded as concepts or constructs of concerns among the students who attended the test in June of 2010.

### Cormap and iView Analysis on “Foxconn Suicide”

In the test taken in June of 2010, more students were involved into contributing ideas toward “Foxconn Suicides” than “Expo 2010”. Perhaps during the period of test, few of them go to Expo 2010, while Foxconn provides a lot of jobs for youths. Figure 6 shows the CorMap of all involved students’ associate words on “Foxconn Suicides”.

Figure 5. Self-organizing map of word association on “Expo 2010” (Iteration times: 12500, initial radius: 3, initial learning rate: 0.09. The number above the word in each circle indicates how many texts belong to the node)

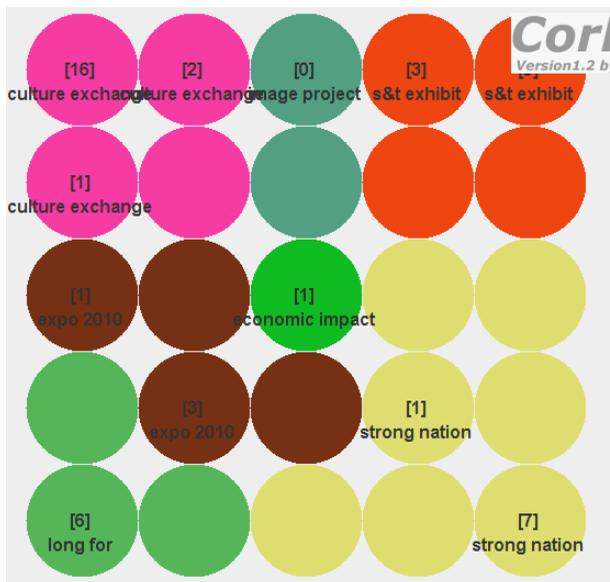
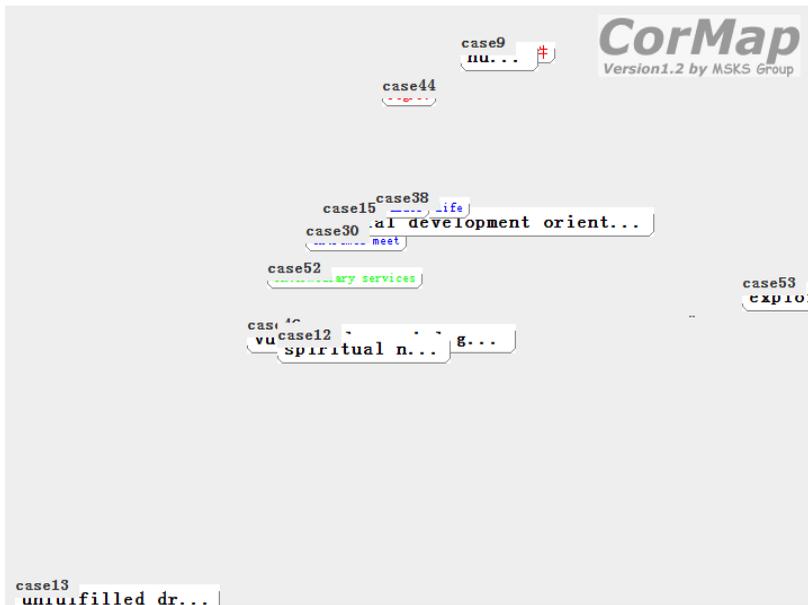


Figure 6. CorMap of all 57 persons with associated words on “Foxconn Suicides”



The fittest number for  $k$ -means clustering of that CorMap is 6 and we get the labels for each cluster are “exploitation”, “Huawei”, “vulnerable social groups”, “extremes meet”, “spiritual needs” and “unfulfilled dreams”. Those words may reflect the main concerns from the students. That is actually in accord to those main reasons exposed by later formal investigations.

Figure 7 is the idea map of iView network on “Foxconn Suicides”. The optimal clustering results 14 clusters with labels are “employee benefit”, “survival stress”, “cherishing life”, “new generation”, “interpersonal relationship”, “vulnerable social groups”, “spiritual needs”, “Huawei”, “values”, “extremes meet”, “intermediary services”, “regret”, “unfulfilled dreams” and “social development orientation”. Those words are highlighted words or main concerns at “Foxconn Suicides”, such as “employee benefits”, “vulnerable social groups” and “spiritual needs”, etc.

The words with larger betweenness values are “survival stress”, “employee benefit”, “employment”, “Foxconn”, “interpersonal re-

lationship”, “new generation”, “cherishing life”, “psychological quality”, “corporate misbehavior”, “work stress”, “labor surplus”, and “exploitation”, while 8 cutpoints are also included. Then we may say those quickly acquired words by iView analysis reflect the main concerns of those college students. Figure 8 shows the self-organizing map, where 5 clusters are generated with labels as “Foxconn”, “life is fragile”, “employee benefit”, “survival stress” and “corporate management”.

Then we may get a rough image from the students about the “Foxconn Suicides” event by 4 phrases, “survival stress”, “employment”, “employee benefits” and “life is fragile”.

## FURTHER ANALYSIS

If we conduct further analysis based on gender and major, more interesting points may be achieved. Tables 3 and 4 give a synthesis of detailed analysis by gender and major of the involved students on each event.

For two tables, we observe that.

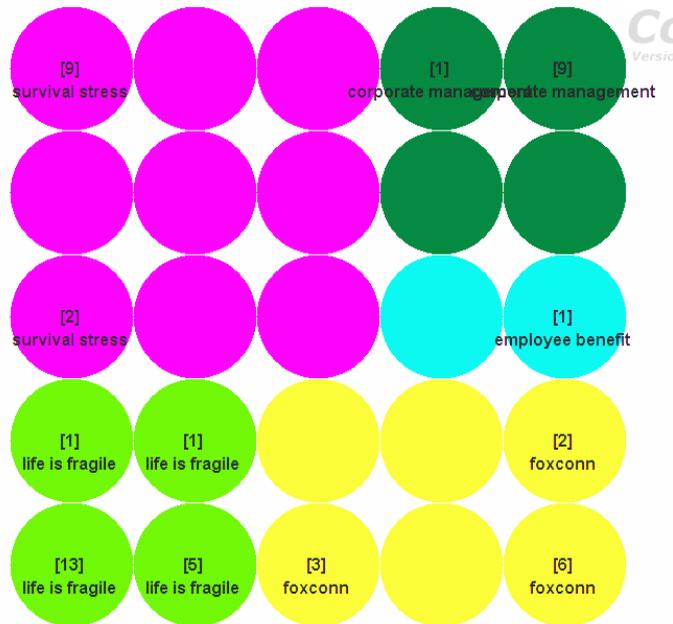
Figure 7. The iView network's idea map of word association on "Foxconn Suicides"



On "Expo 2010", from labels of those clusters and words with highest betweenness values, boys are apt to have negative thoughts as the angry young, such as "image project", "huge crowds", "the public paid the bill", etc. While girls seem more positive, as they "long for", think that "Expo 2010" is "spectacular" and shows a "strong nation". As a matter of course, both "strong nation" and "S&T exhibit" are referred by girls and boys. Due to different ages and experiences, each class has their own concerns. Whatever, we still find "Science & Technology exhibit", "long for", "image project" and "strong nation" are representatives among the whole words contributed by the students.

On "Foxconn Suicides", boys hold a broad view, from the micro level on "employee benefits", the meso-level on "corporate management", to macro level such as social concerns on "vulnerable social groups". Girls think more directly, such as "survival stress", "cherishing life", "employment" and "interpersonal relationship", etc. Those who had finished 4-year university study concern more on "employee benefits", master degree students concern more on "survival stress" while undergraduates on "employment". Taken together, "survival stress", "employment", "employee benefits" and "life is fragile" are common concerns by those students, which also provide a hint of what

Figure 8. Self-organizing map of word association on “Foxconn Suicides” (Iteration times: 12500, initial radius: 3, initial learning rate: 0.096. The number above the word in each circle indicates how many texts belong to the node)



kind of interventions toward college students’ emotional and physical health.

## 5. CONCLUSION

At the Web 2.0 era, rapidly acquiring the main points from diverse community concerns is a badly need especially towards those highlighted social events for emergency management. More research on intelligent information processing has been taken. On the other hand, traditional social or qualitative studies collect and analyze the 1st hand materials based on hypothesis. Rather than start from hypothesis, grounded theory aims to build up a framework of concepts and categories of the concerned problem from the bottom. Problem structuring methods provide paradigms of dealing with wicked problems, while many relevant supporting tools help to acquire possible structures of the problems with a defined framework which are better for logic driven process and not quite flexible to deal with

bottom-up wild thoughts. CorMap and iView are two supporting technologies for qualitative meta-synthesis which holds the similar mission with grounded theory or problem structuring methods, while the supporting mechanism is based on a series of computing methods so to explore possible structures.

In this paper, we apply CorMap/iView to the analysis of the social concerns from a small group of community, college students. We select two highlighted social events “Expo 2010” and “Foxconn Suicides” happened in 2010 in China and conduct word association test among three classes (undergraduate, graduate and 2-year graduation) in management schools from two universities. We get 4 phrases (concepts) “S & T exhibit”, “long for”, “image project” and “strong nation” from the students’ words set by CorMap and iView analysis. The students’ general impression toward ‘Expo 2010’ is rather positive. For “Foxconn Suicides”, “survival stress”, “employment”, “employee benefit” and “life is fragile” are principal concerns,

Table 3. "Expo 2010" word association analysis by gender and major

| Gender/<br>Major                   | CorMap Analysis  |  | iView Analysis  |   |   |
|------------------------------------|--|--|---|---|---|
|                                    | Labels for k-Means Clusters  | Labels for SOM Clusters  | Labels of Clusters on Keyword Network   | Keywords with Highest Betweenness   | Cutpoint  |
| <b>Male</b><br>(19,<br>57.6%)      | 6 clusters: "69 Jihad", sb, hints for Shandong, <b>strong nation</b> , Korea-US joint military exercises, shanghaiense   | 3 clusters: <b>S&amp;T exhibit</b> , Expo 2010, <b>image project</b>   | 10 clusters: <b>image project</b> , huge crowds, <b>S&amp;T exhibit</b> , Expo 2010, shanghaiense, <b>strong nation</b> , Korea-US joint military exercises, waste, harmony, hints for Shandong   | <b>image project</b> , <b>S&amp;T exhibit</b> , the public paid the bill, Expo 2010   | <b>image project</b> , <b>S&amp;T exhibit</b> , Expo 2010   |
| <b>Female</b><br>(33,<br>50.8%)    | 7 clusters: <b>strong nation</b> , S&T development, culture review, Olympic Games, world fast change, urban development, spectacular                                       | 5 clusters: <b>long for</b> , <b>strong nation</b> , <b>S&amp;T exhibit</b> , culture exchange, survival stress, economic impact                       | 11 clusters: <b>long for</b> , <b>strong nation</b> , <b>S&amp;T exhibit</b> , spectacular, culture review, urban development, Olympic Games, gap of wealth, The Internet of Things in Shanghai, world fast change, China Pavilion  | <b>long for</b>   | <b>long for</b> , <b>S&amp;T exhibit</b>  |
| <b>IS class</b><br>(17,<br>56.7%)  | 5 clusters, "69 Jihad", urban development, Olympic Games, sb, The Internet of Things in Shanghai   | 6 clusters: <b>S&amp;T exhibit</b> , <b>image project</b> , Expo 2010, long for, Olympic Games, huge crowds  | 7 clusters: <b>image project</b> , magnificent, Expo 2010, <b>S&amp;T exhibit</b> , huge crowds, Internet of Things in Shanghai, Olympic Games  | <b>long for</b> , Expo 2010, magnificent, <b>image project</b> , <b>S&amp;T exhibit</b> , the public paid the bill                                  | <b>image project</b> , magnificent, <b>long for</b> , Expo 2010, <b>S&amp;T exhibit</b>                     |
| <b>OR class</b><br>(14,<br>70.0%)  | 7 clusters: S&T development, culture review, overall national strength, hints for Shandong, world fast change, spectacular, magnificent                                    | 7 clusters: culture exchange, <b>S&amp;T exhibit</b> , S&T development, magnificent, overall national strength, <b>strong nation</b> , economic impact | 8 clusters: <b>S&amp;T exhibit</b> , overall national strength, culture review, spectacular, hints for Shandong, <b>magnificent</b> , world fast change, China Pavilion   | <b>S&amp;T exhibit</b>  | <b>S&amp;T exhibit</b>  |
| <b>Logistics</b><br>(21,<br>43.8%) | 9 clusters: <b>long for</b> , <b>S&amp;T exhibit</b> , economic impact, <b>strong nation</b> , grand, harmony, waste, urban development, Korea-US joint military exercises | 6 clusters: <b>strong nation</b> , <b>long for</b> , <b>image project</b> , gap of wealth, housing price in Shanghai, urban development                | 11 clusters: long for, <b>image project</b> , <b>strong nation</b> , shanghaiense, urban development, gap of wealth, splendour, harmony, Korea-US joint military exercises, economic impact, waste  | <b>long for</b>   | <b>long for</b>   |
| <b>Total</b><br>(52,<br>53.1%)     | 8 clusters: "69 Jihad", shanghaiense, The Internet of Things in Shanghai, harmony, Korea-US joint military exercises, sb, Olympic Games, gap of wealth                     | 7 clusters: culture exchange, Expo 2010, <b>long for</b> , <b>image project</b> , economic impact, <b>strong nation</b> , <b>S&amp;T exhibit</b>       | 16 clusters: <b>S&amp;T exhibit</b> , <b>long for</b> , <b>image project</b> , <b>strong nation</b> , spectacular, culture review, shanghaiense, Olympic Games, hints for Shandong, world fast change, The Internet of Things in Shanghai, gap of wealth, China Pavilion, waste, Korea-US joint military exercises, harmony | S&T exhibit, <b>image project</b> , Expo 2010, <b>long for</b> , huge crowds, magnificent, urban development, economic impact, <b>strong nation</b> | <b>image project</b> , huge crowds, <b>long for</b> , Expo 2010, <b>S&amp;T exhibit</b> , urban development |

Table 4. "Foxconn Suicides" word association analysis by gender and major

|                              | CorMap Analysis  |   | iView Analysis   |   |  |
|------------------------------|--|---|--|---|--|
|                              | Labels for k-Means Clusters  | Labels for SOM Clusters   | Labels for k-Means Clusters  | Labels for SOM Clusters   | Labels for k-Means Clusters  |
| <b>Male (21, 63.6%)</b>      | 5 clusters: <i>life is fragile</i> , our classmate, corporate management, social development orientation, regret   | 6 clusters: <i>employee benefit</i> , Foxconn, worker, corporate management, <i>life is fragile</i> , work stress   | 12 clusters: <i>employee benefit</i> , Foxconn, corporate management, vulnerable social groups, work stress, worker, <i>life is fragile</i> , regret, unfulfilled dreams, view of life, cheap labor, social development orientation  | <i>employee benefit, survival stress</i> , Foxconn, work stress, worker, corporate management   | Foxconn, <i>survival stress, employee benefit</i> , work stress, worker, corporate management  |
| <b>Female (36, 55.4%)</b>    | 7 clusters: exploitation, intermediary services, pay reform, spiritual needs, wicked old society, values, our classmate  | 5 clusters: <i>survival stress</i> , psychological quality, management system, <i>employment</i> , exploitation   | 13 clusters: <i>survival stress</i> , cherishing life, <i>employee benefit, employment</i> , interpersonal relationship, wicked old society, Huawei, values, spiritual needs, intermediary services, pay reform, extremes meet, our classmate                                    | <i>survival stress</i> , employment, Foxconn, <i>employee benefit</i> , interpersonal relationship, new generation, cherishing life, labor surplus, management system, exploitation                                 | <i>employment</i> , Foxconn, new generation, <i>survival stress</i> , interpersonal relationship, labor surplus, <i>employee benefit</i> , management system, exploitation |
| <b>IS class (22, 73.3%)</b>  | 9 clusters: Huawei, our classmate, unfulfilled dreams, spiritual needs, social development orientation, emotional and physical health, <i>employment</i> , worker, work stress | 6 clusters: <i>employee benefit</i> , work stress, Foxconn, new generation, <i>life is fragile</i> , our classmate  | 7 clusters: <i>employee benefit, life is fragile, survival stress</i> , Huawei, spiritual needs, social development orientation, unfulfilled dreams  | <i>survival stress, employee benefit</i> , Foxconn, new generation, corporate misbehavior, work stress, <i>life is fragile</i> , cherishing life, worker  | Foxconn, corporate misbehavior, <i>survival stress, employee benefit</i> , work stress, new generation   |
| <b>OR class (12, 60.0%)</b>  | 5 clusters: psychological quality, extremes meet, social stress, labor surplus, humanity   | 8 clusters: <i>survival stress, employment</i> , labor surplus, extremes meet, cheap labor, employee communication, interpersonal relationship, professional equality | 7 clusters: <i>survival stress</i> s, humanity, Foxconn, employment, psychological quality, labor surplus, extremes meet   | <i>survival stress</i>  | <i>survival stress</i>   |
| <b>Logistics (24, 50.0%)</b> | 5 clusters: exploitation, Huawei, vulnerable social groups, Foxconn, values  | 8 clusters: Foxconn, corporate management, view of life, psychological quality, <i>employment, survival stress</i> , exploitation, bad corporate                      | 10 clusters: <i>employment</i> , management system, corporate management, vulnerable social groups, suicide, values, Foxconn, <i>life is fragile</i> , regret, intermediary services   | corporate management, psychological quality, <i>employment</i> , management system, exploitation, suicide, <i>survival stress</i>   | corporate management, management system, <i>employment</i> , psychological quality, exploitation   |
| <b>Total (57, 58.2%)</b>     | 6 clusters: exploitation, Huawei, vulnerable social groups, extremes meet, spiritual needs, unfulfilled dreams   | 7 clusters: Foxconn, <i>life is fragile</i> , employee benefit, <i>survival stress</i> , our classmate, <i>employment</i> , corporate management                      | 14 clusters: <i>employee benefit, survival stress</i> , cherishing life, new generation, interpersonal relationship, vulnerable social groups, spiritual needs, Huawei, values, extremes meet, intermediary services, regret, unfulfilled dreams, social development orientation | <i>survival stress, employee benefit, employment</i> , Foxconn, interpersonal relationship, new generation, cherishing life, psychological quality, corporate misbehavior, work stress, labor surplus, exploitation | Foxconn, corporate misbehavior, <i>survival stress</i> , work stress, <i>employment</i> , new generation, labor surplus, exploitation                                      |

and reflect serious attitudes toward the negative event. Those words may be also hints for problem solving and intervention toward college students' employments.

As a matter of course, a rather small example is shown here about the application of CorMap and iView toward the study of the 1st hand materials. The man-machine interaction and acquiring the structures from different perspectives step by step are exhibited to show the value of both qualitative meta-synthesis supporting technologies for practical issues. Supporting qualitative study, CorMap may help to find novel ideas, while iView shows a systemic vision. The results of practice still rely on the experiences and understandings of the analysts with more computations. While the computing way may be helpful to practice the grounded theory, especially to extract concepts from codes by different clustering. In the near future, more tests will be undertaken to acquire community concerns in the social life during the fast economic development with growing social conflicts in China.

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