Problem Chosen	2023HSB MCM/ICM Summary Sheet	Team Control Number
B		MI00008

An MCM Paper Made by Team MI00008

Summary

Here is the abstract of your paper. Firstly, that is ...

Secondly, that is ...

Finally, that is ...

Keywords: MATLAB, mathematics, LaTeX.

Contents

1 Introduction **3**
1.1 Problem Background 3
1.2 Problem Restatement 3
1.3 Our work 3

2 Preparation of the Models **4**
2.1 Assumptions 4
2.2 Notations 4

3 Establishment of Our Model **5**
3.1 Unascertained Measure Model 5
3.2 ISM Model 7
3.3 DEMATEL Model 8
3.4 Establishment of DEMATEL-ISM Model 9
3.5 Establishment of Early Warning Model 10

4 Solution For Problem One & Two **11**
4.1 Selection of Indicators 11
4.2 Establishment of Indicator System(Problem One) 12
4.3 Solution For Problem Two 12
4.3.1 Characteristic 13
4.3.2 Severity 13
4.3.3 Scope of Influence 13
4.3.4 Controllability 13
4.3.5 Commetary on Model 2 16

5 Strengths and Weaknesses **16**
5.1 Strengths 16
5.2 Weaknesses 16

Memorandum **17**

References **17**

Appendix **18**

1 Introduction

1.1 Problem Background

China has been undergoing a period of political, economic, social, and cultural system transformation since the reform and opening up. At the same time that urbanization has accelerated and various new and old types of contradictions and conflicts have persisted, the functioning of the social system has been disrupted, which has forced society to transform in an unbalanced and uncoordinated way. The complexity and unpredictability of society have substantially expanded in the age of worldwide informationization, along with the rapid growth of the economy, and risk factors have multiplied around people's everyday lives, altering how they perceive social security and stability.

The brutal terrorist attack in Kunming, the explosion accident in Tianjin Binhai New Area, the Changchun Changsheng vaccine incident, and the repeated outlawing of environmental pollution and economic aid crimes all strongly suggest the emergence of a risk society. As a result, China must now grapple with the issue of how to preserve social harmony and stability while the country is developing economically and socially and reduce the negative effects of multiple risk events.

1.2 Problem Restatement

- **For problem 1:** We are required to select representative indicators in various aspects to reflect various aspects of social stability. And from a qualitative and quantitative point of view, establish a system of indicators of social stability, and discuss their interrelationship.
- **For problem 2:** We need to establish an early warning model for social stability based on the indicator system that affects social stability established in the first question, and discuss it.
- **For problem 3:** We need to select a country or region that has had a color revolution and use the indicator system and early warning model established by our first and second questions to assess its social stability. And find out the main reasons or factors for the failure of this color revolution, judge the trend of future social stability, and put forward our suggestions.
- **For problem 4:** Find a country where color revolutions have led to regime change, and use the model we have built to find the main causes of regime change.
- **For problem 5:** Put forward our team on the prevention of color revolution, maintain social stability recommendations.

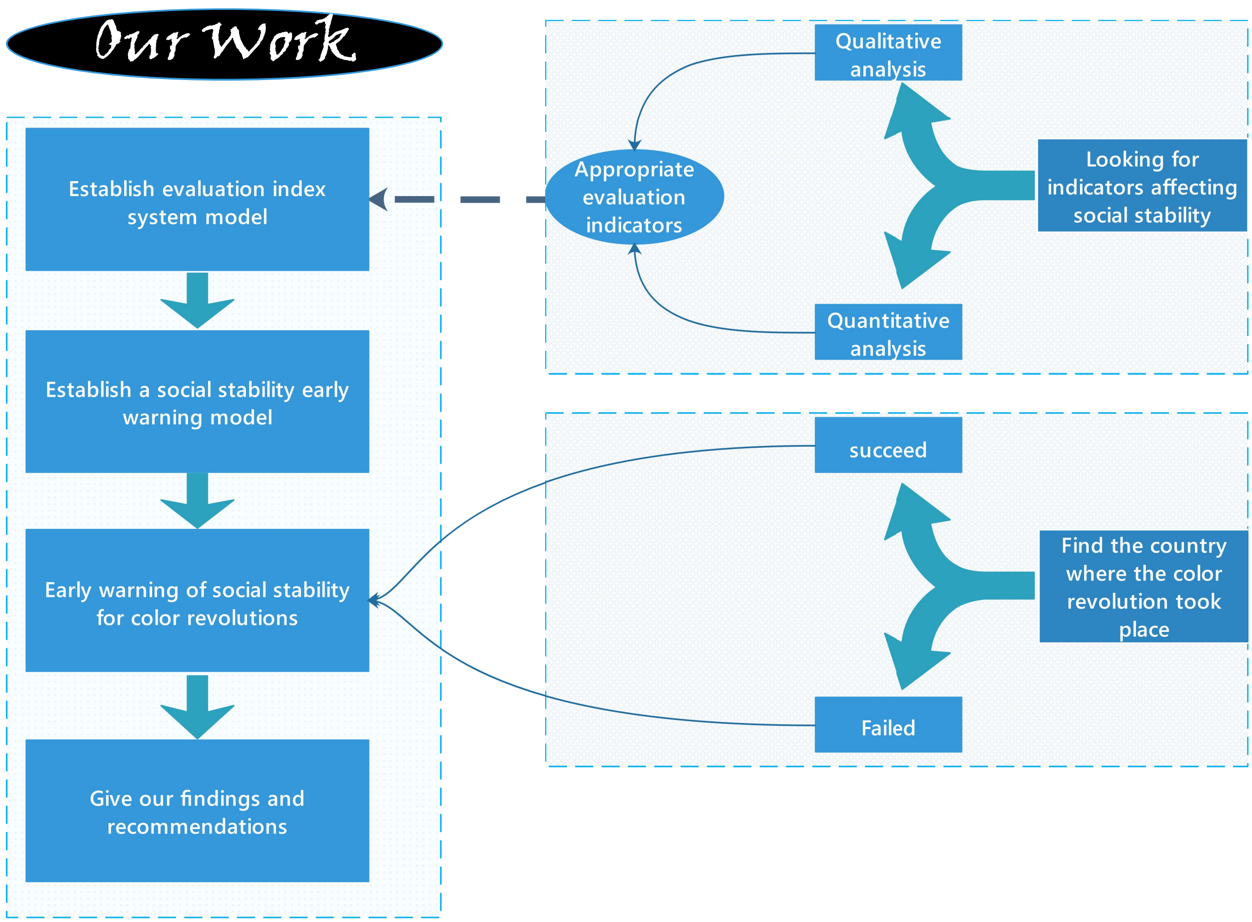
1.3 Our work

Previous research in this area has been very in-depth, and domestic research on the social stability index system is endless. Only then can we use its research results to solve the problems we encounter. Here's our work:

Based on the theory of risk society and social governance, this paper summarizes the relevant literature of social stability and its measurement, and discusses the construction of social stability index and index system.

Based on the research and analysis of social stability risk sources, a dimensional model of social stability index was constructed. Then, according to the principles of data availability, scientificity, and operability, specific indicators are set and selected, and a complete index system framework is gradually built to analyze the actual operation and results of the social stability index.

Based on the determination of various indicators and weight distribution models of the social stability index, the research objects that have occurred in the color revolution were selected to evaluate their social stability, and the main risk factors affecting social stability in the color revolution were identified.



2 Preparation of the Models

2.1 Assumptions

2.2 Notations

The primary notations used in this paper are listed in Table 1.

Table 1: Notations

Symbol	Definition
A_i	Level 1 indicators
A_{ij}	Level 2 indicators
A_{ijk}	Level 3 indicators
SRD	Social Risk Degree

3 Establishment of Our Model

3.1 Unascertained Measure Model

Let $r_1, r_2, \cdots, r_m$ be m objects to be optimized, then $\boldsymbol{R} = \{r_1, r_2, \cdots, r_m\}$ can represent the space to which the object to be optimized belongs. Each $r_i(i = 1, 2, \cdots, m)$ consists of n evaluation indexes. Recorded as $t_1, t_2, \cdots, t_n$. Use $\boldsymbol{T} = t_1, t_2, \cdots, t_n$ to represent the evaluation index space of r_i ,then r_i can be expressed as an n-dimensional vector $\boldsymbol{r_i} = \{r_{i1}, r_{i2}, \cdots, r_{in}\}$. The observed value of the evaluation index is expressed by $r_{ij}(i = 1, 2, \cdots, m; j = 1, 2, \cdots, n)$. Suppose that each R_{ij} has p evaluation levels, denoted $C_1, C_2, \cdots, C_p$. Then the overall evaluation space can be denoted as $\boldsymbol{C} = c_1, c_2, \cdots, c_p$. Among them, the k evaluation grade can be expressed by $c_k(k = 1, 2, \cdots, p)$, and if the k level is greater than the $k+1$ level, it is written as $c_k > c_{k+1}$. If there is $c_1 > c_2 > \cdots > c_p$ or $c_1 < c_2 < \cdots < c_P$, then $c_1, c_2, \cdots, c_p$ is an ordered division class.

Step 1 Measurements r_{ij} of the k rating level c_k. The degree is expressed asin the $u_{ijk} = u(r_{ij} \in c_i)$, requirement u to meet:

$$0 \leq u(r_{ij} \in c_k) \leq 1 \tag{1}$$

$$u(r_{ij} \in C) = 1 \tag{2}$$

$$u(r_{ij} \in U_{i=1}^{k} c_i) = \textstyle\sum_{i=1}^{k} u(r_{ij} \in c_i) \tag{3}$$

Thereinto, $i = 1, 2, \cdots, m$

$j = 1, 2, \cdots, n$

$k = 1, 2, \cdots, p.$

Thereinto, Equation 1 represents "non-negative boundedness", Equation 2 represents "normalization", Equation 3 represents "additivity". The u that simultaneously satisfies the Equation 1 to Equation 3 is called an unascertained measure, and has a single index measure matrix $(u_{ijk})_{n\times p}$:

$$(u_{ijk})_{n\times p} = \begin{bmatrix} u_{i11} & u_{i12} & \cdots & u_{i1p} \\ u_{i21} & u_{122} & \cdots & u_{i2p} \\ \vdots & \vdots & \ddots & \vdots \\ u_{in1} & u_{in2} & \cdots & u_{inp} \end{bmatrix} \tag{4}$$

Step 2 According to the grading standard of the evaluation index and the measured value of each index, the comprehensive measurement evaluation matrix of the index is determined, and the comprehensive measure of multiple indicators is calculated in combination with the comprehensive index weight determined by the improved entropy weight method, which is as follows (Wang Xinmin et al., 2012):

$$u_{ik} = \sum_{j=1}^{n} w_j u_{ijk} \tag{5}$$

Thereinto, $i = 1,2,\cdots,m$

$j = 1,2,\cdots,n$

$k = 1,2,\cdots,p.$

Step 3 Calculate u as:

$$0 \le u_{ik} \le 1 \tag{6}$$

$$u(r_i \in C) = \textstyle\sum_{k=1}^{p} u_{ik} = 1 \tag{7}$$

$$u(r_i \in \textstyle\bigcup_{l=1}^{k} c_l) = \textstyle\sum_{l=1}^{k} u(r_i \in c_l) \tag{8}$$

Therefore, the object of evaluation is obtainedriThe p-dimensional vector of the multi-index comprehensive measure of , which can be expressed as $\boldsymbol{U} = \{u_{i1}, u_{i2}, \cdots, u_{ip}\}$.

Step 4 Multi-indicator evaluation matrix $(u_{ik})_{m\times p}$ as follows:

$$(u_{ik})_{m\times p} = \begin{bmatrix} u_{11} & u_{12} & \cdots & u_{1p} \\ u_{21} & u_{22} & \cdots & u_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ u_{m1} & u_{m2} & \cdots & u_{mp} \end{bmatrix} \tag{9}$$

Step 5 In order to determine the weight of each indicator, the evaluation level of the gold cave tailings pond was calculated by using the confidence identification criterion. Set the reliability to λ and $\lambda \ge 0.5$. If $c_1 > c_2 > \cdots > c_p$, its recognition model is:

$$\min\{k : \sum_{l=1}^{k} u_{il} \ge \lambda, 1 \le k \le p\} \tag{10}$$

Thereinto,$k = 1,2,\cdots,p$,s is the degree of affiliation. When the value of k satisfies the recognition model, the membership degree s is calculated to obtain the evaluation objectriBelongs to the s rating and is credited as c_s.

Step 6 After deriving the security level of the evaluated object according to the confidence identification criterion, it is also necessary to rank the degree of influence of the influencing factors. If the ordered evaluation space is $\{c_i\}$, then c_k of the value equals to e_k, and $e_k > e_{k+1}$. Then we have:

$$q_{Bi} = \sum_{k=1}^{p} e_k u_{ik} \tag{11}$$

Thereinto,q_{Bi} is the importance of the unascertained measure, and the importance vector of the unascertained measure $q = \{q_{B1}, q_{B2}, \cdots, q_{Bn}\}$. The influence degree of the influencing factors is ranked by comparing the size of q.

3.2 ISM Model

ISM (Interpretive Structural Modeling) is a model that is developed to study complex systems. Based on tools such as directed graph, matrix and computer technology, a multi-level hierarchical structure model is constructed (POLAT & RMAC, 2011, p. 169-174). DEMATEL (Decision Making Trial and Evaluation Lab), which is a scientific method based on graph theory and matrix to simplify the complex system structure (Gu Xuesong & Chi Guotai, 2010, p. 508- 514). The combined model in this paper integrates the centrality and causation of DEMATEL into the multi-level hierarchical structure of ISM, which can not only clarify the hierarchical relationship of various influencing factors but also study the relative importance of constraints, so as to make the analysis result more objective and reasonable. The steps to build the composite model are as follows:

Step 1 Determine the set of influencing factors :

$$A = \{a_i | i = 1, 2, \cdots, n\} \tag{12}$$

Step 2 Determine the factor influence scale, and determine the mutual influence relationship between the factors through expert knowledge and experience, and get the direct influence matrix V.

$$V = [v_{ij}]_{n\times n} \tag{13}$$

Thereinto, v_{ij} represents the influence degree of factor a_i on factor a_j. When $i = j$, $v_{ij} = 0$.

Step 3 Calculate the direct impact matrix V to obtain the normalized direct impact matrix X :

$$X = [X_{ij}]_{n\times n} = \frac{V}{\max \sum_{j=1}^{n} V_{ij}} \tag{14}$$

Step 4 Calculate the comprehensive impact matrix T :

$$T = [T_{ij}]_{n\times n} = X(I-X)^{-1} \tag{15}$$

Thereinto, I is identity matrix.

Step 5 The influence degree f_i , the influence degree e_i , the center degree z_i and the reason degree y_i of the constraint factors were calculated. The calculation formula is as follows:

$$f_i = \textstyle\sum_{j=1}^{n} T_{ij}, 1 \le i \le n \tag{16}$$

$$e_i = \textstyle\sum_{j=1}^{n} T_{ij}, 1 \le i \le n \tag{17}$$

$$z_i = f_i + e_i \tag{18}$$

$$y_i = f_i - e_i \tag{19}$$

Step 6 Draw the cause and result diagram:

Cartesian coordinate system is drawn with the degree of center as the abscissa and the degree of cause as the ordinate.

Step 7 Calculate the overall impact matrix H :

$$H = [H_{ij}]_{n\times n} = T + I \tag{20}$$

Step 8 Determine the threshold value λ (Xue Wei1 & Geng Zhiwei, et al. 2019, p. 99-104.):

$$\lambda = \alpha + \beta \tag{21}$$

Where, and respectively refer to the mean value and standard deviation of the comprehensive influence matrix T .Different λ values have different logical relationships with the influencing factors (Sun Jing, 2018). The choice of λ is more subjective based on expert experience, while replacing it with the sum of the mean and standard deviation based on the statistical distribution is more objective, which can reduce the influence of subjectivity.

Step 9 Calculate the standardized reachable matrix K :

$$K = [K_{ij}]_{n\times n} \tag{22}$$

Thereinto, if $H_{ij} > \lambda$,then $H_{ij} = 1$

if $H_{ij} \leq \lambda$,then $H_{ij} = 0$.

Step 10 According to the reachability matrix, the reachability set R_i and antecedent set S_i of each influencing factor are determined.
Thereinto, R_i is composed of the index set corresponding to all the columns with index 1 in the ith row of the reachable matrix

S_i consists of the set of indices corresponding to all rows with index 1 in the ith column of the reachable matrix.

Step 11 Verify:

$$R_i = R_i \cap S_i, (i = 1, 2, \cdots, n) \tag{23}$$

If it is true, then a_i is the highest level factor. At this time, row i and column i are deleted in K , and the calculation is repeated until all factors are deleted.

Step 12 Draw the hierarchical structure diagram of factors according to the order of factors to be deleted, and establish the structural model.

3.3 DEMATEL Model

The decision experiment and evaluation laboratory method, or DEMATEL, is a mathematical language for quantifying complex system problems by using graph theory and matrix tools. DEMATEL obtains the degree of centrality and the degree of cause by calculating the degree of influence and the degree of being affected, and then analyzes the dependence among the factors. The steps for the DEMATEL method are as follows.

Step 1 The object factors are determined, and the direct influence matrix X is established according to the logical relations among the factors.

Step 2 Matrix normalization process, sum the rows of matrix X, set its value to $Sum_i(i = 1, 2, \cdots, n)$, find the maximum value Sum_{max}, let $X' = X/Sum_{max}$, get the normalized matrix X'.

Step 3 Calculating the comprehensive influence matrix T, calculating the matrix T according to the formula $T = X'(I - X')^{-1}$, where I is the unit matrix.

Step 4 The influence degree (T), the affected degree (R), the center degree (P) and the reason degree (E) were calculated according to the comprehensive influence matrix T.

Step 5 Dawing the distribution map of the influencing factors according to the centrality and the degree of cause.

Step 6 The causal factor group and the result factor group were analyzed iteratively, and the causal hierarchy diagram was drawn.

3.4 Establishment of DEMATEL-ISM Model

DEMATEL-ISM was proposed by American scholars. By combining adjacency matrix and direct influence matrix, this method decomposes the complex system into multi-level hierarchical form with clear hierarchy, quantifies the risk factors, studies the influence degree and affected degree of risk factors, and obtains the hierarchical structure relationship of risk factors.

DEMATEL-ISM combines DEMATEL and ISM theories, which can effectively determine the causal relationship between factors, obtain the hierarchical structure of influencing factors, excavate the deep-seated factors leading to accidents, and thus provide a theoretical basis for the proposal of accident prevention measures.

In order to fully analyze the influencing factors of social stability, the DEMATEL-ISM method is specially used to analyze the key factors and core factors that cause accidents, providing theoretical support for preventing accidents. The specific process is as follows: build the impact matrix, determine the impact strength between the factors affecting the fire and explosion accidents in the laboratory, determine the direct impact matrix and normalize it.

Step 1 According to Unascertained Measure Model and ISM Model, the intensity of action between the influencing factors was analyzed, and the values were assigned according to 5 levels, including no influence 0, small impact 1, average impact 2, large impact 3 and severe impact 4, and two initial direct impact matrices were obtained. To eliminate the fluctuation between fractions, the 2 direct impact matrices are averaged to obtain the direct impact matrix W.

Step 2 The row value maximum method is used to process the direct impact matrix to obtain the normalized matrix N:

$$Maxvar = \max(\textstyle\sum_{j=1}^{n} a_{ij}) \tag{24}$$

$$N = (\tfrac{a_{ij}}{Maxvar})_{n\times n} \tag{25}$$

Step 3 Calculated the comprehensive impact matrix T according to the Equation 26:

$$T = (N + N^2 + N^3 + \cdots + N^k) \tag{26}$$

Thereinto, $N \times N$ means the indirect relationship of increase, which includes the increase between the values that are not 0 in the direct impact matrix, and the transfer of the influence between the elements causes the value of 0 to become a non-zero value.

Step 4 According to the data distribution of the overall influence matrix E, the threshold λ is determined and the factors with less influence are screened out, so as to construct the up matrix

M. According to the reachability matrix M, solve for the reachability set $P_{(S_i)}$, the antecedent set $Q_{(S_i)}$ and the common set $C_{(S_i)} = P_{(S_i)} \cap Q_{(S_i)}$ of each factor. According to the principle of hierarchical processing, when $L_1 = C_{(S_i)} = P_{(S_i)}$, S_i is the first layer element, and then the rows and columns corresponding to the first layer factor are crossed out.

Step 5 Repeat the operation until all the elements are divided, thus obtaining a multi-level directed topological graph between the factors:

$$E = T + I \tag{27}$$

$$M = (m_{ij})_{n\times n}, m_{ij} = \begin{cases} 1 & m_{ij} \geq \lambda \\ 0 & m_{ij} < \lambda \end{cases} \tag{28}$$

Thereinto, M_{ij} corresponding value in reachable matrix M. Here, we take $\lambda = 0.15$ to judge.

3.5 Establishment of Early Warning Model

Step 1 We have established an indicator system that affects social stability and determined the weights between each indicator, so that we can obtain the following formula for calculating the degree of social risk:

$$SRD = \sum I_n W_n \tag{29}$$

Thereinto, *SRD* represents the degree of social risk

n is the serial number of the indicator and its weight

I represents the indicator

W represents the weight of the indicator in the entire social risk early warning indicator system.

Step 2 Each indicator in the indicator system uses a five-level scoring method, that is, five values are set according to the size of the indicator value: 10, 20, 30, 40 and 50. The size of the indicator value is directly proportional to the degree of social risk. In this way, we can measure the degree of social risk through the above formula for calculating the degree of social risk and identify it with corresponding early warning signals.

We scored the indicators based on the data we got and calculated the Social Risk Degree(SRD).By consulting the data, we divide the warning level,there are shown in Table 2:

Table 2: Weighted Comprehensive Assessment of Social Risk Police Ranks

SRD Value	[10,20)	[20,30)	[30,40)	[40,50]
Alarm Level	No Alarm	Light Alarm	Medium Alarm	Heavy Alarm
Signal	Green	Blue	Yello	Red

4 Solution For Problem One & Two

4.1 Selection of Indicators

The early-warning mechanism of social security and stability refers to the critical state that signals the operation of society and shows that disorderly phenomena have taken place or are about to take place, a set of systems and methods aimed at attracting the attention of policy makers, managers and the public, analyzing the causes in a timely manner, and implementing effective measures so as to prevent the undesirable phenomena of social operation from further worsening. In the face of the rapid development of modern society, it will be helpful for government decision-making departments and public security organs to establish a complete and effective early-warning mechanism for social security and stability, guan took timely and effective preventive measures against risks in social development in order to maintain and promote social harmony and stability.

Social security is a more complex concept, and due to the broad nature of its content, there is a distinction between broad and narrow senses. Social security in the broadest sense refers to the state of social operation in which the entire social system can maintain benign operation and coordinated development, and the insecurity factors and influence are minimized. Obviously, social security includes economic security, political security, social life security, ideological and cultural security, and many other aspects. Social security in the narrow sense refers to security in areas other than economic and political systems. Based on the analysis of the above two aspects, we believe that the connotation of social security can be interpreted as: Social security refers to the security of the public living space of the population, which includes the security of citizens' lives and property, the order of social life, and the ecological environment, and it directly reflects the needs of public security interests closely related to citizens.

We believe that there is no absolute objectivity and reasonableness in the selection of indicators, of course, we cannot guarantee that the indicators we choose will be reasonable, but we read a lot of literature to ensure that our indicators are as objective and reasonable as possible within our ability.

Social stability includes political stability, economic stability, normal social order and people's peace of mind. These aspects are interrelated, mutually influencing, interacting and inseparable. Political stability is the core of social stability as a whole, economic stability is the foundation of social stability as a whole, normal social order is a necessary condition for political stability and economic stability, and people's peace of mind is a comprehensive reflection of social stability. We divide the indicators into three categories, police source indicators, warning indicators and alarm indicators. According to the analytic hierarchy method, the indicator system is divided into target layer(A_i), criterion layer(A_{ij}) and indicator layer(A_{ijk}). The specific meaning of each of these indicators is listed in Appendix.

Since the standard layer is all consistent, there is a certain correlation between risk factors, so it is necessary to analyze the correlation between social stability risk factors.

We have included our indicators in the Figure 2:

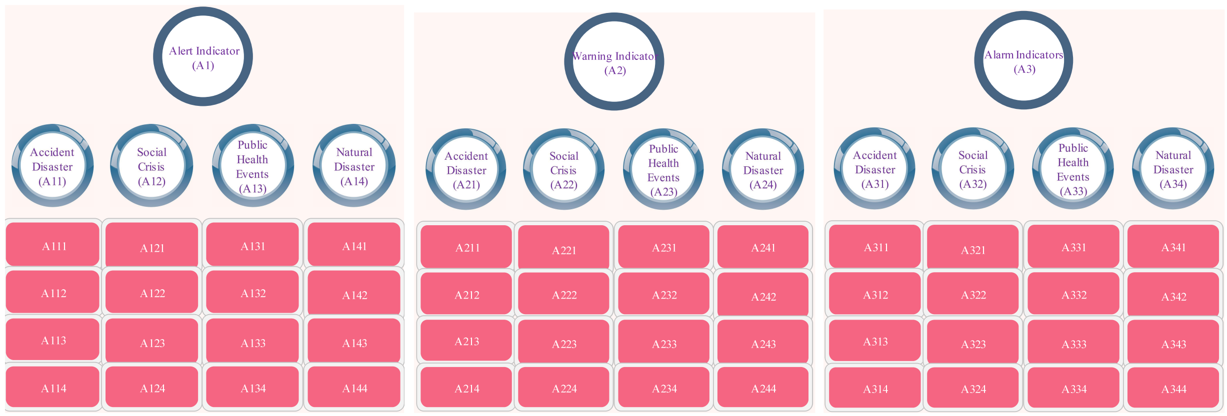
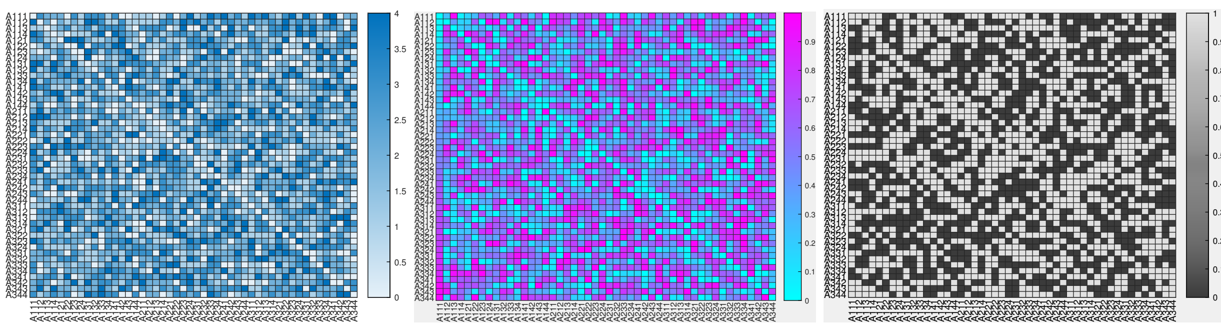


Figure 2: Selection of Indicators

4.2 Establishment of Indicator System(Problem One)

Here in order to more intuitively show the two matrices we have obtained, we will show the **Direct Influence Matrix $\boldsymbol{W}$**, **Comprehensive Influence Matrix $\boldsymbol{T}$** and the **The Reachability Matrix $\boldsymbol{M}$** in the form of Heatmap in the Figure 3:



(a) Matrix W (b) Matrix T (c) Matrix M

Figure 3: Heatmaps of Each Matrixes

From the Heatmap above, we can easily see the relationship between the three indicators (1 in the matrix M indicates that there is a relationship, 0 indicates that there is no relationship). According to our model, there is a positive correlation between the three indicators and the two indicators (we have carried out a positive treatment on the indicators).

At this time, the **Index System** we get is: with the **Alert Indicator(A_1, Weight 0.390)**, **Warning Indicator(A_2, Weight 0.319)**, and **Alarm Indicators(A_3, Weight 0.291)** as the Level 1 indicators. Their secondary indicators are **Accident Disaster(A_{i1}, Weight 0.123), Social Crisis(A_{i2}, Weight 0.245), Public Health Events(A_{i3}, Weight 0.491)** and **Natural Disaster(A_{i4}, Weight 0.142)** respectively. Level 3 indicators and their weights are listed in the table.

4.3 Solution For Problem Two

We have established a social stability early warning model, which only needs to be scored according to the actual situation of each indicator, and the stability level can be obtained according to the final situation. But how to determine the score of each indicator we still need to discuss as follows:

Four aspects should be considered to determine the early warning level:

4.3.1 Characteristic

According to the predictability of its occurrence, it can be divided into sudden and recurrent. Due to their unpredictability, emergencies often have a strong impact on the people after they occur, thereby endangering social security and stability. Because regular events occur more frequently, the people have a certain ability to bear them, so when they occur, the intensity of the impact is less than that of sudden events. From the perspective of foreseeability, the warning level of sudden events should be higher than that of recurring events.

According to the relationship between its harm and residents, it can be divided into direct harm and indirect harm. As the direct hazard type is directly aimed at the personal safety of residents, it will cause great panic to residents once it occurs. The indirect hazard type will not directly threaten the personal safety of residents, so it is not easy to cause huge panic. As for the relationship between hazards and residents, the warning level of direct hazards should be higher than that of indirect hazards.

Considering the two kinds of nature of early warning events. From high to low, the early warning levels are **Sudden Direct Harm Type, Regular Direct Harm Type, Sudden Indirect Harm Type** and **Daily Indirect Harm Type**.

4.3.2 Severity

We have determined the severity of the incident in three respects: the level of threat to **The Lives of The Population, The Magnitude of The Economic Damage** and **The Potential of Further Harm**.

4.3.3 Scope of Influence

We believe that the influence scope can be measured from three aspects: **The Number of People Affected, The Impact of The Spatial Scope** and **The Impact of Psychological Degree**. The higher the number of residents involved in the incident, the higher the level of early warning; the greater the spatial scope of the incident, the higher the level of early warning; the stronger the psychological impact of the incident on the residents, the higher the level of early warning.

4.3.4 Controllability

We believe that people feel safe about situations they can control and fear situations they can't control, so event controllability affects the level of warning. The higher the degree of uncontrollability, the higher the warning level, and if it is completely out of control, it is extremely dangerous. Event controllability is measured from two aspects, namely, **The Understanding and Mastery of Relevant Factors** and The Timely and Effective Degree of Measures.

In the actual early warning, an event will have the above multiple attributes, so it is necessary to comprehensively analyze according to the specific situation and determine the early warning level of each indicator in the urban early warning indicator system.

When we determine the score of the indicator, we only need to bring in Equation 29 to get the warning level.

Table 3: The Meaning and Weight of Each Indicator

Indicator	Indicator Layer	Weight
A111	Enterprise Loss Degree	0.014
A112	Lack Of Investment In Urban Infrastructure	0.035
A113	The Degree Of Consistency Between The Urban Environment And Production	0.056
A114	The Degree To Which Urban Policies Pay Attention To Production Safety	0.018
A121	Crime Rate	0.030
A122	Divorce Rate	0.099
A123	Income Difference Degree Of Urban Residents	0.093
A124	Urban Real Unemployment Rate	0.023
A131	Development Degree Of Urban Health Sector	0.093
A132	Concern About Urban Environmental Sanitation	0.132
A133	Defense Against External Public Health Events	0.206
A134	The Degree Of Attention Paid By Urban Policies To Health Care	0.059
A141	Extent Of Urban External Environment Damage	0.066
A142	Climate Variability	0.022
A143	Potential Threat To Urban Geological Structure	0.011
A144	Public Health	0.044
A211	Frequency Of Production Accidents	0.048
A212	Injury And Death Rate In Production Accidents	0.031
A213	Damage Of Urban Infrastructure	0.010
A214	Damage Degree Of Urban Infrastructure	0.034
A221	Dissatisfaction With Social Order	0.049
A222	Frequency Of Labor Disputes	0.057
A223	Degree Of Pollution And Damage Accidents	0.080
A224	Non-Institutionalized Group Development	0.059
A231	Potential Occurrence And Activity Of Public Health Events	0.250
A232	Active Degree Of Inducements For Public Health Events	0.184
A233	Main Factors Of Natural Disasters	0.034
A234	Natural Disasters	0.023
A241	Instability Of Natural Disasters	0.055
A242	Active Degree Of Main Factors Of Natural Disasters	0.038
A243	Active Degree Of Natural Disaster Inducing Factors	0.043
A244	Warfare Caused By Accidents And Disasters	0.007
A311	Life Loss Caused By Accidents And Disasters	0.068
A312	Economic Losses Caused By Accidents And Disasters	0.055
A313	Group Crime	0.016
A314	Group Fighting	0.004
A321	Frequency And Scale Of Group Crime And Fighting	0.115
A322	The Frequency And Scale Of Religious And Ethnic Conflicts	0.090
A323	Active Degree Of Natural Disaster Inducing Factors	0.008
A324	Warfare Caused By Public Health Events	0.009
A331	Life Loss Caused By Public Health Events	0.217
A332	Economic Losses Caused By Public Health Events	0.159
A333	Psychological Problems Caused By Public Health Events	0.115
A334	Life Loss	0.003
A341	Degree Of Life Loss	0.046
A342	Property Damage Degree	0.029
A343	Degree Of Direct Production Loss	0.051
A344	Indirect Loss Degree Of Natural Disasters	0.016

4.3.5 Commetary on Model 2

The instance of long and wide tables are shown in Table 4.

Table 4: Basic Information about Three Main Continents (scratched from Wikipedia)

Continent	Description	Information
Africa	Africa Continent is surrounded by the Mediterranean Sea to the north, the Isthmus of Suez and the Red Sea to the northeast, the Indian Ocean to the southeast and the Atlantic Ocean to the west.	At about 30.3 million km^2 including adjacent islands, it covers 6% of Earth's total surface area and 20% of its land area. With 1.3 billion people as of 2018, it accounts for about 16% of the world's human population.
Asia	Asia is Earth's largest and most populous continent which located primarily in the Eastern and Northern Hemispheres. It shares the continental landmass of Eurasia with the continent of Europe and the continental landmass of Afro-Eurasia with both Europe and Africa.	Asia covers an area of 44,579,000 square kilometres, about 30% of Earth's total land area and 8.7% of the Earth's total surface area. Its 4.5 billion people (as of June 2019) constitute roughly 60% of the world's population.
Europe	Europe is a continent located entirely in the Northern Hemisphere and mostly in the Eastern Hemisphere. It comprises the westernmost part of Eurasia and is bordered by the Arctic Ocean to the north, the Atlantic Ocean to the west, the Mediterranean Sea to the south, and Asia to the east.	Europe covers about 10,180,000 km^2, or 2% of the Earth's surface (6.8% of land area), making it the second smallest continent. Europe had a total population of about 741 million (about 11% of the world population) as of 2018.

5 Strengths and Weaknesses

5.1 Strengths

- First one...
- Second one ...

5.2 Weaknesses

- Only one ...

Memorandum

To: Heishan Yan
From: Team 1234567
Date: October 1st, 2019
Subject: A better choice than MS Word: LaTeX

In the memo, we want to introduce you an alternate typesetting program to the prevailing MS Word: **LaTeX**. In fact, the history of LaTeX is even longer than that of MS Word. In 1970s, the famous computer scientist Donald Knuth first came out with a typesetting program, which named TeX ...

Firstly, ...

Secondly, ...

Lastly, ...

According to all those mentioned above, it is really worth to have a try on LaTeX!

References

[1] Einstein, A., Podolsky, B., & Rosen, N. (1935). Can quantum-mechanical description of physical reality be considered complete?. *Physical review*, 47(10), 777.

[2] *A simple, easy LaTeX template for MCM/ICM: EasyMCM*. (2018). Retrieved December 1, 2019, from `https://www.cnblogs.com/xjtu-blacksmith/p/easymcm.html`

Appendix

Table 5: The Meaning and Weight of Each Indicator

Indicator	Indicator Layer	Weight
A111	Enterprise Loss Degree	0.014
A112	Lack Of Investment In Urban Infrastructure	0.035
A113	$\mathscr{D}$ Consistency Between The Urban Environment And Production	0.056
A114	$\mathscr{D}$ Which Urban Policies Pay Attention To Production Safety	0.018
A121	Crime Rate	0.030
A122	Divorce Rate	0.099
A123	Income Difference Degree Of Urban Residents	0.093
A124	Urban Real Unemployment Rate	0.023
A131	Development Degree Of Urban Health Sector	0.093
A132	Concern About Urban Environmental Sanitation	0.132
A133	Defense Against External Public Health Events	0.206
A134	$\mathscr{D}$ Attention Paid By Urban Policies To Health Care	0.059
A141	Extent Of Urban External Environment Damage	0.066
A142	Climate Variability	0.022
A143	Potential Threat To Urban Geological Structure	0.011
A144	Public Health	0.044
A211	Frequency Of Production Accidents	0.048
A212	Injury And Death Rate In Production Accidents	0.031
A213	Damage Of Urban Infrastructure	0.010
A214	Damage Degree Of Urban Infrastructure	0.034
A221	Dissatisfaction With Social Order	0.049
A222	Frequency Of Labor Disputes	0.057
A223	Degree Of Pollution And Damage Accidents	0.080
A224	Non-Institutionalized Group Development	0.059
A231	Potential Occurrence And Activity Of Public Health Events	0.250
A232	Active Degree Of Inducements For Public Health Events	0.184
A233	Main Factors Of Natural Disasters	0.034
A234	Natural Disasters	0.023
A241	Instability Of Natural Disasters	0.055
A242	Active Degree Of Main Factors Of Natural Disasters	0.038
A243	Active Degree Of Natural Disaster Inducing Factors	0.043
A244	Warfare Caused By Accidents And Disasters	0.007
A311	Life Loss Caused By Accidents And Disasters	0.068
A312	Economic Losses Caused By Accidents And Disasters	0.055
A313	Group Crime	0.016
A314	Group Fighting	0.004
A321	Frequency And Scale Of Group Crime And Fighting	0.115
A322	The Frequency And Scale Of Religious And Ethnic Conflicts	0.090
A323	Active Degree Of Natural Disaster Inducing Factors	0.008
A324	Warfare Caused By Public Health Events	0.009
A331	Life Loss Caused By Public Health Events	0.217
A332	Economic Losses Caused By Public Health Events	0.159
A333	Psychological Problems Caused By Public Health Events	0.115
A334	Life Loss	0.003
A341	Degree Of Life Loss	0.046
A342	Property Damage Degree	0.029
A343	Degree Of Direct Production Loss	0.051
A344	Indirect Loss Degree Of Natural Disasters	0.016