International Journal of Applied Mathematics and Soft Computing

Volume 4, Issue 1, February, 2018

President: Zhang Jinrong
Chief Planner: Hu Yuejuan
Executive Chief Editor: Chen Lihua, Cui Shuzhen, Shuyu
Editorial Board: Li Shu, Xu Ya, Gao Shufen, Ya Hui, Su Daqi, Albert, Yu Borui, Souza, Pei Liu, Chun Hao, Li Dhidai, Meng Yu
Audit Committee: Lin Lichan, Xu Lijuan, Dong Peiwang, Su Jianmin, Ali Coskun, You Wenying, Chen Xingeng, An Xin, Yan Yanhui, Tang Ming, Yang Ming, Zhi Zhong, Xiao Han, Sun Wenjun, Yoon-seon Lee, Bom Sook Kim, Chang-Duk Jun, Jin Hong Cha, Tan Ker Kan, Tian-Hua Huang, Jorge Serra Colina, Yong Shao, Vikram Kate
Publisher: HongKong New Century Cultural Publishing House
Address: Unit A1, 7/F, Cheuk Nang Plaza, 250 Hennessy Road, Wanchai, Hong Kong
Tel: 00852-28150191
Fax: 00852-25445670

Copyright© 2018 HongKong New Century Cultural Publishing House -All Rights Reserved

Contents

A Tipping Point of Evaluation on Fragility Effected by Climate Change in China

Huanyu Dong, Hebao Zhang, Wenshang Ji……(1)

Propagation Loss Analysis of High Frequency Radio Waves in Multihop Paths

Hanghai Fan, Fangfang Qu, Shihui Yuan……(4)

Fuzzy Rough Set Membership based Fuzzy Multiple Kernel Support Vector Machine

Qiang He, Jiaoyang Zhang……(7)

Charging Station Demand Assessment Method based on Regional Development Difference Information

Qichuan Kang……(13)

Comparisons of two Non-Monotone Strategies for Solving Derivative-free Wedge Trust-Region Problems

Yan Li, Qinghua Zhou, Yan Zhan……(15)

Study on Sea Surface Reflection of High Frequency Radio Signals

Meihan Liu, Lin Gao, Runyuan Zhao……(18)

Research on Developing Tendency of Xiaozhan Rice in Tianjin

Wenmei Liu, Hongyan Gu……(20)

A Climatic Network Model of Region Stability

Hongfei Niu, Weiyu Xiong, Weibo Dai……(25)

The Impact of Climate Change on Regional Instability

Qian Ran, Jinzi Bi, Chunkun Luo, Zhonghao He, Qin Zhang……(28)

The Impact of Climate Change on Regional Instability

Haiyao Sun……(30)

A Study of Multi-hop HF Radio Propagation

Meiqi Sun, Yunzhi Zhao, Miaomiao Ge……(33)

Impact of Climate Change on Vulnerability

Runda Tian, Qiang Li, Chengxing Liao……(36)

Objective Modeling and Analysis of Interstate Energy Contract

Jinghan Wang, Suiyu Zhang, Yanjun Li……(38)

Electric Vehicle Market Prediction based on Improved Competitive Lotka-Volterra Systems

Kechen Wang, Ziyin Xu……(40)

Application of Plant Landscape in Interior Design

Wanjun Chen, Mi Zhang, Zichen Tang, Lun Xu*……(42)

Discussion on Green Design of Interior Space Based on "Internet Plus"

Tianshu Wang, Mi Zhang, Zichen tang, Lun Xu*……(45)

Warehouse location based on 0-1 Integer Linear Programming Model

Shangmin Yu, Dongqian Meng, Lu Yang……(47)

Prediction on the Number of Different Language Speakers

Huaxia Zhang, Jinhui Chen, Tianyuan Liu……(49)

The Evaluation Criteria of Vulnerable Regions Affected by Climate Change

Runsheng Zhou……(52)

Application Characteristics and Classification of Wrestling Techniques in Sanda Competition

Zhiyang Han……(57)

Research on Component Fusion Image Encryption Method based on Compound Chaotic Model

Huihong Chen, Shiming Liu……(61)

Structure Design of Automatic Loading and Unloading Manipulator Based on Visual Positioning

Xiaolin Wei, Cheng Xia……(66)

Research on Dynamic Access Control Method of Encrypted Data in Cloud Computing Environment

Yucheng Pan……(73)

Research on Multi-objective clustering Optimization of Logistics Distribution Line in E-commerce Environment

Shiming Liu, Huihong Chen……(80)

Location Tracking and Prediction Method for Social Network Users based on Data Mining

Jian Wang……(86)

A Tipping Point of Evaluation on Fragility Effected by Climate Change in China

Huanyu Dong, Hebao Zhang, Wenshang Ji
College of Qianhu, Nanchang University, Nanchang, 330031, China

Abstract: Climate changes has made great influences on instability. It is of vital importance to establish an efficient evaluation system, which meet the following requirements. Figure out when and how climate change force a country become more fragile. Based on the principles of mode and average, we identify the tipping point of 15 factors separately. We define the average as tipping point 1 of transforming from stable to vulnerable, mode as tipping point 2 that turning vulnerable to fragile. If the sum of all the representative numbers is over 22, the country is in fragile status. Then we utilize optimized ANN-Markov model to predict the development trend of China, which proves that it will not fall into fragility in future years.

Keywords: ANN Markov chains Fragility

1. Introduction

Climate change has been widely regarded as a driver of change in shaping the future of most areas and at scales ranging from individual to the global [1]. Climate change amplifies the negative effects on the areas, which su er from common environmental problems. The negative issues increase likelihood on climate shocks. Those areas in long run can fall into the degree to which an exposure unit is susceptible to harm due to exposure, to a perturbation or stress, in conjunction with its ability to cope, or fundamentally adapt [2], which is called the fragile state. Thus it is crucial to assess country vulnerability, which can reflect the general process of social ecosystems under climate change [3]

2. A Tipping Point

The condition of any country cannot stay the same in the development process. It is essential to figure out the exact tipping point to prevent from falling into the fragile state. We define the tipping point by considering the vulnerable status of the 15 indicators. We obey the principle of mode and average. The average of data set given by Fund for Peace is set as turning point 1 of transform from table to vulnerable status. The mode of data set represents the turning point 2 that turning the vulnerable to fragile status.

Table 1. The Turning Point of 15 Factors based on Fragility

	Security Apparatus	Factionalized Elites	Group Grievance	Uneven Economic	Economic Inequality	Human Flight and Brain Drain	State Legitimacy	Public Services
Turning point 1	5.7	6.5	6.2	5. 7	5.9	5.7	6.1	5.5
Turning point 2	7.2	8.2	7.8	7	7.6	7.5	8.2	7.9
	Human Rights	**Demographic Pressures**	**Refugees and IDPs**	**External Intervention**	**Precipitation**	**Temperature**	**Natural disaster**	
Turning point 1	5.8	5.8	5.3	5.8	5.8	5.2	5.1	
Turning point 2	7.8	8.1	7.3	7.6	7.7	7.4	7.6	

We value the diverse number in different weights, which is shown as follows.

$$\begin{cases} number \le tippingpoint1 & weight = 0 \\ tippingpoint1 < number < tippingpoint2 & weight = 1 \\ number \ge tippingpoint2 & weight = 2 \end{cases}$$

If the sum of all the representative numbers is over 22 points, the country is probably in fragile condition. The less number means the more stable condition.

3. Evaluate the State of China

The complex indicator of China from 2006 to 2015 is shown in table 2. We conclude the fragility of China is under 22, which means China has been a stable but quite vulnerable status for a decade.

Table 2. The Complex Index in China

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Complex index	16	15	15	17	17	14	13	15	14	13

4. Evaluate the State of China

The prediction on when a country may reach the tipping point is based on the ANN with additional momentum optimized by adaptive variable step model. We set previous and the other separately as the training and test data set. It is obvious that China will not reach the tipping point in the future. However, there is huge gap between expected and predicted results. To deal with this, we combine the advantages of ANN and Markov chain.

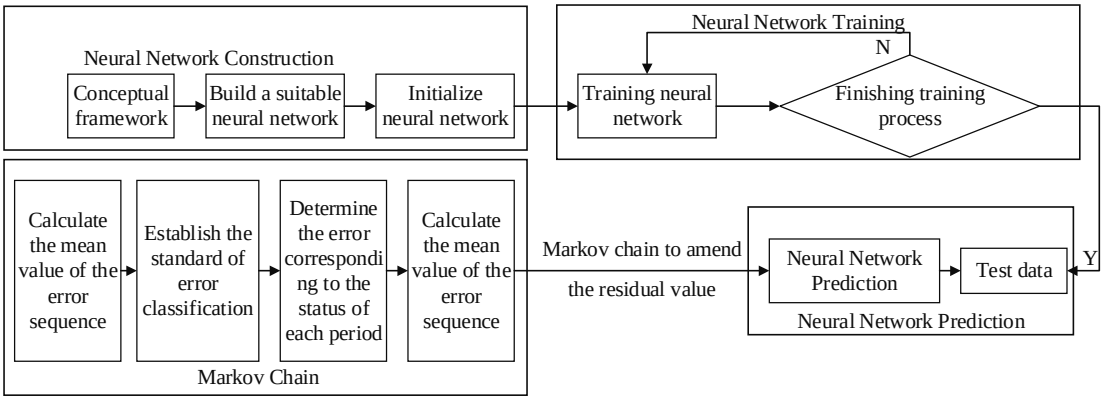

Figure 1. The Flowchart of Optimized ANN-Markov Model

To reflect the effect of optimization model clearly, we compare the relative value between the ANN and improved ANN-Markov Chains model. The relative error has largely decreased, identifies the proposed ANN-Markov Chains has well performance on diminishing the error.

Table 3. The Comparison of Relative Error between ANN and ANN-Markov Chai

Year	The complex index	ANN		Markov Chains	
		predicted value	relative error	modified value	relative error
2006	82.5	71.2	0.14	80.8	0.02
2007	81.2	68.6	0.16	80.1	0.01
2008	80.3	67.8	0.16	78.3	0.02
2009	84.6	68.7	0.19	81.7	0.03
2010	83.0	68.5	0.17	80.5	0.03

5. The Effects of Climate Change on Fragility in China

Figure 2 intuitively reflects the impact of climate change on fragility in China. The darker color represents a more fragile state. There was a slight impact of climate changes on vulnerability in the western China from 2006-2015. But the fragility of south area was deeply influenced by the climate change. Those western area due to its location can prevent themselves from being influenced by extreme disasters. North area is the most stable region of China.

Overall, those area nearby the ocean are the most likely to be influenced by climate change, which has the closest connection with fragility.

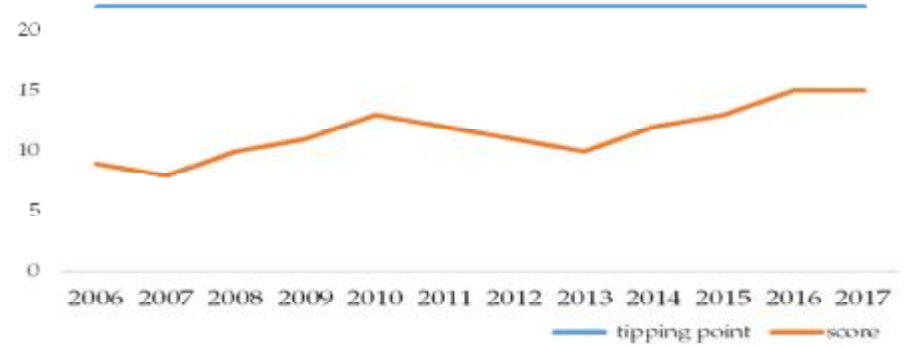

Figure 2. The Predictive Trend of Vulnerability in China from 2006 to 2017

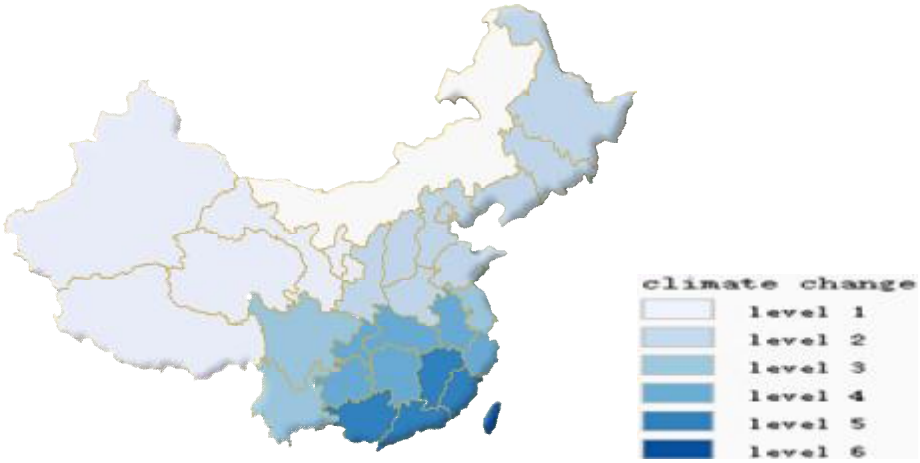

Figure 3. The Influence of Climate Changes on Fragility in China

References

[1] J. Urry, Climate Change & Society, Polity Press, Cambridge, 2011.

[2] Guillaumont, P. Measuring Structural Vulnerability to Allocate Development Assistance and Adaptation Resources. Development Policies Working Paper (68). FERDI, 2015.

[3] Wei, W., Alvarez, I., Martin, S., Sustainability analysis: viability concepts to consider transient and asymptotical dynamics in socio-ecological tourism-based systems. Ecol. Model. 251, 103–113, 2013.