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An Efficient Feedback Control Mechanism for Positive or Negative Information Spread in Online Social Networks

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ABSTRACT: The wide availability of online social networks (OSNs) facilitates positive information spread and sharing. However, the high autonomy and openness of the OSNs also allow for the rapid spread of negative information, such as unsubstantiated rumors and other forms of misinformation that often elicit widespread public cognitive misleads and huge economic losses. Therefore, how to effectively control the negative information spread accompanied by positive information has emerged as a challenging issue. Unfortunately, this issue still remains largely unexplored to date. To fill this gap, propose an efficient feedback control mechanism for the simultaneous spread of the positive and negative information in OSNs. Specifically, a novel computational model is first proposed to present the temporal dynamics of the positive and negative information spread. Furthermore, the proposed mechanism restrains the negative information spread with minimal system expenses by devising and performing three synergetic intervention strategies. Technically, this mechanism intensively evaluates the number of seed users performing three intervention strategies. Besides, each seed user performs the received control task independently, and then the control plan for the next time step is adjusted dynamically according to the previous feedback results. Finally, evaluate the efficiency of the proposed mechanism based on the extensive experimental results obtained from two real-world networks.

I. INTRODUCTION

Psychological stress is becoming a threat to people's health nowadays. With the rapid pace of life, more and more people are feeling stressed. According to a worldwide survey reported by New business in 20101, over half of the population have experienced an appreciable rise in stress over the last two years. Though stress itself is non-clinical and common in our life, excessive and chronic stress can be rather harmful to people's physical and mental health. According to existing research works, long-term stress has been found to be related to many diseases, e.g., clinical depressions, insomnia etc.. Moreover, according to Chinese Center for Disease Control and Prevention, suicide hasbecome the top cause of death among Chineseyouth, and excessive stress is considered to be a major factor of suicide. All these reveal that the rapid increase of stress has become a great challenge to human health and life quality. Thus, there is significant importance to detect stress before it turns into severe problems. Traditional psychological stress detection is mainly based on face-to face interviews, self-report questionnaires or wearable sensors. However, traditional methods are actually reactive, which are usually labor-consuming, time-costing and hysteretic.

II. LITERATURE REVIEW

1. **Efficient coupling diffusion of positive and negative information in online social networks [X. Wang, X. Wang**, F. Hao, G. Min, and L. Wang] F. Hao, G. Min, and L. Wang] **https://ieeexplore.ieee.org/document/8717734**
States that "Online social networks have become an

effective and important social platform for communication, opinions exchange, and information sharing. However, they also make it possible for rapid and wide misinformation diffusion, which may lead to pernicious influences on individuals or society. Hence, it is extremely important and necessary to detect the misinformation propagation by placing monitors. First define a general misinformation-detection problem for the case where the knowledge about misinformation sources is lacking.Extensive experiments on realworld networks show the effectiveness of proposed algorithms with respect to minimizing the number of monitors ".

2. State-dependent pulse vaccination and therapeutic strategy in an Si epidemic model with nonlinear incidence rate [K. Liu, T. Zhang, and Lu.Chen)https://ieeexplore.ieee.org/document/8613016 States that "The state-dependent pulse vaccination and therapeutic strategy are considered in the control of the disease. A pulse system is built to model process based on an SI ordinary differential equation model. At first, for the system neglecting the impulse effect, give the classification of singular points. Then for the pulse system, by using the theory of the semicontinuous dynamic system, the dynamics is analyzed. Analysis shows that the pulse system exhibits rich dynamics and the system has a unique order-1 homoclinic cycle, and by choosing p as the control parameter.

3. Information diffusion nonlinear dynamics modeling and evolution analysis in online social network based on emergency events [X. Liu, D. He, and C. Liu] https://ieeexplore.ieee.org/document/8613016 States that "A nonlinear dynamic emergency public event information diffusion system and mathematical model for public events are proposed based on the propagation dynamics. First, public diffusion for public emergency information communication is analyzed and designed, the opinion evolution is divided into and the viewpoint of value, influence, interest, conformity, intimacy five factors of information emergencies; second, the dynamic diffusion network is designed; information propagation mathematical public emergencies the final model is constructed.

4. Dynamic stability of an SIS epidemic network and its optimal control [K. Li, G. Zhu, Z. Ma, and L. Chen] https://www.sciencedirect.com/science/article/abs/pii/S1007570418301977 States that "Develop a complex network based SIS model, calculate the threshold R0 of infectious disease transmission and analyze the stability of the model. In the model, three control measures including isolation and vaccination are considered, where the isolation is structured in isolation of susceptible nodes and the isolation of infected nodes. Regard these three kinds of controls as time-varying variables, and obtain the existence and the solution of the optimal control by using the optimal control theory.

5. Viral cascade probability estimation and maximization in diffusion networks [A. Sepehr and H.Beigy] https:// www.computer.org/csdl/journal/tk/2019/03/08367882/17D45WXIkH9 States that " People use social networks to share millions of stories every day, but these stories rarely become viral. Can estimate the probability that a story becomes a viral cascade If so, can find a set of users that are more likely to trigger viral cascades These estimation and maximization problems are very challenging since both rare-event nature of viral cascades and efficiency requirement should be considered. Unfortunately, this problem still remains largely unexplored to date. Given temporal dynamics of a network, first develop an efficient viral cascade probability estimation method, VICE, that leverages an special importance sampling approximation to achieve high accuracy.

6.Adversarial influence maximization [J. Khim, V.Jog,andP. Loh] https://www.ijcai.org/proceedings/2020/594 States that "Consider the problem of influence maximization in fixed networks for contagion models in an adversarial setting. The goal is to select an optimal set of nodes to seed the influence process, such that the number of influenced nodes at the conclusion of the campaign is as large as possible. Formulate the problem as a repeated game between a player and adversary, where the adversary specifies the edges along which the contagion may spread, and the player chooses sets of nodes to influence in AN EFFICIENT FEEDBACK CONTROL MECHANISM FOR POSITIVE OR NEGATIVE INFORMATION SPREAD IN ONLINE SOCIAL NETWORK 7

7.Bistability and resurgent epidemics in reinfection models [R. Pagliara, B. Dey, and N. E. Leonard] https:// www.semanticscholar.org/paper/Bistability-and-Resurgent-Epidemics-inReinfection-PagliaraDey/d3d3735811e90fd7abd4e32d72a8c5019cb77a88 States that "An epidemic model with

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heterogeneous susceptibility which generalizes the SIS (susceptible– infected–susceptible), SIR (susceptible–infected– recovered) and SIRI (susceptible–infected–recovered–infected) models. The proposed model considers the case that some infected people are susceptible again after recovery, some infected people develop immunity after infection, and some infected people are reinfected after recovery. Perform a comprehensive theoretical analysis of the model, showing that under appropriate initial conditions, delayed outbreak phenomenon occurs that can give people false impressions.

8. Learning multiple factors-aware diffusion models in social networks [C.-K. Chou and M.-S. Chen]
https://www.researchgate.net/publication/322015861_Learning_Multiple_ Factors-Aware_Diffusion_Models_in_Social_Networks
States that "Information diffusion is a natural phenomenon occurring in social networks. The adoption behavior of a node toward an information piece in a social network can be affected by different factors, e.g. freshness and hotness. Previously, many diffusion models are proposed to consider one or several fixed factors. In fact, the factors affecting adoption decision of a node are different from one to another and may not be seen before. For a different scenario of diffusion with new factors, previous diffusion models may not model the diffusion well, or are not applicable at all.

III. METHODOLOGY

Generally, the social relationship between users is crucial in the process of information spread. It can be intuitively understood that a user is more likely to spread the information that has been believed by most people. Considering interactive effects between user's social relationships and their spread behaviors, when different users spread positive and negative information in the network region, they usually exhibit three different behavioral states:1)considering (thinking); 2) spreading (active); and 3) hesitation (uncertainty) . Therefore, each user in is in one of the following four states: 1) unknown state (U); 2) positive information-spreading state (Pd); 3) negative informationspreading state (Nd); and 4) dual information-hesitating state

Disadvantages:
1. Traditional psychological stress detection is mainly based on face-to-face Interviews, self-report questionnaires or wearable sensors. However, traditional methods are actually reactive, which are usually labor- consuming, time-costing and hysteretic.
2. These works mainly leverage the textual contents in social networks. In reality, data in social networks is usually composed of sequential and inter connected items from diverse sources and modalities, making it be actually cross-media data.
3. Though some user-level emotion detection studies have been done, the role that social relationships plays in one's psychological stress states, and how can incorporate such information into stress detection have not been examined yet.

Advantages:
1. Experimental results show that by exploiting the users' social interaction attributes, the proposed model can improve the detection performance (F1-score) by 6-9% over that of the state-of-art methods. It indicates that the proposed attributes can serve as good cues in tackling the data sparsity and ambiguity problem. Moreover, the proposed model can also efficiently combine tweet content and social interaction to enhance the stress detection performance.
2. Beyond user's tweeting contents, analyze the correlation of users' stress states and their social interactions on the networks, and address the problem from the stand points of: (1) Social interaction content , by investigating the content differences between stressed and non-stressed users' social interactions ; and (2) Social interaction structure , by investigating the structure differences in terms of structural diversity, social influence, and strong/weak tie. AN EFFICIENT FEEDBACK CONTROL MECHANISM FOR POSITIVE OR NEGATIVE INFORMATION SPREAD IN ONLINE SOCIAL NETWORK 3
3. User build several stressed-twitter-posting datasets by different ground-truth labeling methods from several popular social media platforms and thoroughly evaluate proposed method on multiple aspects. 4. Carry out in-depth studies on a real-world large scale dataset and gain insights on correlations between social interactions and stress, as well as social structures of stressed users.

MODULES:
- Data collection: To lead perceptions and assess our successive model, we initially gather a set of datasets utilizing diverse naming techniques.
- CNN(Convolutional neural networks): We propose a bound together hybrid model incorporating to use both tweet content properties and social connections to upgrade stress discovery.

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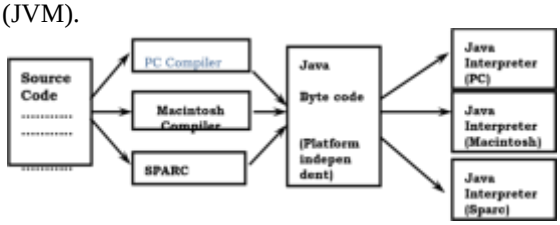
- Tweet Classification: We utilize a cross auto-encoder (CAE) to take in the methodology invariant representation of each single tweet with various modalities. Indicating the content, visual, and social traits of a tweet by vT and vI the CAE is planned.
- Attribute Categorization: To address the issue of stress recognition, we initially characterize two arrangements of ascribes to quantify the distinctions of the stressed and non-stressed on user via web-based networking media stages.

IV. IMPLEMENTATION

When you compile the code, the Java compiler creates machine code (called byte code) for a hypothetical machine called Java Virtual Machine (JVM).



JVM is supposed to execute the byte code. The JVM is created for overcoming the issue of portability. The code is written and compiled for one machine and interpreted on all machines. This machine is called Java Virtual Machine. Compiling and interpreting Java Source Code

V. EXPERIMENTAL RESULT

Fig 8.1 : Screenshot of result(1)

Fig 8.2 : Screenshot of result(2)

Fig 8.3 : Screenshot of result(3)

Fig 8.4 : Screenshot of result(4)

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Fig 8.5 : Screenshot of result(5)

Fig 8.6 : Screenshot of result(6)

Fig 8.7: Screenshot of result(7)

Fig 8.8: Screenshot of result(8)

Fig 8.9 : Screenshot of result(9)

VI. CONCLUSION

The problem of the coupling spread of the positive and negative information in OSNs. First, have established a coupling spread model of the positive and negative information to describe the dynamic coupling spread process. In addition, have proposed three synergetic control strategies to control the coupling spread process of positive and negative information. Afterward, have devised an NFCM to perform three synergetic control strategies with minimal system expenses. The experimental results demonstrate that proposed NFCM can effectively decrease the spread of negative information. Future directions include the investigation of the network topology and node property on the spread process of positive and negative information. Then, intended to employ the idea of crowd sourcing to design a distributed control algorithm to intervene in the coupling spread of the positive and negative information.

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