

Minimizing and Detecting Stress in Social Networks based on Social Interactions

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ABSTRACT:

Psychological stress is threatening people's health. It is non-trivial to detect stress timely for proactive care. With the popularity of social media, people are used to sharing their daily activities and interacting with friends on social media platforms, making it feasible to leverage online social network data for stress detection. In this paper, we find that users stress state is closely related to that of his/her friends in social media, and we employ a large-scale dataset from real-world social platforms to systematically study the correlation of users' stress states and social interactions. We first define a set of stress-related textual, visual, and social attributes from various aspects, and then propose a novel hybrid model - a Factor Graph Model (FGM) combined with Convolutional Neural Network (CNN) to leverage tweet content and social interaction information for stress detection. Experimental results show that the proposed model can improve the detection performance by 6-9 percent in F1-score. By further analyzing the social interaction data, we also discover several intriguing phenomena, i.e., the number of social structures of sparse connections (i.e., with no delta connections) of stressed users is around 14 percent higher than that of non-stressed users, indicating that the social structure of stressed users' friends tend to be less connected and less complicated than that of non-stressed users.

Keywords—Stress detection, factor graph model, micro-blog, social media, healthcare, social interaction.

INTRODUCTION:

In today's world, people look out for perfection and success. The constant search for perfection and obsession with the current competitions in every field is beginning of the stress. When people's hard work does not satisfy them they tend to get stressed. According to a survey, 33% of adults feel they are living with extreme stress. Now-a-days stress has become a social phenomenon which should be studied, considered and a proper chain of solution must be proposed as it can cause a deep damage.

According to existing research works, long-term stress has been found to be related to many diseases, e.g., clinical depressions, insomnia etc.. Moreover, a report shows that suicide has become the top cause of death among youth worldwide, 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.

In this case, to overcome the drawbacks of traditional approach for detecting psychological stress which is time consuming, laborious and time costing, we design a framework which collects users data(like texts, images and emoticons) while communicating with their contacts using social media and analyze it to propose a graph model which exhibits how much a person is stressed.

EXISTING SYSTEM:

- ❖ Studies based on emotion analysis are at the tweet level in social media, using text-based linguistic features and classic classification approaches. A system called *MoodLensto* performs emotion analysis on the Chinese micro-blog platform Weibo, classifying the emotion categories into four types, i.e., angry, disgusting, joyful, and sad.
- ❖ By studying the previous existing system regarding the emotion propagation problem in social networks it was found that negative emotions spread quickly.
- ❖ As stress is mostly considered as a negative emotion, this interpretation can help us in validating the social influence of users for stress detection.

DISADVANTAGES OF EXISTING SYSTEM:

- ❖ Traditional psychological stress detection approach is mainly based on face-to-face interviews, self-report questionnaires or wearable sensors. However, these methods are actually labor-consuming and time-costing.
- ❖ These works mainly use textual contents which in turn is combination of different media.
- ❖ By using these emotion detection techniques, the role of social media plays a vital role to extract such information.

PROPOSED SYSTEM:

- ❖ From psychological theories, we first differentiate a set of attributes for stress detection from tweet-level and user-level aspects respectively: 1) **tweet-level attributes** from content of user's single tweet, and 2) **user-level attributes** from user's weekly tweets.
- ❖ By taking advantage of the user-level information as well as tweet-level content information, we present a novel hybrid model of Factor Graph Model combined with a Convolutional Neural Network (CNN).
- ❖ The *tweet-level attributes* are mainly composed of linguistic, visual, and social attention (i.e., being liked, re-tweeted, or commented) attributes extracted from a single-tweet's text, image, and attention list. The *user-level attributes* however are composed of: (a) *posting behavior attributes* as summarized from a user's weekly tweet postings; and (b) *social interaction attributes* extracted from a user's social interactions with friends.
- ❖ In particular, the social interaction attributes can further be divided into: (i) social interaction content attributes extracted from the content of users social

interactions with friends and (ii) social interaction structure attributes extracted from the structures of users social interactions with friends.

ADVANTAGES OF PROPOSED SYSTEM:

- ❖ The results show that by using social interaction attributes our proposed model can improve detection performance (F1-score) by 6-9% over that of the state-of-art methods.
- ❖ After the user's tweeting contents, we analyze the correlation of users stress states and their social interactions on the networks, and address the problem from the standpoints of: (1) **social interaction content**, by inspecting the content differences between stressed and non-stressed users' social interactions; and (2) **social interaction structure**, by inspecting the structure difference terms of structural diversity, social influence, and strong/weak tie.
- ❖ Our study gives in depth knowledge between social interactions and stress, as well as social structures of stressed users.
- ❖ By developing several stressed-twitter-posting datasets by different ground-truth labeling methods from several popular social media platforms we evaluate our proposed method on multiple platforms.

SYSTEM ARCHITECTURE:

The architecture of our model is designed in a way to give a basic look. Initially, we require three basic information i.e., tweet-level attributes, user-level posting behavior attributes and user-level social interaction attributes, whose attribute explanation will be described later. We address the solution through the following two key components: First, we design a CNN with Cross Auto Encoders (CAE) to generate user-level interaction content attributes from tweet-level attributes. Then, we design a Partially-labeled Factor Graph (PFG) to incorporate

all three aspects of user-level attributes for user stress detection. Factor graph model has been effectively used in social network modeling. It is proved to be productive in leveraging social correlations for different prediction tasks.

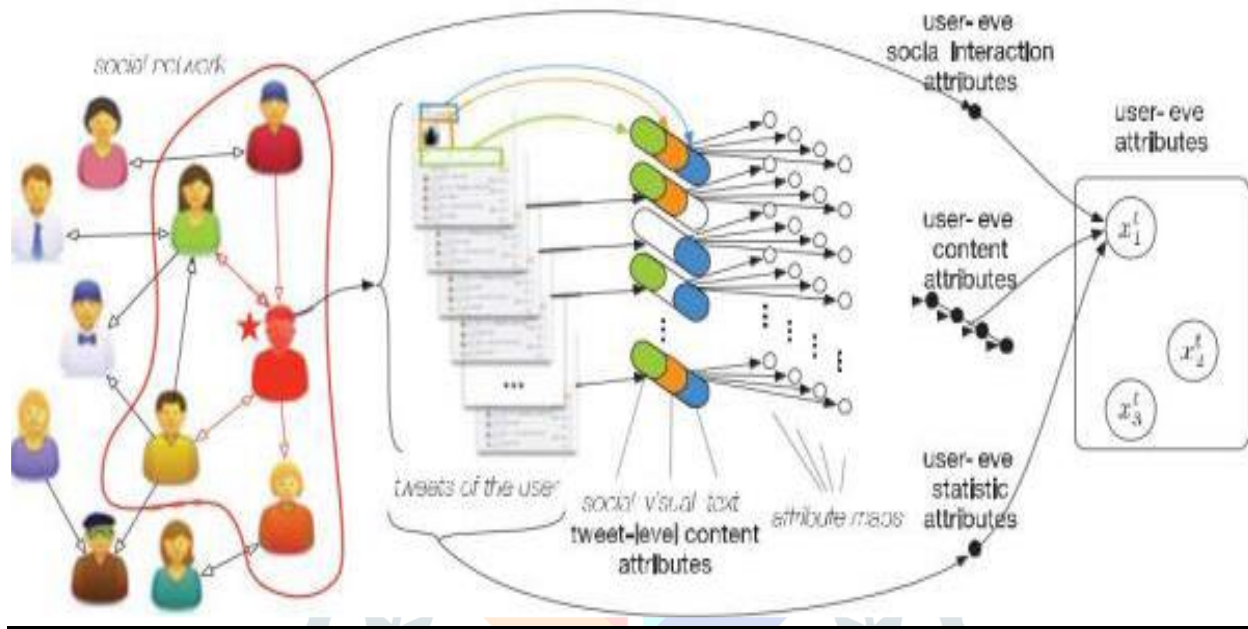


Figure: Architectural model

CONCLUSION:

In this paper we validate the psychological stress states on weekly basis with social media data and leveraging tweets as well as social interactions. To fully understand this we proposed a hybrid model which combines factor graph model (FGM) Convolutional Neural Network (CNN). The research also reveals that the respondents also realize their level of stress which influences them to look out for the solution. The preventive measures if implemented in generating a graph based model using social interactions will considerably improve the rate of people overcoming stress. Lastly, studying needs to be carried out in the future for detection of stress mechanism thoroughly and finding the loopholes in it and suggesting better mechanisms.

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