Sentiment Analysis Based Social Media Application to Reduce Stress

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ABSTRACT

The stress and anxiety levels among youth and students, in particular, are on an exponential rise. There are a lot of factors all around us like exams, job search, etc. contributing to this problem. But the means to reduce or tackle these troubles are quaint. Social media has become an indispensable part of our lives. But, is it really helping to reduce worries or just piling them up for us in the hindsight? This paper aims at using these two ubiquitous part of our lives to produce an amalgam that can help us reduce stress via social media. This report tries to find ways, using techniques like sentiment analysis and text-mining, to make our lives less burdensome. We have perused various research papers with relevant citing to draw some conclusions that might help us in developing such an application.

Keywords – Text mining, sentiment analysis, stress reduction, web application, social media

1. INTRODUCTION

"People become attached to their burdens sometimes more than the burden is attached to them."– George Bernard Shaw
The existence of stress and worry can be traced back to the genesis of mankind. And there is no panacea to completely eradicate stress. But, we can surely device some ways to handle stress and keep it in check. It is no surprise that the anxiety levels are the highest among the productive population and, particularly, among college students. According to a recent survey conducted by the American College Health Association under the National College Health Assessment II in 2015 consisting of 19,861 respondents as the Reference group, 57.7% of the students reported feeling "overwhelming anxiety" at least once in the last 12 months[4]. There are hundreds of other similar surveys present online corroborating this trend. The cost of college continues to skyrocket and the student loans are both more prevalent and more expensive than ever before. Surely, the bills will not ever stop coming, exams and assignments would never end, there will never be more hours in a day and our career and family responsibilities will always be demanding. Most of the time we alone suffer our ordeals and do not get to share it or vent it out in a desirable way due to a social barrier of judgement and negativity. Moreover, the monotonicity of our lives exacerbates the problem.

We decided to give our users a break from their routine and let them escape into a completely anonymous world to relax, reflect and rehabilitate. We can tackle stress if we develop a positive attitude towards it. The orthodox methods of tackling stress like listening to music, outdoor activities, etc. may soothe us temporarily but this soothing effect is not long-lasting. We regress back into our bubble of worry as soon as we resume our daily tasks.

We have conducted surveys and cited studies to understand this in a better way. The results of these surveys and studies are included in the subsequent section of this report. We found out that someone who has gone through a similar experience and is willing to help others can play a cameo in such situations. They can empathize and expedite this process of relieving stress in a better and quicker way. This is the basic idea governing the proposal of our application. We have planned to develop an application that lets its users share their feelings and emotions. Firstly, to address this problem we will develop a social platform primarily focussed on venting out and seeking help from others while maintaining complete anonymity.

Secondly, we plan to use various sentiment analysis algorithms to predict the stress(or happiness) of a person based on the thoughts they share. Furthermore, we find the keywords from their posts using text mining and save them as tags for future reference. This collected data can be used to find a proper match from the user database. The match would be a person with similar troubles or someone who had faced a similar problem and has overcome it. The user would get few match suggestions to choose from after viewing their profile and ratings. Once the user chooses a match, they can connect to share their thoughts and ideas via a chat messenger incorporated in our application. We also records the satisfaction level of a user after talking to a particular match and use it to update the helper's rating.

2. LITERATURE REVIEW

The concept of stress may be found as an independent variable, a dependent variable, or a process (Cooper C.L. et al., 2001). According to the HSE (2001) stress is defined as "the adverse reaction people have to excessive pressure or other types of placed on them". The American National Institute for Occupational Safety and Health (NIOSH) (1996) defines work stress as "the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources or needs of the worker". Stress may be defined as the opposite of relaxation. A situation is considered stressful if it puts pressure on the individual to perform more accurately or faster or differently from his normal mode (Pfaff M.S., 2008). Cooper C.L. et al. (2001) suggest that environmental factors that may function as sources of stress are called stressors and the individual's reaction to the stressors is called strain. Stress is characterized as the relationship between the perceived demands of the current situation and the individual's ability to respond (Pfaff M.S., 2008). Stress may have negative impact or positive impact, which make aware people to stay focus and work in order to obtain performance[1]. This clearly shows that stress has become an inseparable part of our lives and is growing significantly. Battling stress has become the need of the hour and the gravity of this issue needs to be addressed imminently.

Language is the most common and reliable way for people to translate their internal thoughts and emotions into a form that others can understand. Language is comprised of sentences which are made of words which convey some meaning and combined together they can express a variety of emotions. Words and language, then, are the very stuff of psychology and communication. They are the medium by which cognitive, personality, clinical, and social psychologists attempt to understand human beings[2]. The words we use in daily life reflect who we are and the social relationships we are in[2]. This is neither a new nor surprising insight. Words are used to share our feelings and the psychology associated with them.

The problem of sharing an intangible asset such as the knowledge of individuals - can be viewed from many perspectives: psychological, economic, organisational, sociological and technological[3].The research[3] concerned the reasons for helping other people selflessly. According to the results, it can be assumed that a worker will share his or her knowledge for motives other than sheer ego, provided that he or she feels empathy towards the knowledge recipient. If a person connects with another person emotionally then he/she is willing to help others. Empathy will be elicited much more by a person who seems similar to us in some way, such as holding similar values or having similar interests and experience. There is an interaction between empathy and liking[3]. When we like someone, it is easier for us to feel empathy towards him or her, and by feeling empathy towards someone, it is easier for him or her to like us. When we feel empathy towards another person, we will share knowledge with him or her to help him or her to, for instance, meet a deadline, without regard for our own interest. It can be regarded as a genuinely altruistic activity. When we do not feel empathy,

we will make our knowledge available with our own interest in mind because the prospective profits exceed the losses[3]. It can be inferred that people who share the same experience be it happy or sad, tend to connect emotionally with each other. If a person who has undergone similar set of circumstances meets another person who is undergoing the same experience then he or she is likely to consult him and help him. This is the basis of our research which is similar to our survey results.

[5]Online opinions have been recently analyzed using sentiment analysis (SA). This is basically a natural language processing (NLP) application that uses computational linguistics and text mining to identify text sentiment, typically as positive, neutral or negative.

This technique is also known in the text mining literature as emotional polarity analysis (EPA), opinion mining, review mining, or appraisal extraction (Zagal, Tomuro, & Shepitsen, 2012). Thus, SA can be regarded as an automated knowledge discovery technique that aims at finding hidden patterns in a large number of reviews, blogs or tweets. To calculate a sentiment score, the sentiment obtained from the text is compared to a lexicon or a dictionary to determine the strength of the sentiment. For example, the lexical resource SentiWord, which includes around 200,000 entries, uses a semi-supervised method to assign each word with positive, negative and objective scores.

We are going to use this method to analyse the post made by the users and see how negative or positive these emotions are. On the basis of this analysis we will use some algorithms to match the user with potential people who can help them. We are also going to use text mining which is going to help us in extracting keywords which will expedite the process of searching and matching, and would also allow the user to refine their suggestions.

3. DATA COLLECTION

To understand the effects of stress and anxiety on people, and the mechanisms they use to cope with it, we designed a questionnaire survey using Google Forms. This survey included questions about how often do the people face stress in the daily life and how they handle it. We have described about each question below and tried to draw lines as to how it would help us in our application.

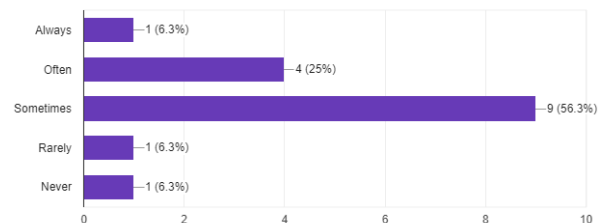Question 1: How often do you feel stress/anxiety?

Figure 1: How often do you feel stress/anxiety?

This question helped us understand how often people experience stress or anxiety in their daily lives. The options represent five different levels.The results showed that more than half of people in their lives were more or less stressed. This is the foundation of our problem statement.

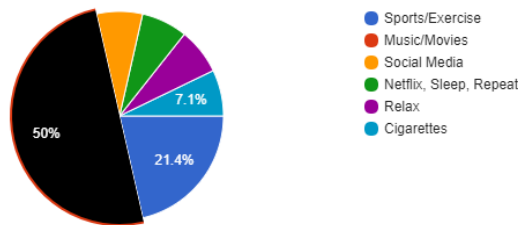Question 2: What methods you use to reduce this stress?

Figure 2: What methods you use to reduce this stress?

The problem is mainly focused on how people try to reduce/relieve stress. We all know about the various traditional ways to relieve stress, from sports to watching movies to socializing. The results clearly reflect that social media is not the preferred way to share personal emotions or vent out. This made us think about fundamental reason to not use social media application for such purposes. And we came to a conclusion that this might be because of the fear of judgment from one's peers. Hence we decided to build an anonymous social media platform which would help people come out of their shells and share about their feelings more openly, and in turn relieve their stress substantially.

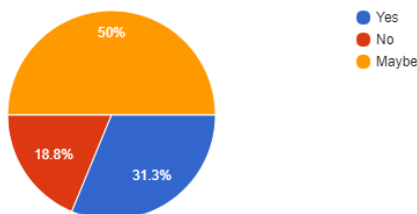Question 3: Are you willing to share with family or friends to release stress?

Figure 3: Are you willing to share with family or friends to release stress?

The question is mainly about whether people are willing to confide in people close to them. We found out that only 31.3% would want to talk to their friends and family, and more than half of them didn't know if they would. 50% of the people may or may not share their feelings depending on the kind problems they are facing. This shows that people are still wary of talking to their acquaintances. Hence, it strengthens our use of an anonymous platform.

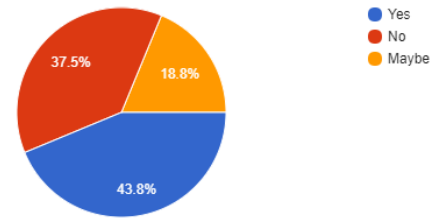Question 4: If you are anonymous are you willing to share about your problems/feelings?

Figure 4: If you are anonymous are you willing to share about your problems/feelings?

The question is asking whether people are willing to share their feelings of stress or anxiety to others anonymously. The results showed that, more people were willing to talk to strangers as compared to their near ones.

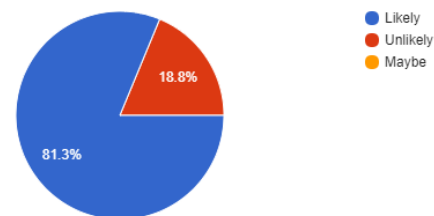Question 5: How likely are you to help others who are battling stress/problems?

Figure 5: How likely are you to help others who are battling stress/problems?

This question examines the willingness of people to help others who are under stress. The results look really optimistic, with majority of people showing willingness to help those who are under stress. This is one of the major ideas behind the concept of our application, as it also relies on people who are willing to help others. We are going to introduce this factor to implement the chatting solution that has been mentioned earlier in the report.

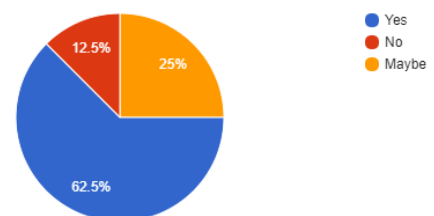Question 6: If there is a platform that can help you relieve stress, would you use it?

Figure 6: If there is a platform that can help you relieve stress, would you use it?

This question asked whether people would use a platform to relieve stress. The intention here was to predict the acceptance ratio of our application once it is made public. The

results showed that more than 60 percent of people showed willingness to use it, and the number of potential users, with more than 85 percent of potential users.

4. EVALUATION PLAN

The applications can be tested based on the few metrics given below.

Scalability	+	Multiple users can access the application at once.
Availability	+	The application will be deployed to multiple servers and will always be available with very low to zero downtime.
Modularity	++	The application will be developed phase by phase and every functionality will be placed in a different component or module.
Security	+	The application is secure as user information will be encrypted like password will hash in the server.
Adaptability	++	The project will be adaptable as we are writing the business logic on server side and we just make the API calls from the frontend.

Moreover, unit tests will be written for the whole application and the test coverage can be considered as the base evaluation. Once the application is developed, different features can be tested in the application.

5. FEATURES

Social media:

Social media are computer based technologies which lets the user share their thoughts, idea, interests, etc... via a shared recourse or network.

We are going to use technologies like Ruby on Rails to implement a web-based social media application. This application will let the user post texts on the dashboard which will be available to other users as well. These posts will be used for our next step of text-analysis. Moreover, we'll implement a chat messenger to allow two matched users to share ideas and exchange thoughts.

Sentiment Analysis:

Sentiment Analysis refers to the process of identifying and segregating opinions shared by users by analysing the text that they share on social platforms. This is aimed at mainly understanding the writer's traits and attitude towards a product or any topic, in general. We usually classify these reactions as positive, neutral, and negative.

We are going to use various sentiment analysis and text-mining API's to gather information like keywords, attitude, etc... using the user's post. This gather information will further help us to suggest possible matches to the user.

Matching mechanism:

We are planning to match users based on tags or labels which would be extracted as keywords from the text that they share. We will use text mining to search for keywords from the text, then match the users with same experience(labels or tags) as they may have common languages.

Chat Messenger:

This allows two users to interact in a messenger environment. Once the user is provided with match suggestion, they can choose one of the suggestion to invite for a chat.

6. CONCLUSION

As we have seen that stress is one of the biggest problems faced by the youth today, especially the students. Still it remains so obscure and goes unnoticed by the people suffering from it either due to unawareness or lack of acknowledgement.

There are a lot of ways to tackle stress but none of them are fruitful in the long run. Furthermore, people don't feel comfortable in sharing all of their emotions even to the loved ones.

Our application is going to:

1. help the users to vent out and share their feelings anonymously, and talk about these emotions to someone who has gone through the same experience and empathize with them, and provide them with helpful insights at the same time.

2. having said that, there is no permanent solution to battle stress but from the survey results that we have gathered, our application can prove to be a really effective way to manage stress and keep it under safe level.

7. FUTURE SCOPE

Rewards: We can implement a rewarding system to encourage the users to step-up and help others even more. One way is to invite social workers who are working in the field of depression or other stress ailments to help our users and in turn we can help by donating to their particular charity.

Professional Help: We can think of some mechanism to include people who are professional in this field like Psychologists to join our application and help our users who are willing to pay. This obviously needs to be done at a cheaper rate than the outside world as most of our user base would be students.

8. REFERENCES

[1] Ways of reducing the impact of stress on human capital performance Lecturer PhD Nicoleta Valentina FLOREA Valahia University of Targoviste, Romania. Professor PhD Constanta POPESCU Valahia University of Targoviste, Romania.

[2] The Psychological Meaning of Words: LIWC and Computerized Text Analysis Methods Yla R. Tausczik1 and James W. Pennebaker1 Journal of Language and Social Psychology

[3] Willingness to Share Knowledge Compared with Selected Social Psychology Theories- Ewa Krok

[4] American College Health Association. American College Health Association-National College Health Assessment II: Reference Group Executive Summary Fall 2015. Hanover, MD: American College Health Association; 2016.

[5] More than words: Social networks' text mining for consumer brand sentiments Mohamed M. Mostafa Instituto Universitario de Lisboa, Business Research Unit, Avenida das Forcas Armadas, Lisbon, Portugal