JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Stress Detection using social media interactions.

Qauseen Mulla

Mtech , Dept. of CNE

SECAB I.E.T, Vijayapur

Karnataka,India

Aslam J karjagi

Assist Prof , Dept. of CSE

SECAB I.E.T, Vijayapur

Karnataka,India

Sayed Abulhasan Quadri

Prof , Dept. of CSE

SECAB I.E.T, Vijayapur

Karnataka,India

Abstract—Stress is a pervasive mental health issue affecting individuals worldwide and its timely detection is important for effective intervention and support. Stress detection in this project harnesses the vast amount of data usually termed as big data generated by social media and identifies the signs of stress in individuals. By analyzing the data available on social media, valuable insights can be gleaned about mental wellbeing of the individual. Machine Learning algorithms like CNN (Convolutional Neural Network) and FGM (Factor Graph Model) are employed to detect linguistic patterns indicating stress in an individual. The stress levels can be monitored in the forms of graphs for individuals as well as whole community.

Keywords—Stress, Mental health, SQL, MVC, CNN, FGM.

I. INTRODUCTION (*HEADING 1*)

Stress is a multifaceted issue with various causes and implications. Stress is a common factor that largely diminishes individual morale. It develops when a person cannot handle their inner and outer feelings. When the stress becomes chronic or exceeds a certain level, it affects an individual's mental health and may lead to different psychological disorders.[1] It is essential to recognize and address the stressors faced by people to promote their overall well-being. By implementing effective coping strategies and fostering supportive environments, we can empower individuals to navigate the challenges of life, enabling them to thrive and develop into resilient humans capable of managing stress effectively.

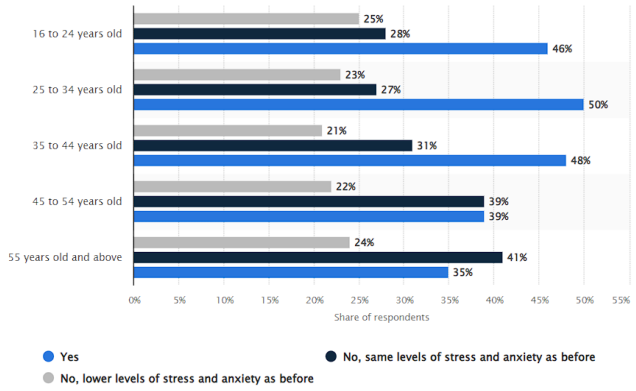


Fig 1.1. Graph showing stress levels of people of various ages during last 12 months in India as of May 2022. [2]

According to a survey by Rakuten Insight in India was conducted on May 2022, 50 percent of respondents in the 24 to 34 age group stated that they were felling more stressed or anxious during past 12 months. In the same survey 28 percent of respondents in the 16 to 24 age group stated that they experienced the same level of stress and anxiety as before. [2]. The bar graph in Fig.1.1. depicts the stress levels of people of various ages ranging from 16 years to 55 years and above according to the survey conducted by Rakuten Insight in India in the year 2022.

Long-term stress may lead to insomnia, clinical depression, etc. [3]. Causes of stress may include academic pressure, social expectations, transitions and uncertainty, family issues, time and self-management etc. Which impacts on health both physically and mentally, degrades academic performance, relationships, behavioral changes.[4].

Cyberspace is a vast soapbox where people post anything and utmost everything that they witness in their day-to-day lives. Social media content is mostly used for review, opinion, influence, or sentiment analysis. Social media also plays the role of public opinion detector. We have over 4.2 billion active worldwide social media users. With the whirlwind expansion of Web 2.0, people have developed a

liking to express their thoughts and approach over the Internet, which has consequently resulted in an increase of user-generated content and self-opinionated data. [5]

II. LITERATURE SURVEY

Mental stress is turning into a danger to individuals' wellbeing these days. With the fast pace of life, an ever-increasing number of individuals are feeling stressed. The Keyword Stress defines the state of mental or emotional which subjects to the pressure or tension. Moreover, it mostly impacts on the people who are in the process of developing a child into an adult (adolescent). [6] It is difficult to recognize the client's stress at the beginning period to ensure the client.[7]. Algorithms like SVM, CNN, Navies bayes, BERTH can be used for detection of stress. Many studies on social media-based emotion analysis are at the tweet level, using text-based linguistic features and classic classification approaches. A system called Mood Lens to perform emotion analysis on the Chinese micro-blog platform Weibo, classifying the emotion categories into four types, i.e., angry, disgusting, joyful, and sad. [8]

III. PROBLEM DEFINITION

Design and implement a model that can analyze social media interactions to accurately detect and classify stress levels in individuals.

Utilize the data generated by social interactions to detect stress in individuals. The system should be capable of processing diverse textual and behavioral data that is generated by social media platforms. There is a requirement for healthy stress detecting mechanism.

IV. OBJECVTIVES

1. To develop a model that can predict stress levels in an individual or a community through social media data based on social interactions.
2. To identify patterns and features of data present in Cyberspace that are indicative of stress.
3. To assess the system's performance, a dataset comprising posts on social media from individuals will be utilized.
4. To explore the potential applications of detection of high level of stress in monitoring mental health and well-being, and help in providing timely interventions and support to individuals.

V. PROPOSED WORK

This proposed system aims to leverage the vast amount of data generated on social media to identify patterns of stress in individuals. By analyzing social media interactions, including textual content and behavioral patterns, the system can accurately detect and classify stress levels in near-real-time. This system offers several benefits, including early intervention and support, improved services for mental health, surveillance over public health, and insights for research. It also promotes awareness of stress and facilitates targeted resources for vulnerable populations.

By developing and implementing this system, we can contribute to building a healthier society by effectively addressing stress and promoting mental well-being. A hybrid machine learning model is built and executed to deliver the sentiment analysis using the data that incorporates a broad range of tweets.

The Proposed model is trained with labelled dataset consisting of stress words in numbers. After training, the data from social interactions is extracted and pre-processed then tokenized, remove unwanted patterns, remove stop words, extract the insights and those insights are used by the model for classifying and detecting stress levels in an individual whose data is been extracted from social media. The model uses CNN and FGM algorithms as base for detection of stress.

VI. METHODOLOGY

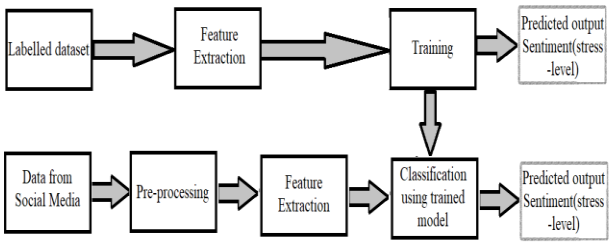


Fig 8.1: Methodology for stress detection through social media interactions.

A hybrid machine learning model is built and executed to deliver the sentiment analysis using the data that incorporates a broad range of tweets. The block diagram of the recommended model is as given in Fig. 1. The model is trained with labelled dataset consisting of a number of stress words. After training the model data from social media is extracted and pre-processed then tokenization, remove the unwanted patterns, remove the stop words are performed to extract the insights and those insights are used by the model for classifying and detecting stress levels in an individual whose data is been extracted from social media. The model uses CNN and FGM algorithms as base for detection of stress.

Convolutional Neural Networks (CNN) is highly effective in analyzing visual data, such as images, by extracting relevant features through convolutional layers. However, the application of CNN in textual analysis has also gained traction, where words are treated as sequences and represented as vectors. By adapting CNN to process textual data, it becomes possible to capture patterns and features associated with stress within social media content.[9]

Factor Graph Models (FGM) offer a flexible framework for modelling complex relationships between different factors. In the context of stress detection through social media interaction, FGM can capture the dependencies between various factors such as linguistic patterns, user interactions, and contextual information. By incorporating these factors into a unified graph-based representation, FGM enables a comprehensive understanding of stress dynamics of social environments.[10]

By integrating CNN and FGM, we aim to create a robust system that could detect stress. The CNN component analyses the texts of interactions on social media, extracting relevant features that may indicate stress. The FGM incorporates these features to analyse the interconnection among these factors, enabling the estimation of individuals stress levels by examining their social media activity.

This approach offers many advantages. Firstly, by leveraging CNN, we can capture subtle textual cues and patterns associated with stress, enabling a fine-grained analysis of the content on social media. Secondly, FGM lets us to explore a wide range of factors, such as user interactions, linguistic patterns, and contextual information, providing a holistic view of stress dynamics. By integrating these two approaches, we aim to improve the accuracy and

effectiveness of stress detection using social media interactions.

The proposed stress detection system has importance for both individuals and community. Early identification of stress in social media interactions can facilitate timely interventions and support for individuals in need. Moreover, the data extracted is aggregated and anonymized and can contribute to public health surveillance efforts, enabling policymakers to identify population-level stress trends and allocate resources accordingly.

THE MVC MODEL

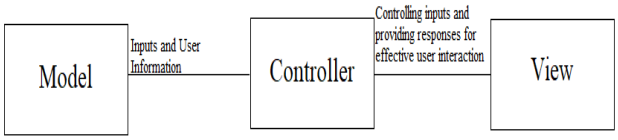


Fig 8.2. MVC model

MVC stands for Model-View-Controller, is a software architectural pattern commonly used in web applications and desktop applications. The MVC pattern separates an application into three interconnected components: the Model, the View, and the Controller. Each component has a specific responsibility, promoting the separation of concerns and enhancing the maintainability and reusability of the codebase.

The user provides his details through Model register page, login page and user home page these details are taken as input. The Controller controls these inputs and responses that are generated as View. This MVC model is overall useful for data handling and visualization.

VII. RESULTS AND DISCUSSIONS

User logins through the login page, the user home page comes up as soon as right credentials are provided. User can use it casually like he/she uses social media. If account doesn't exist user can create one. All the interactions done by user is stored in dataset. These interactions are classified into normal interactions and stressed interactions and hence graphs are generated showing the stress level of individuals as well as whole community using this social media platform.

The figures shown below justifies the same.

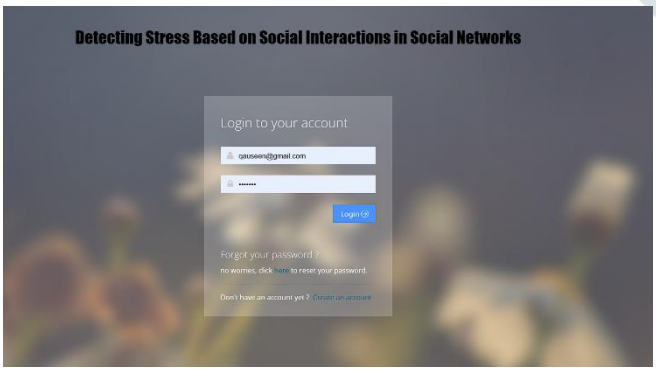


Fig 10.1. Log in page

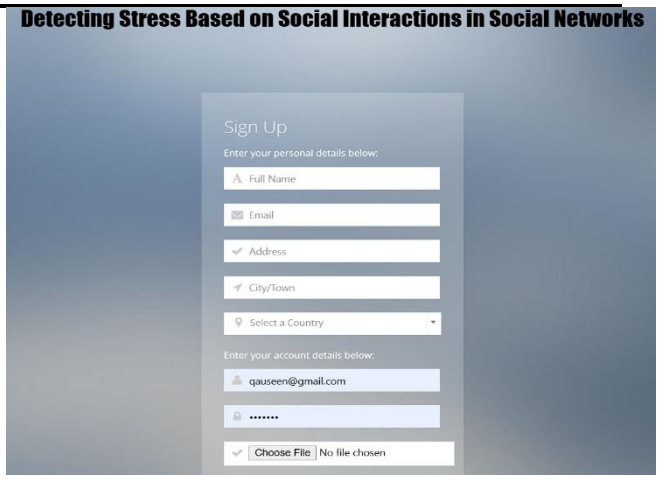


Fig 10.2. Sign up or registration.

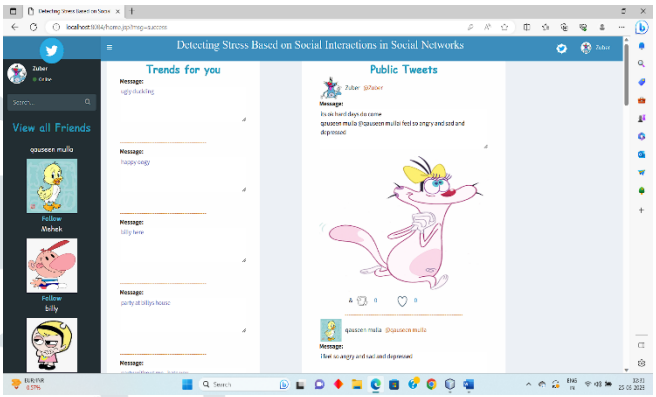


Fig 10.3 User home page.

Fig 10.4 User home page ii.

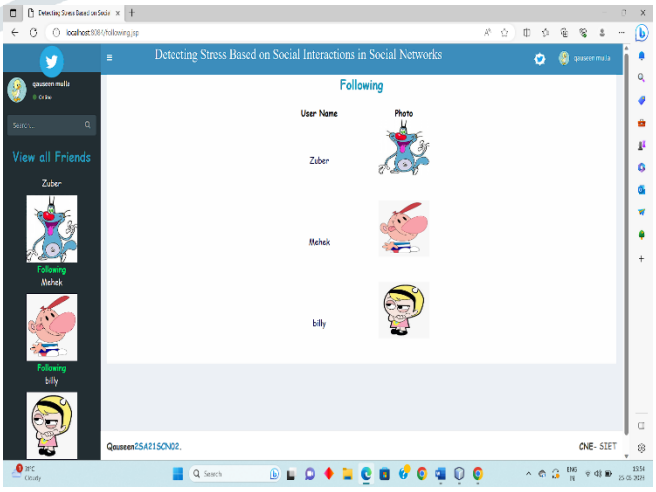


Fig 10.5 User followings.

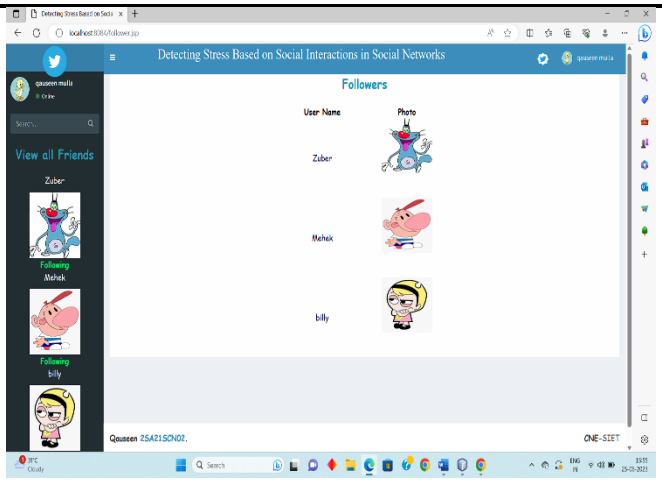


Fig 10.6 User followers.

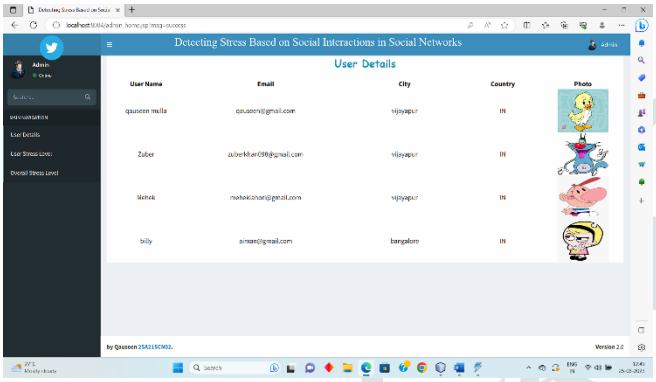


Fig 10.7 Admin homepage.

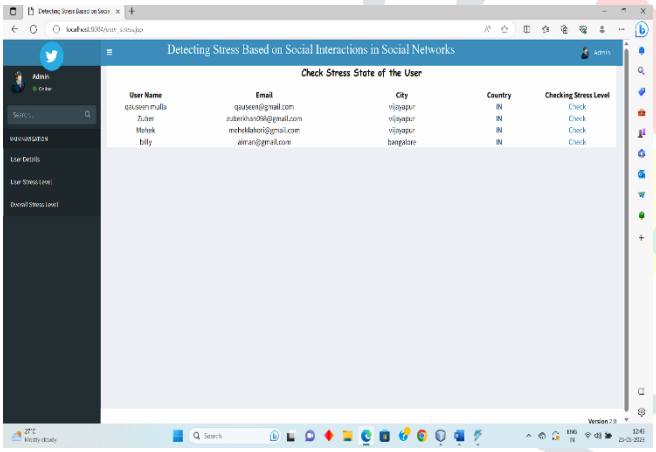
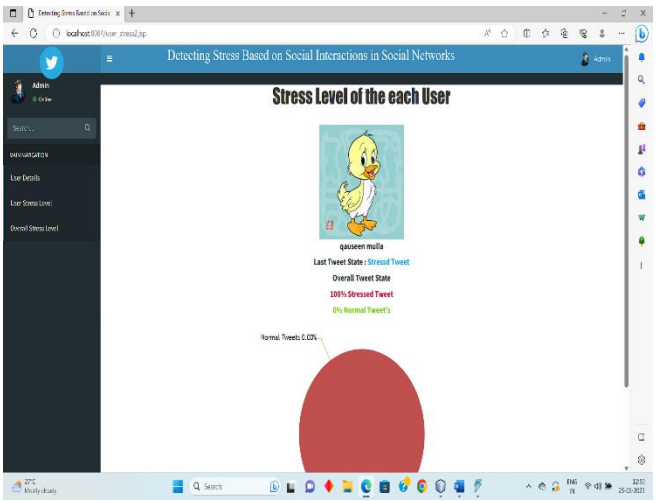
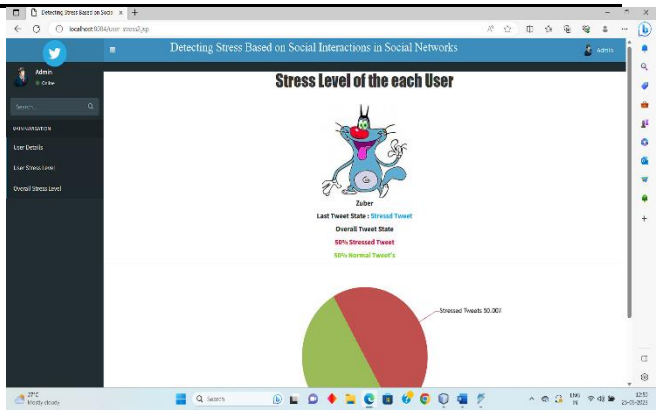
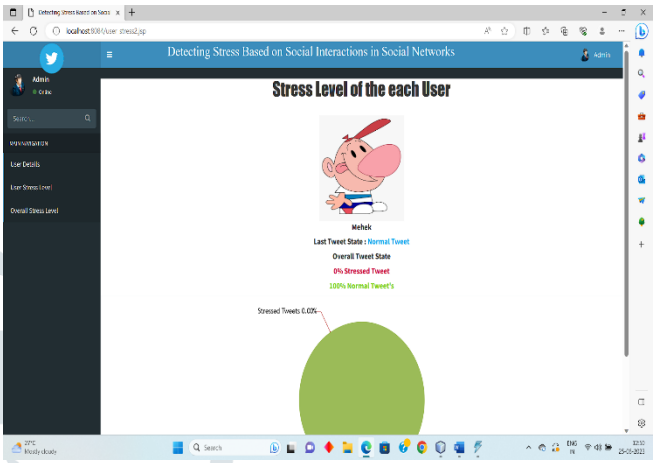


Fig 10.8 Admin homepage- User stress level.







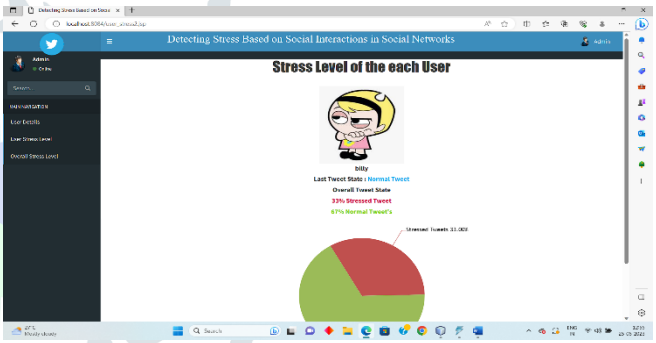


Fig 10.9 Admin homepage- User stress level for each individual.

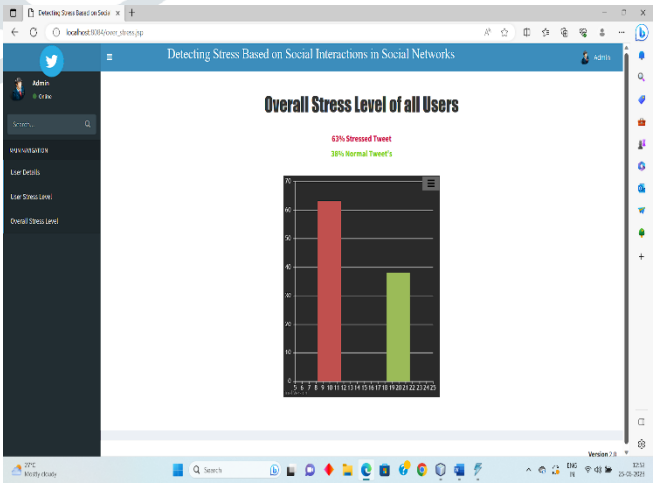


Fig 10.10 Admin homepage- Over all User stress level.

VIII. CONCLUSION

Stress detection through social media interactions holds great promise in addressing the growing concerns surrounding stress and mental health. By leveraging the

wealth of data available on social media, this project aims to develop an algorithm or system capable of accurately detecting and classifying stress levels in individuals. This project can provide early interventions, support, and resources, thereby promoting overall well-being and mental health. It also contributes to improve services for mental health, health surveillance over a community, research insights, and enhanced awareness of stress in society. This project can help in making significant strides towards building a healthier, more resilient society where stress is identified and addressed effectively. Using the hybrid model comprising of CNN and FGM algorithm the consistency of the model is higher.

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