

## A Survey on Stress Detection using Data Mining Techniques

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**Abstract**— Stress is actually survival response when our body gets any outside force or event. The human body is designed to experience stress and react to it. Stress can be positive, keeping us alert, motivated and ready to avoid danger. Sometimes the stress becomes negative when a person faces continues challenges without any relaxation, mental tension caused by demanding, conflicts with others. Stress that continues without relief, a hormone called cortisol is released into blood stream suppressing the functioning of immune, digestive and reproductive system. Because of this it is important to practice stress management in order to keep our body healthy. The purpose of this study is to find out the level of stress among various categories of people like school going students, working people and people under medical treatment using data mining techniques. Data mining is a process used in many areas to turn raw data into useful information. It is the process of discovering patterns in large data sets involving methods at the intersection of machine learning, statistics, and database systems.

**Keywords**— Machine learning, Cortisol, discovering patterns, Data mining

### I. INTRODUCTION

Data mining is also known as knowledge discovery in database. It helps end users to extract useful information from large database to convert it into knowledge. Data mining is the process of analyzing data from different perspectives and summarizing it into useful information. It is difficult to get faster and appropriate information by traditional manual analysis method which is tedious as well as very troublesome. Because of that the data mining is used basically to reduce costs through proper detection and prevention of waste and fraud and to obtain appropriate and up-to-date information and also to increase revenues through improved marketing strategy. The present study consist of stress at work has become a serious problem affecting many people of different professions, life situations, and age groups. The workplace has changed considerably due to globalization of the economy, use of new information and communications technologies, growing diversity in the workplace, and increased workload which results in mental stress.

#### Stressors classifications

There are a number of factors that are likely to cause stress called stressors. The term stressors relates to a challenging occurrence that may produce stress. The stress and health risks at workplace can be categorized as long work hours, work overload, time pressure, difficult, demanding or complex tasks, lack of breaks, lack of variety, and poor physical work conditions [5]. The stressors are classified into various categories they are eustress, distress, hyper Stress, hypo Stress and environmental stressor.

#### Eustress

A positive form of stress having a beneficial effect on health, motivation, performance and emotional well-being [1]. Eustress is indicated by hope and active engagement. It is typically stay in short term duration, increases our immediate strength, affects us at times of creativity, physical activity, enthusiasm or excitement, it perceived as within our coping abilities and improves the performance.

#### Distress

Distress is an aversive, self-focused emotional reaction (e.g., anxiety, worry, discomfort) to the apprehension or comprehension of another's emotional state or condition. A distress signal, also known as a distress call, is an internationally recognized means for obtaining help. It can lead to mental and physical problems also decreases performance.

#### Hyper Stress

Hyper stress refers to the extreme mental or psychological strain that an individual may feel when overwhelmed by work or responsibility. It can contribute to various health problems if suffered long-term. Due to hyper stress the tolerance level is lowered and forces emotional response.

#### Hypo Stress

Hypo stress is a type of stress characterized by boredom and restlessness. People who experience hypo stress are often restless and uninspired. They feel bored, lack of challenge, lack of enthusiasm, uninspired and doing repetitive job.

## II. RELATED WORK

**(J.S.Kanchana, R.Surya, H.Thaqneem Fathima, R.Sandhiya 2018)** describes the psychological problems are becoming a major threat to human life. It is important to detect and manages stress before it turns into a severe health issue. The stress state of users is classified using Naïve Bayes classification algorithms and is categorized into stressed and non-stressed user.

**(Siobhan Hugh-Jones, Sally rose 2018)** focuses the present study thus elicited retrospective, experiential accounts from people who had taken part in a workplace mindfulness-based intervention in order to generate a data driven, provisional model of how positive benefits were secured by them. We examined an adapted mindfulness programme available for free to the workforce of a large higher education institute (HEI) in the United Kingdom.

**(D.Umanandhini,G.Kalpna 2017)** describes that stress will exist once operating or paying attention to somebody shouts at you. It is caused through conflicts, creating selection or it will exist owing to various social demands on time. The purpose of study consists of student studying in higher secondary school in Tamil Nadu.

**(sudhir M.Gorade, ankit Deo, Preetesh Purohit 2017)** analyzed the data generated by the health organizations is very vast and complex and it is difficult to analyze the data in order to make important decision regarding patient health. This data contains details regarding hospitals, patients, medical claims, treatment cost etc. So, there is a need to generate a powerful tool for analyzing and extracting important information from this complex data. In this paper proposed a classification based algorithm which reduce number of attribute and classify a known record to a correct class.

**(V.R.Kavitha 2016)** focus on adolescence stages and their growth, it is rapid in terms of physical and mental maturity. Due to this they may experience incompatibility in adjusting with their surroundings. It leads to problems. These problems will be developed psychological troubles and even leads to behavior deviations. Depending on the individuals' strength and perseverance of stress it can be positive or negative. Personality of an individual, cognitive assessment of the stress, social support will also be considered here. The students' information is collected from various institutions and during various situations. Two methods are used to collect information from the students. First a questioner is prepared and the students are asked to fill up the questioner. This is basically for the data which is going to reflect their behavior.

**(Lazarus & Cohen 1977)** describes the three things make stress an important area of study for a variety of disciplines.

First, stress emotions and their effects are of the greatest importance to satisfaction and morale. Second, stress emotions strongly influence every aspect of adaptive functioning, including, for example, problem solving, social competence, and somatic health illness. Third, when stress emotions such as anxiety, fear, guilt, anger, sadness-depression, and jealousy occur, we can be certain that some important transaction has been taking place between the person and the environment.

**(Anil Kumar & Meenakshi Yadav)** describes the foregoing analysis reveals that there exist significant variations between the age of working women and various factors causing occupational stress. Working women in the higher age groups face the problem of stress more than other age groups. The sources of stress are household responsibilities, job demands, lack of support, lack of facilities and infrastructure, having too much responsibility, inability to give time to family, inability to learn enough to take higher responsibilities, having more work load, vague and unclear directions. As the study was conducted in the NCR region a huge diversity was found regarding the working women. It is the time to realize that working women significantly contributes towards economic and social development of the country. The growth of the working women should be looked upon from the perspective of family, state and national development. In a comparable occupational setting, working women perceive higher level of life stress and work stress It was suggested that working women must be provided with peer support, favourable working environment, less working hours, proper supervision and training, assistance with child care and developing zero tolerance policies to reduce stress.

**(Vemuri Swathi, M.Sudhir Reddy)** Women are playing a vital role in the economic and social development of the nations all over the world. Working women have a whole set of problems involving both family and professional lives. The Review of literature described that working women generally involved simultaneously in many tasks, juggling between family and work responsibilities, which leads towards stress among them.

**(Feng-Tso Sun, Cynthia Kuo<sup>1</sup>, Heng-Tze Cheng, Senaka Butthipitiya, Patricia Collin and Martin Griss)** states that a multimodal approach to model the mental stress activation affected by physical activities using accelerometers, ECG, and GSR sensors. Our analysis showed that accelerometer data is necessary to improve mental stress detection in a mobile environment. We also noticed that the Decision Tree classifier has the best performance in our experiments using 10-fold cross validation. Decision Tree is recognized as one of the classification methods with low computational complexity [4]. Therefore, the performance along with the low complexity of the Decision Tree classifier makes it a practical design choice for stress detection on mobile devices.

**(Kanta Devi)** A survey conducted in the exploratory way to assess the level of stress among working and non-working women with the support of questionnaire.

### III. METHODOLOGY

There are several major data mining techniques have been developing and using in data mining area recently including association, classification, clustering, prediction, sequential patterns, decision tree and summarization.

The association rule mining is a procedure which is meant to find frequent patterns, correlations, associations, or causal structures from data sets found in various kinds of databases such as relational databases, transactional databases, and other forms of data repositories. The goal of classification is to accurately predict the target class for each case in the data. Classification is a data mining (machine learning) technique used to predict group membership for data instances. Example classifies cars based on mileage.

The clustering is a process of partitioning a set of data (or objects) into a set of meaningful sub-classes, called clusters. Help users understand the natural grouping or structure in a data set. Used either as a stand-alone tool to get insight into data distribution or as a preprocessing step for other algorithms. The prediction in data mining is to identify data points purely on the description of another related data value. This is used to predict a future state, rather than a current one [6].

The sequential method is concerned with finding statistically relevant patterns between data examples where the values are delivered in a sequence. It is usually presumed that the values are discrete, and thus time series mining is closely related, but usually considered a different activity. A decision tree is a structure that includes a root node, branches, and leaf nodes. Each internal node denotes a test on an attribute, each branch denotes the outcome of a test, and each leaf node holds a class label. By using decision trees in data mining, user can automate the process of hypothesis generation and validation.

The summarization is a key data mining concept which involves techniques for finding a compact description of a dataset. An example of summarizing is writing a three or four-sentence description that touches upon the main points of a long book.

### IV. RESULTS AND DISCUSSION

Initially research on stress detection started with school students and found issues arise in their behavior and emotional problems due to difficulties they face during to adjust the challenges during school days. Questionnaire methods are used to find the stress level of school students and concluded that it can be overcome through good physical and psychological practice.

Later the research moves towards the users frequently using the social Medias like facebook, twitter and so on. The users are identified under three categories. First by set of low level features from tweets, second by middle-level based on psychological and art theories like linguistic attributes, visual attributes and social

attributes and third by the microblog data using sparse neural networks.

Based on above two findings the combination of questionnaire method and statistical data analytical method will give optimal result.

### V. CONCLUSION

Stress is one of the most prevalent and inevitable problem in modern life. A stressor may be defined as any demand made by the internal or external environment that upsets a person's balance, which needs some restoration. This paper surveys about the various methods and techniques used to find stress in different category of people. Also this paper focuses on technologies that support to detect stress using various data mining techniques.

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