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Prediction of Stress for IT Professionals by Applying Machine Learning

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Abstract*—The main motive of this work is identifying and detect stress level in the IT professionals by apply the Machine learning concept. In this article, we have included study of existing work done by the researcher in the same field. In this article, we identify and rectify the limitation of existing system. The objective of this paper to introduce the model that able to handle or mange the stress in the field of IT Professional and making the good environment to get the best out of them during working hours. Major issue and challenging task are to verify whether or not one beneath depressed state or not. Automatic detection of stress, this is need of scientific tool. This scientific tool is required for automatic detection of stress rather than answering decided Question. Nowadays these tools are widely used by the that uses physiological signals thereby automating the detection of stress levels in people. These all the scientific tools are highly costly and executed by only the well trained expert. So, this is another major challenging issue to replace these highly costly machine or tools by new technologies, like IT technology.*

Keywords:*—Stress Prediction, Facial Expressions.*

1. INDTRODUCTION

This Introduction section includes the basic information about the Stress management systems. Stress management is the basic need for everyone in daily life. High stress level will make disturb our daily working routine. Due to this result in mental furthermore as socio –fiscal issue, unbalanced work routine, effect in the work, it will affect relation, depression many more. As per the WHO (World Health Organization) definition, Stress may be a psychological state drawback moving the lifetime of one in four voters. Some of the solution for deal this problem like counseling to be provided for the stressed people, resolve the problem at ground level, medicine as recommended by doctor, yoga, meditation and regular exercise etc. This will help to manage the stress. Stress turning away is not possible however preventive actions help to beat the stress. Currently, solely medical and physiological consultants will verify whether or not one is beneath depressed state (stressed) or not. Next Section we highlight some methodology that widely used for to notice the stress.

2. METHODOLOGY USED TO INDENTIFY STRESS

This section covers the existing list of methodology to detect the Stress. Normal and very simple method to detect stress is using the answers given by the particular person. one in every of the normal methodology to notice stress is predicated on form. This the traditional method widely used measure

stress.

Once the stress is detected than reduce stress, it will also reduce the health problem.

Automatic detection of stress, this is need of scientific tool. This scientific tool is required for automatic detection of stress rather than answering the predefined Question. Now a day these tools are widely uses physiological signals there by automating detection of stress levels in people. These all the scientific tools are highly costly and executed by only the well trained expert. So, this is another major challenging issue to replace these highly costly machine or tools by new technologies, like IT technology.

Next Section will cover the information about the literatures survey related to work done by authors in this field.

3. LITERATURE SURVEY

Stress detection is mentioned in varied literatures because it may be a vital social contribution that enhances the approach to life of people. Nowadays because IT industries square measure setting a replacement peek within the market by transferable new technologies and merchandise within the market. During this study, the stress levels in staff also are noticed to lift the bar high. Although their square measure several organizations United Nations agency give psychological state connected schemes for his or her staff however the problem is much from management.

[1]This study develops a framework for the detection and analysis of stress/anxiety emotional states through video-recorded facial cues. A thorough experimental protocol was established to induce systematic variability in affective states (neutral, relaxed and stressed/ anxious) through a variety of external and internal stressors. The analysis was focused mainly on non-voluntary and semi-voluntary facial cues in order to estimate the emotion representation more objectively. Features under investigation included eye-related events, mouth activity, head motion parameters and heart rate estimated through camera based photoplethysmography. A feature selection procedure was employed to select the most robust features followed by classification schemes discriminating between stress/anxiety and neutral states with reference to a relaxed state in each experimental phase. In addition, a ranking transformation was proposed utilizing self reports in order to investigate the correlation of facial parameters with a participant perceived amount of stress/anxiety. The results indicated that, specific facial cues, derived from eye activity, mouth activity, head movements and camera-based heart activity achieve good accuracy and are suitable as discriminative indicators of stress and anxiety.[2] Stress is a part of life it is an unpleasant state of emotional arousal that people experience in situations like working for long hours in front of computer. Computers have become a way of life, much life is spent on the computers and hence we are therefore more affected by the ups and downs that they cause us. One cannot just completely avoid their work on computers but one can at least control his/her usage when being alarmed about him being stressed at certain point of time. Monitoring the emotional status of a person who is working in front of a computer for longer duration is crucial for the safety of a person. In this work a real-time non-intrusive videos are captured, which detects the emotional status of a person by analyzing the facial expression. This paper detects an individual emotion in each video frame and the decision on the stress level is made in sequential hours of the video captured. Employ a technique that allows us to train a model and analyze differences in predicting the features. Theano is a python framework which aims at improving both the execution time and development time of the linear regression model which is used here as a deep learning algorithm.[3] stress disorders are a common issue among working IT professionals in the industry today. With

changing lifestyle and work cultures, there is an increase in the risk of stress among the employees. Though many industries and corporate provide mental health related schemes and try to ease the workplace atmosphere, the issue is far from control. In this paper, we would like to apply machine learning techniques to analyze stress patterns in working adults and to narrow down the factors that strongly determine the stress levels. Towards this, data from the OSMI [7] mental health survey 2017 responses of working professionals within the tech-industry was considered. Various Machine Learning techniques were applied to train our model after due data cleaning and preprocessing. The accuracy of the above models was obtained and studied comparatively. Boosting had the highest accuracy among the models implemented. By using Decision Trees, prominent features that influence stress were identified as gender, family history and availability of health benefits in the workplace. With these results, industries can now narrow down their approach to reduce stress and create a much comfortable workplace for their employees. [4] Chronic stress detection is an important factor in predicting and reducing the risk of cardiovascular disease. This work is a pilot study with a focus on developing a method for detecting short-term psycho physiological changes through heart rate variability (HRV) features. The purpose of this pilot study is to establish and to gain insight on a set of features that could be used to detect psycho physiological changes that occur during chronic stress. This study elicited four different types of arousal by images, sounds, mental tasks and rest, and classified them using linear and non-linear HRV features from electrocardiograms (ECG) acquired by the wireless wearable ePatch® recorder. The highest recognition rates were acquired for the neutral stage (90%), the acute stress stage (80%) and the baseline stage (80%) by sample entropy, detruded fluctuation analysis and normalized high.[5] Stress, anxiety and depression in the workplace are detrimental to human health and productivity with significant financial implications. Recent research in this area has focused on the use of sensor technologies, including smart phones and wearable's embedded with physiological and movement sensors. In this work, authors explore the possibility of using such devices for mood recognition, focusing on work environments. This article proposes a novel mood recognition framework that is able to identify five intensity levels for eight different types of moods every two hours. Authors also present a Smartphone app ("HealthyOffice"), designed to facilitate self- reporting in a structured manner and provide our model with the ground truth. They evaluate our system in a small-scale user study where wearable sensing data is collected in an office environment. Our experiments exhibit promising results allowing us to reliably recognize various classes of perceived moods. out of context, outlandish or argumentative behavior, very excitable moods, and/or eating or drinking to excess.[6]. The main concept of this paper is to detect stress in the IT professionals with the help of Machine learning and Image processing techniques. This paper is an upgraded version of the old stress detection systems which excluded the live detection and the personal counseling but this paper comprises of live detection and periodic analysis of employees and detecting physical as well as mental stress levels in his/ her by providing them with proper remedies for managing stress by providing survey form periodically. This paper mainly focuses on managing stress and making the working environment healthy and spontaneous for the employees and to get the best out of them during working hours.[8] The main goal of the system is to analyze the mental stress through physiological data using electrocardiograph in different positions and moods. Different pre-processing techniques can be used for stress detection. In feature extraction discrete wavelet transform can apply. Many classifiers like artificial neural network, support vector machine, Bayesian network, and decision tree are using to get more accurate results based on accuracy. Physiological sensors analytics is becoming

more and more important as the availability of sensor-enabled portable, wearable, and implantable devices becomes ubiquitous in the growing Internet of Things (IoT). Physiological multi-sensor studies have been conducted successfully to detect stress. The proposed scheme will be developed to ensure the more image security during transmission by facilitating the quick image transfers. These applications usually do not have strong security mechanisms to protect the user data. The proposed algorithm will be designed to fill that certain gap of stronger security mechanism for image sharing based social media applications. Psychological stress is injuring to health. In existing system stress is identified in face-to-face interview, communication or any other activities. where two or more people are analyzed by another. In this proposed a system framework for detecting users psychological stress states by using users "weekly social media data, leveraging tweets" content as well as users social interactions This implemented system will be helpful to detect Stress by using their daily conversations on social media data, to the user and categories the user as stressed or relaxed.

4. SYSTEM ARCHITECTURE

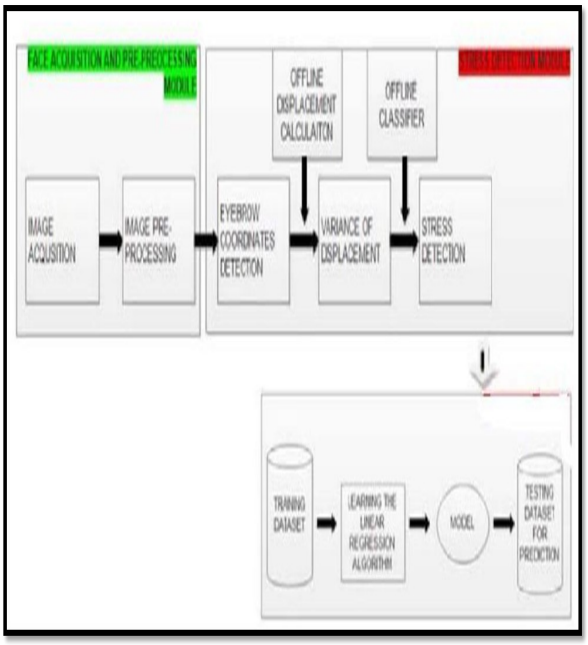

Figure 1: System Architecture

Figure 2: Admin Page

Figure 3: Stress Detection page

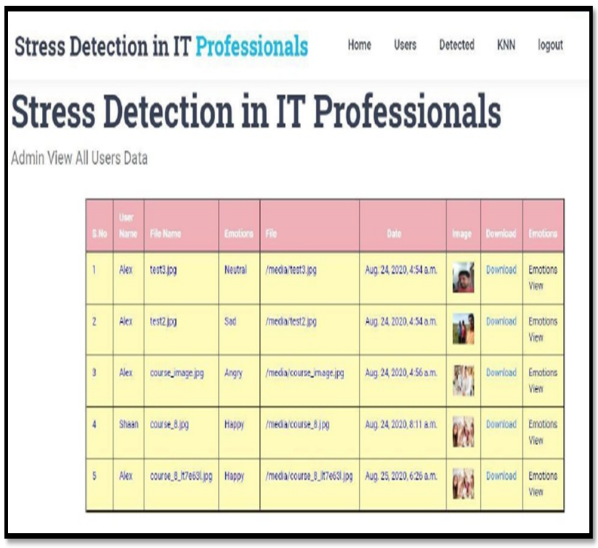

Figure 3: Stress Detection Page

Table 1: Comparative Study Table

#.	Paper Title	Author Name	Method	Advantage	Disadvantage
1.	Stress and anxiety detection using facial cues from videos	G. Giannakakis, D. Manousos, F. Chiarugi	Face ROI detection, Data Preprocessing.	a variety of semi voluntary facial features are jointly used for the detection of anxiety and/or stress instead of the traditional facial expression analysis,	Time Consuming
2.	Detection of Stress Using Image Processing and Machine Learning Techniques	Nisha Raichur, Nidhi Lonakadi, Priyanka Mural	Image Pre-Processing.	Integrates image processing and deep learning to detect ongoing stress to minimize future health risks	Difficult to implement on larger areas.
3.	Machine Learning Techniques for Stress Prediction in Working Employees	U. S. Reddy, A. V. Thota and A. Dharun	Logistic Regression, Decision Tress, Random Forest Classifier.	customize the survey taken in order to procure responses in the right format and to increase the number of attributes as per relevance.	vast dataset is needed to accomplish
4	Classification of acute stress using linear and non-linear heart rate variability analysis derived from sternal ECG	Tanev, G., Saadi, D.B., Hoppe, K., Sorensen, H.B	Naive Bayesian classifier.	Standardizing non-linear HRV features for each subject	Little Bit time Consuming
	Effective stress detection using Physiological parameters	Monika Chauhan, Shivani V. Vora, Dipak Dabhi	SVM , ANN		
	Stress Detection Using Wearable Physiological And Sociometric Sensors	Virginia Sandulescu, Sally Andrews, David Ellis, Nicola Bellotto, Radu Dobrescu	SVM,KNN		
	Mental Stress Detection in University Students using Machine Learning	Ravinder Ahuja, Alisha Banga	Random Forest		
	A Machine Learning Approach for Stress Detection using a Wireless Physical Activity Tracker	B. Padmaja, V. V. Rama Prasad and K. V. N. Sunitha	Hypothesis Building		
	Stress Detection through Speech Analysis using Machine Learning	Dr. S. Vaikole, S. Mulajkar, A. More, P. Jayaswal, S. Dhas	CNN		
	Human Stress Detection Based On Social Interactions	S.Venkateswaran1,K.Sangeetha2,S.Abinaya3, B.Divyalakshmi4	CNN,KNN		
	Continuous Stress Detection Using a Wrist Device	Martin Gjoreski, HristijanGjoreski, MitjaLuštrek	SVM		
	Detecting Stress Based on Social Interactions in Social Networks	Huijie Lin, Jia Jia, JiezhonQiu, Yongfeng Zhang, LexingXie, Jie Tang, Ling Feng, and Tat-Seng Chua	CNN		

5. WHAT IS IN EXISTING SYSTEM?

In the existing system work on stress detection is based on the digital signal processing, taking into consideration Galvanic skin response, blood volume, pupil dilation and skin temperature. And the other work on this issue is based on several physiological signals and visual features (eye closure, head movement) to monitor the stress in a person while he is working. However these measurements are intrusive and are less comfortable in real application. Every sensor data is compared with a stress index which is a threshold value used for detecting the stress level.

6. DISADVANTAGES OF EXISTING SYSTEM:

Physiological signals used for analysis are often pigeonholed by a Non- stationary time performance. The extracted features explicitly give the stress index of the physiological signals. The ECG signal is directly assessed by using commonly used peak j48 algorithm. Different people may behave or express differently under stress and it is hard to find a universal pattern to define the stress emotion. Algorithm: Bayesian Network, J48.

7 .WORK TO BE DONE

The proposed System Machine Learning algorithms like KNN classifiers are applied to classify stress. Image Processing is used at the initial stage for detection, the employee's image is given by the browser which serves as input. In order to get an enhanced image or to extract some useful information from its image processing is used by converting image into digital form and performing some operations on it. By taking input as an image and output may be image or characteristics associated with that image. The emotion is displayed on the rounder box. The stress level indicating by Angry, Disgusted, Fearful, Sad.

8. CONCLUSION

This paper covers the basic information about the stress detection and its challenging issue. Here we include the Machine learning concept to implement the stress detection system. The major objective about the paper is introduce to less use or avoid the scientific tools .literature survey section cover the information about existing work done by the community of researcher in the domain of this topic followed by the complete comparative study.

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