

International Journal of
Engineering Research and Science & Technology



ISSN : 2319-5991

www.ijerst.com

Email: editor@ijerst.com or editor.ijerst@gmail.com

STRESS DETECTION IN IT PROFESSIONALS USING DEEP LEARNING

Mr.K.V V Siva Prasad ¹,Nagireddy Veera Siva Sai Sowmya Likitha ²,Merigi Nushitha ³,Dodda Sushma ⁴,Sarella Chandana Keerthi ⁵,Rentala Meher Sri Karpura Lakshmi Sravya ⁶

ABSTRACT

The main motive of our project is to detect stress in the IT professionals using vivid Machine learning and Image processing techniques. Our system is an upgraded version of the old stress detection systems which excluded the live detection and the personal counselling but this system 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 forms periodically. Our system 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.

1. INTRODUCTION

Stress management systems play a significant role to detect the stress levels which disrupts our socio-economic lifestyle. As World Health Organization (WHO) says, Stress is a mental health problem affecting the life of one in four citizens. Human stress leads to mental as well as socio-fiscal problems, lack of clarity in work, poor working relationship, depression and finally commitment of suicide in severe cases. This demands counselling to be provided for the stressed individual's cope up against stress. Stress avoidance is impossible but preventive actions help to overcome stress. Currently, only medical and physiological experts can determine whether one is in a depressed state (stressed) or not. One of the traditional method to detect stress is based on questionnaires. This method completely depends on the answers given by the individuals, people will

be reticent to say whether they are stressed or normal. Automatic detection of stress minimizes the risk health issues and improves the welfare of society. This paves the way for the necessity of a scientific tool, which uses physiological signals thereby automating the detection of stress levels in individuals. Stress detection is discussed in various literatures as it is a significant societal contribution that enhances the lifestyle of individuals. Ghaderi et al. analysed stress using Respiration, Heart rate (HR), facial electromyography (EMG), Galvanic skin response (GSR) foot and GSR hand data with a conclusion that, features pertaining to respiration processes are substantial in stress detection. Maria Viqueira et al. describes mental stress prediction using a standalone stress sensing hardware by interfacing GSR as the only physiological sensor.

ASSISTANT PROFESSOR
DEPT OF COMPUTER SCIENCE AND ENGINEERING
PRAGATI ENGINEERING COLLEGE(A), SURAMPALEM (EAST GODAVARI) A.P, INDIA

David Liu et al. proposed a research to predict stress levels solely from Electrocardiogram (ECG). Multimodal sensor efficacy to detect stress of working people is experimentally discussed in. This employs the sensor data from sensors such as pressure distribution, HR, Blood Volume Pulse (BVP) and Electrodermal activity (EDA). An eye tracker sensor is also used which systematically analyses the eye movements with the stressors like Stroop word test and information related to pick up tasks. The authors of performed perceived stress detection by a set of non-invasive sensors which collect the physiological signals such as ECG, GSR, Electroencephalography (EEG), EMG, and Saturation of peripheral oxygen (SpO2). Continuous stress levels are estimated during the physiological sensor data such as GSR, EMG, HR, Respiration in. The stress detection is carried out effectively using Skin conductance level (SCL), HR, Facial EMG sensors by creating ICT related Stressors. Automated stress detection is made possible by several pattern recognition algorithms. Every sensor data is compared with a stress index which is a threshold value used for detecting the stress level. The authors of collected data from 16 individuals under four stressor conditions which were tested with Bayesian Network, J48 algorithm and Sequential Minimal Optimization (SMO) algorithm for predicting stress. Statistical features of heart rate, GSR, frequency domain features of heart rate and its variability (HRV), and the power spectral components of ECG were used to govern the stress levels. Various features are extracted from the commonly used physiological signals such as ECG, EMG, GSR, BVP etc., measured using appropriate sensors and selected features are grouped into clusters for further detection of anxiety levels. In, it is concluded that smaller clusters result in better balance in stress detection using the selected General Regression Neural Network (GRNN) model. This results in the fact that different combinations of the extracted features from the sensor signals provide better solutions to predict the continuous anxiety level. Frequency domain features like LF power (low frequency power from 0.04 Hz to 0.15 Hz), HF power (High frequency power from 0.15 Hz to 0.4 Hz), LF/HF (ratio of LF to the HF). and time domain features like Mean, Median, standard deviation of heart signal is considered for continuous real time stress detection in. Classification using decision tree

such as PLDA is performed using two stressors namely pickup task and stroop based word test wherein the authors concluded that the stressor-based classification proves unsatisfactory. In 2016,

2. LITERATURE SURVEY

1) Stress and anxiety detection using facial cues from videos

AUTHORS: G. Giannakakis, D. Manousos, F. Chiarugi

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 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 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) Detection of Stress Using Image Processing and Machine Learning Techniques

AUTHORS: Nisha Raichur, Nidhi Lonakadi, Priyanka Mural

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 a 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 real-time non-intrusive videos are captured, which detects the emotional status of a person by analysing facial expressions. We detect an individual emotion in each video frame and the decision on the stress level is made in sequential hours of the video captured. We employ a technique that allows us to train a model and analyse 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. The experimental results show that the developed system is well on data with the generic model of all ages.

3) Machine Learning Techniques for Stress Prediction in Working Employees

AUTHORS: U. S. Reddy, A. V. Thota and A. Dharun
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 corporates 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 analyse stress patterns in working adults and to narrow down the factors that strongly determine stress levels. Towards this, data from the OSMI 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.

3. 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.

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 stress emotion.

Algorithm: Bayesian Network, J48

3.2 PROPOSED SYSTEM:

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. 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.

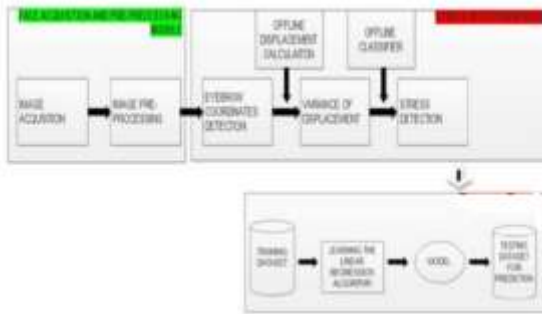
ADVANTAGES OF PROPOSED SYSTEM:

- Output in which result is altered image or report that is based on image analysis.
- Stress Detection System enables employees with coping up with their issues leading to stress by preventative stress management solutions.
- We will capture images of the employee based on the regular intervals and then the tradition survey forms will be given to the employees

Algorithm: K-Nearest Neighbour (KNN)

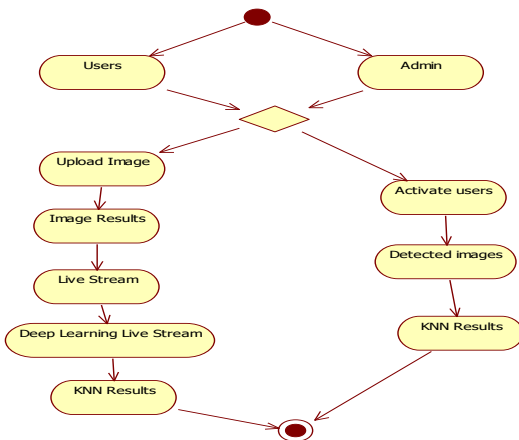
4. SYSTEM ARCHITECTURE .

Below diagram depicts the whole system architecture of STRESS DETECTION IN IT PROFESSIONALS.



Activity Diagram

A graphical representations of work process of stepwise exercises and activities with support for decision, emphasis and simultaneousness, used to depict the business and operational well-ordered stream of parts in a framework furthermore demonstrates the general stream of control.



5.SYSTEM IMPLEMENTATION

- **User**
- **Admin**
- **Data Preprocess**
- **Machine Learning**

MODULES DESCRIPTION:

5.1.1 User:

The User can register the first. While registering he required a valid user email and mobile for further communications. Once the user register then admin can activate the customer. Once admin activated the customer then user can login into our system. First user has to give the input as image to the system. The python library will extract the features and appropriate emotion of the image. If given image contain more than one faces also possible to detect.

The stress level we are going to indicate by facial expression like sad, angry etc.. The image processing completed the we are going to start the live stream. In the live stream also we can get the facial expression more that one persons also. Compare to tensor flow live stream the tensor flow live stream will fast and better results. Once done the we are loading the dataset to perform the KNN classification accuracy precession scores.

5.1.2 Admin:

Admin can login with his credentials. Once he login he can activate the users. The activated user only login in our applications. The admin can set the training and testing data for the project dynamically to the code. The admin can view all users detected results in hid frame. By clicking an hyperlink in the screen he can detect the emotions of the images. The admin can also view the KNN classification detected results. The dataset in the excel format. By authorized persons we can increase the dataset size according the imaginary values.

5.1.3 Data Preprocess:

Dataset contains grid view of already stored dataset consisting numerous properties, by Property Extraction newly designed dataset appears which contains only numerical input variables as a result of Principal Component Analysis feature selection transforming to 6principal components which are Condition (No stress, Time pressure, Interruption), Stress, Physical Demand, Performance and Frustration.

5.1.4Machine Learning:

K-Nearest Neighbour (KNN) is used for classification as well as regression analysis. It is a supervised learning algorithm which is used for predicting if a person needs treatment or not. KNN classifies the dependent variable based on how similar it is; independent variables are to a similar instance from the already known data. the KNN Classification can be called as a statistical model that uses a binary dependent variable. In classification analysis, KNN is estimating the parameters of a KNN model. Mathematically, a binary KNN model has a dependent variable with two possible value, which is represented by an indicator variable, where the two values are labelled "0" and "1".

6.TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of

ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

6.1 TYPES OF TESTING

■ Unit testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

■ Integration testing

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

■ Functional test

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following items:

7.RESULTS



Fig. 7.1 Home page of the project



Fig. 7.2 image input



Fig7.3 upload image



Fig. 7.4 Result

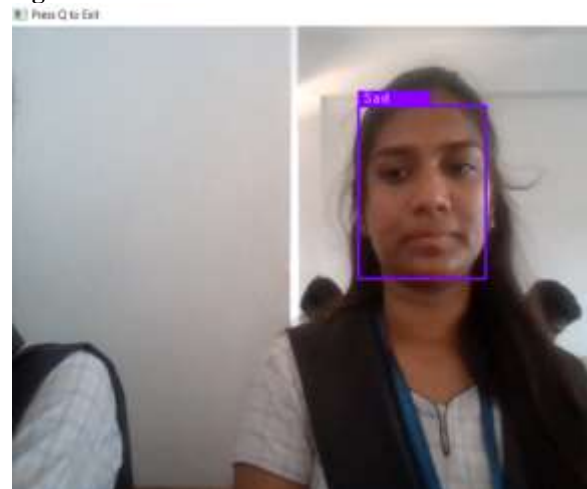


Fig7.5 Live stream

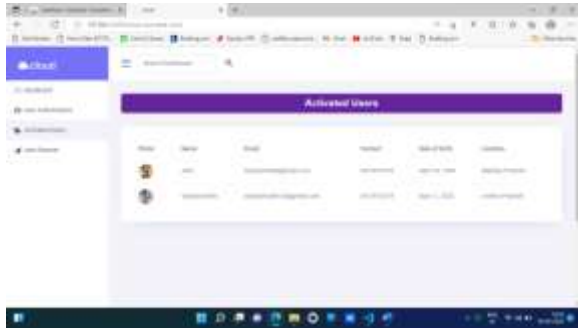


Fig. 7.6 This fig shows the Activated Users in Cloud

8. CONCLUSION & FUTURE WORK

Stress Detection System is designed to predict stress in the employees by monitoring captured images of authenticated users which makes the system secure. The image capturing is done automatically when the authenticated user is logged in based on some time interval. The captured images are used to detect the stress of the user based on some standard conversion and image processing mechanisms. Then the system will analyse the stress levels by using Machine Learning algorithms which generate results that are more efficient.

REFERENCES

- [1] G. Giannakakis, D. Manousos, F. Chiarugi, "Stress and anxiety detection using facial cues from videos," *Biomedical Signal processing and Control*, vol. 31, pp. 89-101, January 2017.
- [2] T. Jick and R. Payne, "Stress at work," *Journal of Management Education*, vol. 5, no. 3, pp. 50-56, 1980.
- [3] Nisha Raichur, Nidhi Lonakadi, Priyanka Mural, "Detection of Stress Using Image Processing and Machine Learning Techniques", vol.9, no. 3S, July 2017.
- [4] Bhattacharyya, R., & Basu, S. (2018). Retrieved from 'The Economic Times'.
- [5] OSMI Mental Health in Tech Survey Dataset, 2017
- [6] U. S. Reddy, A. V. Thota and A. Dharun, "Machine Learning Techniques for Stress Prediction in Working Employees," 2018 IEEE International Conference on Computational Intelligence and Computing Research (ICCIC), Madurai, India,

2018, pp. 1-4.

[7] <https://www.kaggle.com/qiriro/stress>

[8] Communications, N.. World health report. 2001. URL:

http://www.who.int/whr/2001/media_centre/press_release/en/.

[9] Bakker, J., Holenderski, L., Kocielnik, R., Pechenizkiy, M., Sidorova, N..

Stress@ work: From measuring stress to its understanding, prediction and handling with personalized coaching. In: Proceedings of the 2nd ACM SIGHIT International health informatics symposium. ACM; 2012, p. 673-678.

[10] Deng, Y., Wu, Z., Chu, C.H., Zhang, Q., Hsu, D.F.. Sensor feature selection and combination for stress identification using combinatorial fusion. *International Journal of Advanced Robotic Systems* 2013;10(8):306.