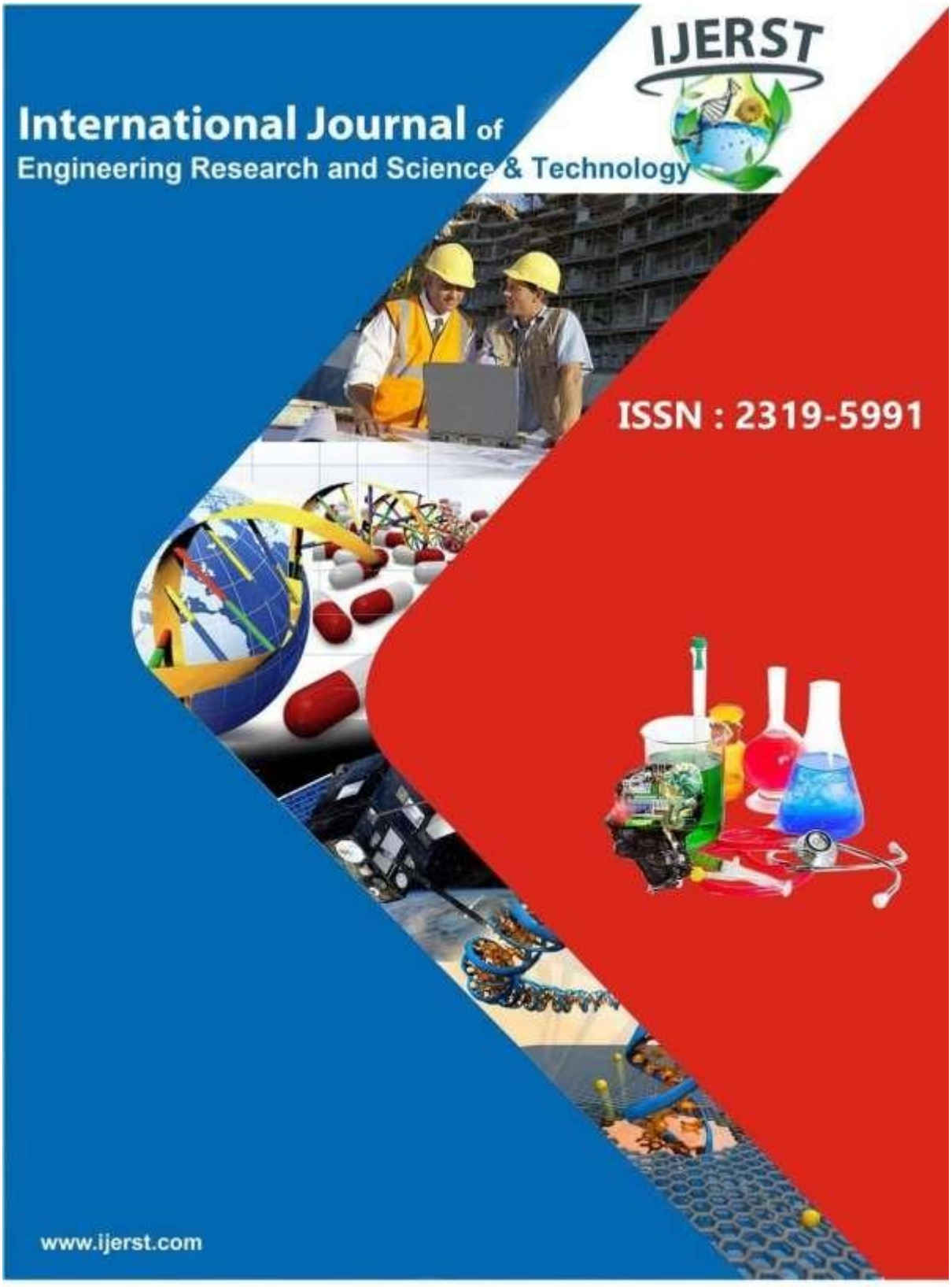


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# STRESS DETECTION IN IT PROFESSIONALS USING DEEP LEARNING

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**ABSTRACT**

The main motive of our project is to detect stress in the IT professionals usingvivid Machine learning and Image processing techniques. Our system is anupgraded version of the old stress detection systems which excluded the livedetection and the personal counselling but this system comprises of live detectionand periodic analysis of employees and detecting physical as well as mental stresslevels in his/her by providing them with proper remedies for managing stress byproviding survey forms periodically. Our system mainly focuses on managing stressand making the working environment healthy and spontaneous for the employeesand to get the best out of them during working hours.

## 1.INTRODUCTION

Stress management systems play a significant role to detect the stress levels whichdisrupts our socio-economic lifestyle. As World Health Organization (WHO) says,Stress is a mental health problem affecting the life of one in four citizens. Humanstress leads to mental as well as socio-fiscal problems, lack of clarity in work, poorworking relationship, depression and finally commitment of suicide in severecases. This demands counselling to beprovided for the stressed individual's copeup against stress. Stress avoidance is impossible but preventive actions helps toOvercoming 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 methodcompletely depends on the answers given by the individuals, people will betremulous to say whether they are stressed or normal. Automatic detection of stressminimizes the risk health issues and improves the welfare of society. Thispaves the way for the necessity of a scientific tool, which uses physiologicalsignals thereby automating the detection of stress levels in individuals. Stressdetection is discussed in variousliteratures as it is a significant societalcontribution that enhances the lifestyle of individuals. Ghaderi et al. analysed stressusing Respiration, Heart rate (HR), facial electromyography (EMG), Galvanic skinresponse (GSR) foot and GSR hand data with a conclusion that, features pertainingrespiration processes are substantial in stress detection. Maria Viqueira et aldescribes mental stress prediction using a standalone stress sensing hardware byinterfacing GSR as the only physiological sensor.

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David Liu et al. proposed aresearch to predict stress levels solely from Electrocardiogram (ECG). Multimodalsensor efficacy to detect stress of working people is experimentally discussed in.This employs the sensor data from sensors such as pressure distribution, HR,BloodVolume Pulse (BVP) and Electrodermal activity (EDA). An eye tracker sensor isalso used which systematically analyses the eye movements with the stressors likeStroop word test and information related to pick up tasks. The authors of performedperceived stress detection by a set of non-invasive sensors which collects thephysiological signals such as ECG, GSR, Electroencephalography (EEG), EMG,and Saturation of peripheral oxygen (SpO2). Continuous stress levels are estimateduring the physiological sensor data such as GSR, EMG, HR, Respiration in. Thestress detection is carried out effectively using Skin conductance level (SCL), HR,Facial EMG sensors by creating ICT related Stressors. Automated stress detectionis made possible by several pattern recognition algorithms. Every sensor data iscompared with a stress index which is a threshold value used for detecting thestress level. The authors of collected data from 16 individuals under four stressorsconditions which were tested with Bayesian Network, J48 algorithm andSequential Minimal Optimization (SMO) algorithm for predicting stress. Statisticalfeatures of heart rate, GSR, frequency domain features of heart rate and itsvariability (HRV), and the power spectral components of ECG were used togovern the stress levels. Various features are extracted from the commonly usedphysiological signals such as ECG, EMG, GSR, BVP etc., measured usingappropriate sensors and selected features are grouped into clusters for furtherdetection of anxiety levels. In, it is concluded that smaller clusters result in betterbalance in stress detection using the selected General Regression Neural Network(GRNN) model. This results in the fact that different combinations of the extractedfeatures from the sensor signals provide better solutions to predict the continuousanxiety level. Frequency domain features like LF power (low frequency powerfrom 0.04 Hz to0.15Hz), HF power (High frequency power from 0.15Hz 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 stressdetection in. Classification using decision tree such as PLDA is performed usingtwo stressors namely pickup task and stroop based word test wherein the authorsconcluded 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/anxietyemotional states through video-recorded facial cues. A thorough experimentalprotocol was established to induce systematic variability in affective states(Neutral, relaxed and stressed/anxious) through a variety of external and internalstressors.The analysis was focused mainly on non-voluntary and semi-voluntaryfacial cues to estimate the emotion representation more objectively.Features under investigation included eye-related events, mouth activity, headmotion parameters and heart rate estimated through camera-basedphotoplethysmography. A feature selection procedure was employed to select themost robust features followed by classification schemes discriminating betweenstress/anxiety and neutral states with reference to a relaxed state in eachexperimental phase. In addition, a ranking transformation was proposed utilizingself-reports to investigate the correlation of facial parameters with aparticipant perceived amount of stress/anxiety. The results indicated that, specificfacial cues, derived from eye activity, mouth activity, head movements and camerabased heart activity achieve goodaccuracy and are suitable as discriminativeindicators of stress and anxiety.

2) Detection of Stress Using Image Processing and MachineLearning Techniques

AUTHORS: Nisha Raichur, Nidhi Lonakadi, Priyanka Mural

Stress is a part of life it is an unpleasant state of emotional arousal that peopleexperience 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 andHence, we are therefore more affected by the ups and downs thatthey cause us. Onecannot just completely avoid their work on computers but one can at least controlhis/herusage 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 computerfor longer duration is crucial for the safety of a person. In this work real-timenon-intrusive videos are captured, which detects the emotional status of a personby analysing facial expressions. We detect an individual emotion in each videoframe and the decision on the stress level is made in sequential hours of the videocaptured. We employ a technique that allows us to train a model and analysedifferencesin predicting the features. Theano is a python framework which aims atimproving both the execution time and development time of the linear regressionmodel which is used here as a deep learning algorithm. The experimental resultsshow that the developed system is well on data with the generic model of all ages.

3) Machine Learning Techniques for Stress Prediction in WorkingEmployees

AUTHORS: U. S. Reddy, A. V. Thota and A. Dharun Stress disorders are a common issue among working IT professionals in theindustry today. With changing lifestyle and work cultures, there is an increase inthe risk of stress among the employees. Though many industries and corporatesprovide 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 learningtechniques to analyse stress patterns in working adults and to narrow down thefactors that strongly determine stress levels. Towards this, data from the OSMImental health survey 2017 responses of working professionals within the tech-industry was considered. Various Machine Learning techniques were applied totrain our model after due data cleaning and preprocessing. The accuracy of the above models was obtained and studied comparatively. Boosting had the highestaccuracy among the models implemented. By using Decision Trees, prominentfeatures that influence stress were identified as gender, family history andavailability of health benefits in the workplace. With these results, industries cannow narrow down their approach to reduce stress and create a muchcomfortableworkplace for their employees.

## 3. EXISTING SYSTEM

In the existing system work on stress detection is based on the digital signalprocessing, taking intoconsideration Galvanic skin response, blood volume, pupildilation and skin temperature. And the other work on this issue is based on severalphysiological signals and visual features (eye closure, head movement) to monitorthe stress in a person while he is working. However, these measurements areintrusive and are less comfortable in real application. Every sensor data iscompared with a stress index which is a threshold valueused for detecting thestress 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 physiologicalsignals. The ECG signal is directly assessed by using commonly used peakj48 algorithm
- Different people may behave or express differently under stress, and it isIt 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 areapplied 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 getan enhanced image or to extract some useful information from its image processingis used by converting image into digital form and performing some operations onit. By taking input as an image and output may be image or characteristicsassociated with that image. The emotion is displayed on the rounder box. Thestress 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 issuesleading to stress by preventative stress management solutions.
- We will capture images of the employee based on the regular intervals andthen the tradition survey forms will be given to the employees

Algorithm: K-Nearest Neighbour (KNN)

## 4.SYSTEM ARCHITECTURE .

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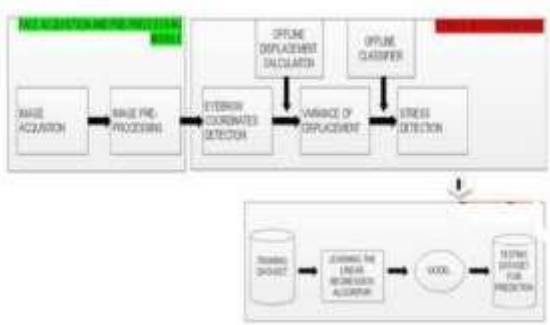
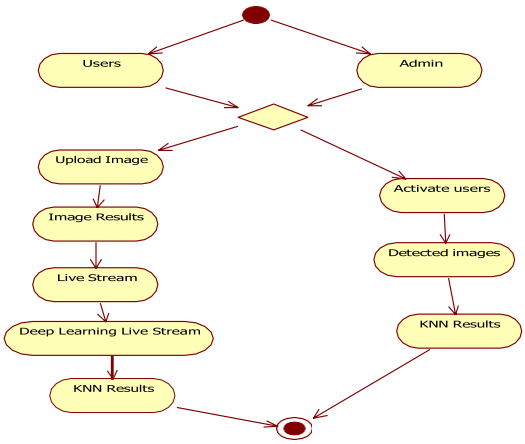
Below diagram depicts the whole system architecture of STRESS DETECTION IN IT PROFESSIONALS.



**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 imagecontain 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 onlylogin 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 classificationanalysis, 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

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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

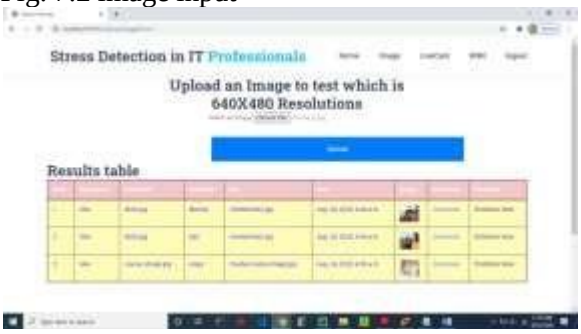


Fig7.3 upload image


**Fig. 7.4 Result**

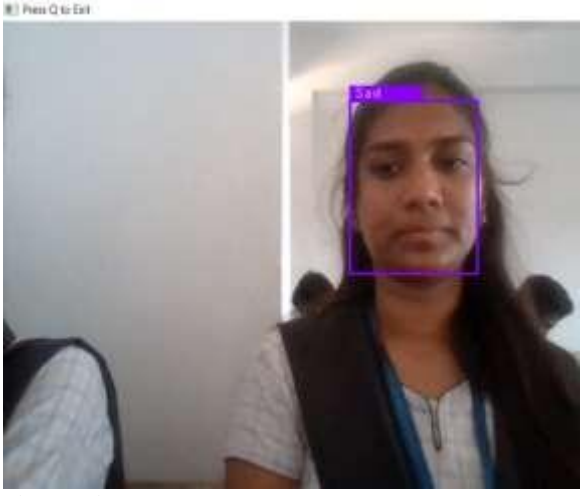


**Fig7.5 Live stream**

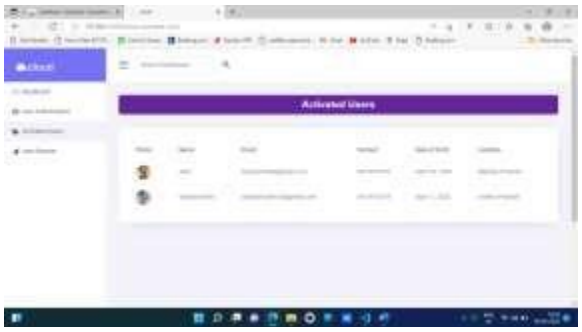


**Fig. 7.6 This fig showsthe Activated Users in Cloud**

## 8. CONCLUSION & FUTURE WORK

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

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