



Employees Stress Detection With Facial Expressions Using Machine Learning

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Abstract- The objective of this paper is to apply machine learning and visual processing to identify overworked IT employees. Our technology is an improved version of older stress detection systems that did not include live detection or personal counseling. Stress detection methods that don't include real-time monitoring or individual counselling are being updated in this research. A survey is used to collect data on employees' mental stress levels in order to provide effective stress management solutions. In order to get the most out of your employees, this paper will look at stress management and how to create a healthy, spontaneous work environment.

Keywords- Stress prediction, KNN classification, facial expressions. data analysis.

I.INTRODUCTION

Stress is the most common problem in the today's world and everyone suffers from it at some point in their lives. Stress can last for a short or long period of time, but it has a mental impact and can lead to a variety of health problems. Stress can manifest itself in a variety of ways, including feelings of guilt, embarrassment, worry, and even fury and impatience. Loneliness can manifest itself as fatigue, tension, concern, irritation, moodiness, and loneliness. As a result of stress, a person's behavior alters. When people are stressed, they are more likely to get into accidents, abuse drugs or alcohol, or engage in confrontational behavior. Anxiety and stress can decrease cognitive ability, cause impulsive behavior, limit memory, and even cause hypersensitivity to criticism [13]. In the early stages of depression, tension is common. Money, employment, and personal relationships are just some of the factors that might generate stress. Employees in the corporate world have a limited idea of what it's like to work in high-stress situations. Long-term stress is particularly common among those in the IT business.

To be competitive, the IT industry is continually launching new items and services. Furthermore, employees' stress levels have increased over the past year, according to this poll. The problem exists, despite the fact that many firms provide mental health benefits to their personnel. According to the WHO, stress is a mental disease that affects one out of every four voters. Mental and social issues, a lack of openness in the job, a loss of faith in coworkers, and even death are just a few examples. Obesity, heart attack, diabetes, asthma, and other health complications may arise as a result of stress. Hourly, a student in a different section of the country commits suicide.

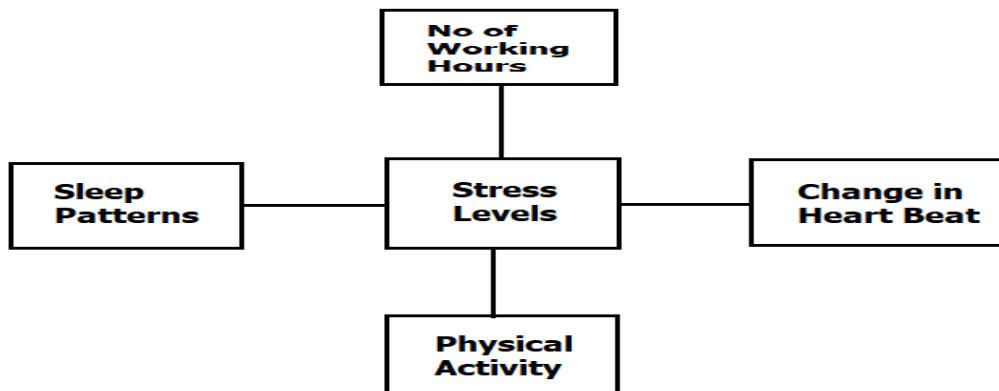


Figure. 1 Shows the Model of Stress of IT Employees

The usage of stress monitoring software can improve both the well-being of society and the health of individuals. It is consequently necessary to develop scientific technologies that can analyse physiological data and automatically estimate stress levels in humans. This surprising result that approximately 92% of IT employees are stressed at workplace is the world record.

II. LITERATURE SURVEY

G. Giannakakis, et al. [1] Using video-recorded face clues, this literature review establishes a model for detecting and identifying stress/anxiety emotional states. Through some kind of range of external and internal stresses, a complete experimental method was designed to induce systematic diversity in emotional states (neutral, relaxed, and stressed/anxious). In order to evaluate emotion expression more clearly and accurately, the paper concentrated mostly on non-voluntary and semi-voluntary facial cues. Sight-related activities, oral activity, gesture recognition characteristics, and heart rate were also examined [4].

Nisha Raichur, et al. [2] A real-time non-intrusive video is produced in this paper, which detects by analyzing a person's facial expression, can determine their emotional state. Each video frame contains an individual feeling, and the stress level is determined in the hours after the video capture [18]. A mechanism is applied that enables us both to train a system and analyze feature prediction differences. The paper's findings suggest that the developed technique works effectively with a generic model of all ages [5].

U. S. Reddy, et al. [3] Machine Learning techniques were utilized to train the model that had been constructed after preprocessing the data. It was measured and compared to the models shown above in order to determine how well they were manufactured. Out of all the models, boosting proved to be the most accurate in our experiments. According to the Decision Trees, factors such as gender, family history, and the availability of health benefits at work are all factors that contribute to stress. Many companies now know more about how to make their workplaces less stressful for their employees by implementing innovative technological solutions [6].

III. EXISTING SYSTEM

In the existing system, work on stress detection is based on 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/she 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.

- 1. Decision Tree, Native Byes Classifier-** Check heart rate, pulse value and galvanic skin response in hand and measure those values and compare with threshold values using decision tree.
- 2. Using Ecg Test With The Support Vector Machine-** Based up on the heart rate values given by the ECG of the user, SVM classifies the stress level of the user about the user is stressed or not.
- 3. Stress Detection Using Nlp And Sentiment Analysis-** Identify the user recently posted posts in social media and in user digital diaries and analysis those posts using natural processing and classify the output with the sentiment analysis based up on that the output will be stressed or not stressed.
- 4. Heart Rate Variability (Hrv), Along With The Skin Temperature, Decision Tree-** Measures heart rate and skin temperature values of the user and compare those values with the threshold values of normal human being heart rate and skin temperature and decide decision (whether stressed or not) with decision tree algorithm.

IV. 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 employees' image is given by the browser which serves as input. In order to get an enhanced image or to extract some useful information from it 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 those images. The emotions are displayed on the rounder box. The stress level indicating by Angry, Disgusted, Fearful, Sad.

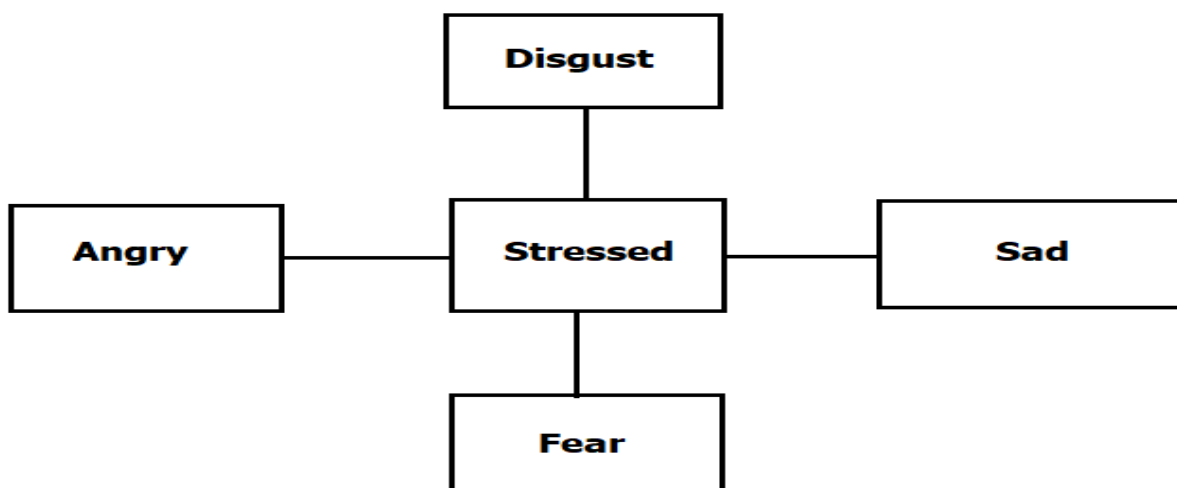


Figure. 2: Indication of stressed emotions states.

In previous papers, various machine learning algorithms are used like SVM, linear regression, logistic regression, etc., but didn't use KNN for the experiment which is similar to our approach. Not only accuracy but we also found Classification Error, Sensitivity, specificity, false positive rate error, precision. Our system is an updated version of prior stress detection systems that did not include live analysis or individual counseling, but it now incorporates live monitoring and frequent employee



analysis, as well as identifying physically and emotionally stress levels. Because there is no continuous taking of photographs, it takes less time and produces more effective outcomes when compared with the results achieved by continuously capturing images of a person.

By taking a picture as inputs and returning a photograph or characteristics associated with those images as output. We use a bounded box to show the employee's feeling, and also the emotions are shown at the top of the bounded box. Angry, Disgusted, Fearful, Sad, and Neutral are all stress indicators.

Advantages of this Approach

- ❖ An image that has been edited or a report based on image analysis as a result of the output.
- ❖ The Stress Detection System helps workers in managing difficulties that add to stress by giving proactive stress management solutions.
- ❖ Over periodic times, we will take photographs of employees and then distribute traditional survey forms to them.
- ❖ We can also use live Cam to detect the stress of the employee, which shows the stress characteristic of a person.

DATASET

Dataset contains a grid representation of an existing dataset with distinctive characteristics. Feature selection is the method involved with diminishing the quantity of information factors while fostering a prescient model. To complete the task in accordance with predictions or judgments, an explicit mathematical model is developed using "training data". Image mining can be used to find hidden information in images, link previously unrelated data, and uncover new patterns in the data being mined.

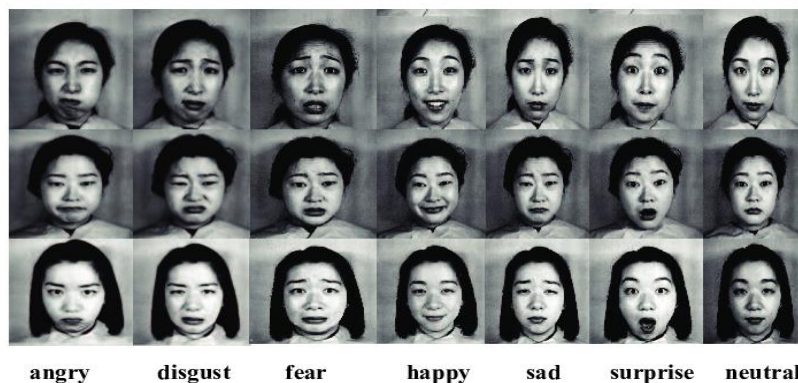


Figure.3 The 7 Basic Emotions of DEAP Dataset

V. IMPLEMENTATION

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 than one person. Once done the we are loading the dataset to perform the KNN classification accuracy precession scores.



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.

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 6 principal components which are Condition (No stress, Time pressure, Interruption), Stress, Physical Demand, Performance and Frustration.

Machine Learning: K-Nearest Neighbor (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. Inclassification analysis, KNN is estimating the parameters of a KNN model. Mathematically, abinary KNN model has a dependent variable withtwo possible value, which is represented by anindicator variable, where the two values arelabeled "0" and "1".

VI. CONCLUSION

The Stress Detection System is designed to assess employee stress by reviewing photographs submitted by verified users, making the framework is reliable. After the successful registration and login, user uploads the image and also uses the live cam. After uploading the image, we will get the output of the stress level on the top of bounded box as angry, sad, happy, disgusting, and neutral. We develop this model by using Machine Learning Algorithm like KNN classifier. We use KNN classifier and predict the accuracy of the model. Along with the accuracy we also predict classification error, sensitivity, specificity, false positive rate error, and precision. We can supply successful solutions for stress management, keeping the working conditions sound and unconstrained for representatives, and capitalizing on them all through work hours, thusly.

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