Industrial Engineering Journal
ISSN: 0970-2555
Volume : 53, Issue 8, August : 2024

# ANTICIPATING STRESS LEVELS IN EMPLOYEES FOR PROACTIVE REMEDIATION THROUGH MACHINE LEARNING ALGORITHM

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**ABSTRACT:**

The primary goal of our study is to identify IT workers who are experiencing stress by using advanced methods in machine learning and image processing. Our system is an improvement over previous stress detection systems that did not include personal counseling or live detection. Instead, our system analyzes employees on a regular basis, finds out how much stress they are under emotionally and physically, and then gives them tools to deal with it. The primary goals of our approach are stress management, creating a healthy and spontaneous work atmosphere, and optimizing employee performance when they are on the clock.

**INDEX:** primary, goal, IT employee, stress detection, deep learning

**INTRODUCTION:**

In order to identify the stress levels that are interfering with our socioeconomic way of life, stress management methods are crucial. One in four people experience stress in their lives, according to the World Health Organization (WHO). A number of negative outcomes may result from human stress, including mental and social health issues, bad work relationships, depression, and, in the worst instances, suicide attempts. As a result, those who are already experiencing stress should have access to counseling services. While completely avoiding stress is an impossibility, taking proactive measures may greatly assist in overcoming it. At this time, the only people who can tell whether someone is sad or anxious are those who work in the medical and physiological fields. Questionnaires have long been one of the go-to tools for stress detection. People will be nervous to report whether they are anxious or not since this approach is entirely dependent on their responses. Reduced health risks and enhanced societal well-being are the results of automatic stress detection. Because of this, a scientific instrument that automates the identification of stress levels in people by means of physiological signals is

required. As a major social contribution that improves people's quality of life, stress detection is spoken about in a lot of books and articles. Features related to the breathing process are important in stress detection, according to Ghaderi et al.'s analysis of data from respiration, heart rate (HR), face electromyography (EMG), Galvanic skin response (GSR) feet, and GSR hands. Predicting mental stress using a single physiological sensor (GSR) interfaced into a standalone stress detecting device is described by Maria Viqueira et al. In order to forecast stress levels using just electrocardiogram (ECG) data, David Liu et al. suggested a study. In, the experimental discussion centers on the multimodal sensor's effectiveness in detecting workers' stress. Pressure distribution, heart rate, blood volume pulse (BVP), and electrodermal activity (EDA) are some of the sensors that this makes use of. The use of an eye tracker sensor allows for the systematic analysis of eye movements in relation to stressors such as the Stroop word test and data pertaining to pickup tasks. By collecting physiological data including electrocardiograms (ECGs), graphs of spontaneous respiration (GSRs), electromyograms (EMGs), and saturation of peripheral oxygen (SpO2), the authors of were able to accomplish perceived stress detection without intrusive procedures. In order to determine continuous stress levels, data from physiological sensors like heart rate, electromyography (EMG), and respiration is used. By developing ICT-related stressors, it is possible to successfully detect stress utilizing skin conductance level (SCL), heart rate (HR), and facial electromyography (EMG) sensors. A number of design acknowledgment methods take into account mechanized pressure location. A pressure record, an edge an incentive for distinguishing pressure, is contrasted and all sensor information. To assess the pressure expectation calculations Successive Insignificant Enhancement (SMO), Bayesian Organization, and J48, the creators of assembled information from sixteen individuals under four different stressor conditions.

Anxiety levels may be further detected by clustering physiological data (ECG, EMG, GSR, BVP, etc.) recorded with the right sensors and employing certain criteria. According to the results of the study, the chosen General Regression Neural Network (GRNN) model for stress detection performs better with smaller clusters. As a consequence, there are several permutations of the sensor signal properties that provide more accurate predictions of the ongoing anxiety level. Examples of characteristics that fall within the realm of frequencies are low frequency power (LF power), high frequency power (HF power), and

the ratio of low recurrence capacity to high recurrence power (LF/HF). permits ceaseless ongoing pressure discovery in, along with worldly area measurements like the mean, middle, and standard deviation of the cardiovascular sign. Subsequent to applying two stressors — the pickup task and the stroop-based word test — to choice tree grouping utilizing PLDA, the creators found that stressor-based order was fruitless. Gjoreski et al. created pressure discovery classifiers utilizing electrocardiogram (ECG) and pulse fluctuation (HRV) information in 2016. To decide the level of pressure, the GRNN model is applied to the ECG highlights. Feelings of anxiety are grouped utilizing parts of pulse inconstancy (HRV) and RR stretches (cycle length variable span length between two resulting Rs). The classification technique that was most often utilized was Support Vector Machine (SVM) because of its strong mathematical foundation and ability to generalize. After testing out many kernels using support vector machines (SVMs), the authors of this study found that a linear SVM trained on features representing ECG frequency and heart rate variability (HRV) yielded the best results.

Currently, the IT industry is providing innovative items and technology to the market, which is creating a stir. Employee stress levels are also shown to be elevated in this research. The problem is out of hand, even though many companies provide programs to help their workers with mental health. To get to the bottom of this issue, we set out to identify patterns of stress in the workplace using image processing and machine learning methods. Our goal was to distinguish the particular factors that generally affect workers' feelings of anxiety. With regards to pressure order, AI techniques, for example, KNN classifiers are utilized. In the principal level of location, picture handling is utilized. The camera snaps a photo of the representative and uses it as info. By digitizing images and doing various operations on them, image processing may improve the quality of the picture or extract valuable information from it. This method uses video frames as input and produces either a picture or image-related properties as output. The three main components of image processing are:

Bringing the picture in using picture capture software. Examining and adjusting the photograph.

end product, the outcome of which is a report or modified picture generated using image analysis. Machine learning is an AI application that gives systems the ability to learn and create all alone without being explicitly intended to do as such. AI makes independent PC programs by permitting them to get to information and gain from it. Utilizing AI, express programming

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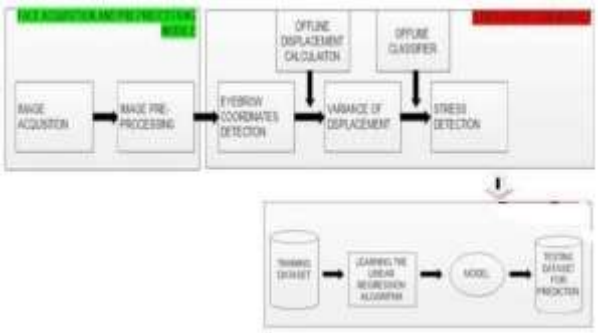
makes a numerical model utilizing "preparing information" to do the work in light of forecasts or decisions. Picture mining is a technique for discovering previously unseen patterns in images, as well as for associating previously unseen data with those images. Datasets, Machine Learning, Image Processing, and Data Mining are all components of this interconnected area of study. Half to eighty percent of all physical illnesses are attributed to stress, according to conservative estimates found in clinical distributions. The primary driver of cardiovascular ailments is believed to be pressure. Various medical conditions, including diabetes, ulcers, asthma, headaches, skin infections, epilepsy, and erectile brokenness, may be exacerbated by stress. All of these illnesses, along with a plethora of others, are psychosomatic, meaning they are influenced by mental factors like stress or are brought on by them. Stress manifests itself in three ways:

Some of the subjective repercussions of stress include emotions like anger, irritation, guilt, embarrassment, and worry. Tiredness, tension, nervousness, irritability, moodiness, and loneliness are some common experiences.

Behavioural impacts of stress depict the outward manifestations of a person's emotional and mental distress. Behavioral stress manifests itself in a variety of ways, including an increase in accidents, substance abuse, inappropriate laughing, extreme impulsivity, hyperactivity, and binge eating and drinking.

**SYSTEM ARCHITECTURE**




**METHODOLOGY**

**Introducing the Modules**

The user must first upload a picture to the system. The characteristics and suitable emotion of the picture will be removed utilizing the python library. Perceiving many countenances in an equivalent picture is likewise practical. Our facial expressions, such as sadness, anger, etc., will convey our degree of stress. We are ready to begin the live feed now that the picture processing is finished. More than one person's expressions may be seen in the live feed as well. If you're looking for speed and quality, tensor flow live stream is your best choice. The next step is to load the dataset so that we can calculate the precession scores for k-nearest neighbors classification accuracy.

**Admin**

Login credentials may be used by the administrator. He will be able to activate users after he logs in. Our programs only allow the activated user to log in. The project's preparing

and testing information might be powerfully set to the code by the administrator. All client location results are visible to the admin in the hidden frame. He can read the pictures' sentiments only by clicking a link on the screen. The results of the knn categorization may also be seen by the admin. I have the dataset in Excel. To account for imaginary numbers, authorized users might raise the dataset size.

**Cleaning Up Your Data:**

After undergoing Principal Component Analysis feature transformation into six head parts — Condition (No pressure, Time pressure, Interference), Stress, Actual Interest, Execution, and Dissatisfaction — a recently developed dataset with just mathematical info factors is produced by Property Extraction. The original dataset consisted of a grid view of many properties.

**Automated Learning:**

Two common applications of K-Nearest Neighbor (KNN) are regression analysis and categorization. Predicting whether a patient need therapy is the job of this supervised learning system. The K-Nearest Neighbors (KNN) classification algorithm uses the degree of similarity between the dependent and independent variables to identify instances that fit the model. that Knn A statistical model using a binary dependent variable is what classification is all about. Kullback-Nelson (KNN) parameter estimation is used in classification analysis. According to mathematical definitions, a binary KNN model uses an indicator variable with the labels "0" and "1" to indicate a dependent variable in the model that may take on two alternative values.

**KNN Algorithm classification:**

In k-mean clustering and k-Nearest Neighbor Algorithm, while creating clusters, you have to find the value of k and the data points that are closed enough to be considered as nearest neighbors; we use different distance metrics like Euclidean, Manhattan, Minkowski, or Hamming.

**Types of metrices used in KNN algorithm:**

**Euclidean:**

The Euclidean distance is defined as the distance between two points. In other words, the Euclidean distance between two points in the Euclidean space is defined as the length of the line segment between two points. As the Euclidean distance can be found by using the coordinate points and the Pythagoras theorem, it is occasionally called the Pythagorean distance.

$$E(x,y) = \sqrt{\sum_{i=0}^{n}(x_i - y_i)^2}$$

**Manhattan:**

Manhattan distance is a metric in which the distance between two points is the sum of the absolute differences of their Cartesian coordinates. In a simple way of saying it is the

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total sum of the difference between the x-coordinates and y-coordinates.

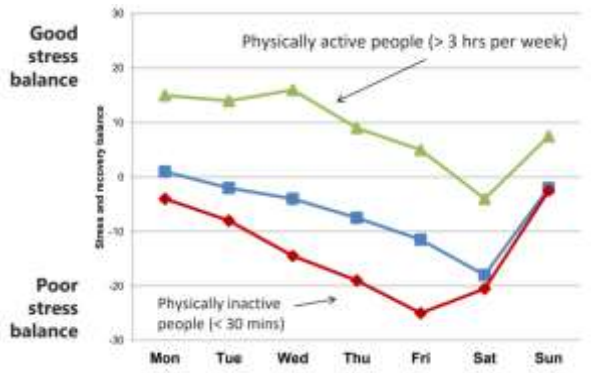
$$\text{Manhattan Distance } (p,q) = \sum_{i=1}^{n} |p_i - q_i|$$

**Minkowski:**

Minkowski distance is a distance/ similarity measurement between two points in the normed vector space (N dimensional real space) and is a generalization of the Euclidean distance and the Manhattan distance.

$$D(x,y) = (\sum_{i=0}^{n} |x_i - y_i|^p)^{\frac{1}{p}}$$

**RESULTS ANALYSIS**


Line Chart Prediction Results


Bar Graph Prediction Results

**CONCLUSION**

The Stress Detection System is a safe way to anticipate when workers may start to show signs of stress by keeping tabs on photos taken by verified users. After a certain amount of time has passed since the authenticated user signed in, the system will automatically capture their picture. Using certain common image processing and conversion algorithms, the recorded photos may be utilized to identify the user's level of stress. After then, the system will study the stress levels with the use of Machine Learning algorithms, which provide better outcomes.

**FUTURE ENHANCEMENT**

The integration of biomedical wearable sensors with Internet of Things technology has already shown promising results in the healthcare industry. Both patients and physicians have benefited from the use of these gadgets. Among its many benefits are the following: the ability to diagnose medical issues earlier, access to speedier medical aid via remote monitoring and telecommunication, and an emergency alarm system that can inform both the caregiver and

the personal doctor, among other things. By continually monitoring and giving frequent feedback on stress levels, the suggested multimodal IoT system promises to be a better health aide for a person. It would be fascinating to build on this work in future studies to create a stress detection model that incorporates more physiological characteristics, such as an activity identification system and machine learning methods.

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