

# Automated Stress Detection using Machine Learning

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**Abstract**—Human existence turns out to be progressively distressing and not every person can deal with his/her own life well. Stress problems are a typical issue among working IT experts in the business today. The vast majority don't know about pressure despite the fact that pressure is a typical ailment that effects on day-to-day existence, including family, connections, and examining. With changing way of life and work societies, there is an expansion in the gamble of pressure among the representatives. However numerous enterprises and organizations give emotional well-being connected plans and attempt to facilitate the working environment climate, the issue is a long way from control. Additionally, stress influences wellbeing, both truly and intellectually at all ages. Whenever individuals experience the ill effects of pressure over and again, stress will go to numerous states of being and mental issues like nervousness and sadness. In this way, it is decided to be the strategy to oversee and lessen pressure in the application. Framework work on pressure identification depends on the advanced sign handling, thinking about Galvanic skin reaction, blood volume, student expansion and skin temperature. Also, the other take care of on this problem depends on a few physiological signs and visual elements (eye conclusion, head development) to screen the pressure in an individual while he is working. Be that as it may, these estimations are nosy and are less agreeable in genuine application. Each sensor information is contrasted and a pressure record which is an edge esteem utilized for recognizing the anxiety.

As indicated by feeling of anxiety, framework organize video meeting with specialists.

**Keywords**—Stress, Convolution Neural Network (CNN), Facial Expression Recognition (FER), Audiorecognition, machine learning.

## I. INTRODUCTION

Stress, characterized as "vague reaction of the body to any request upon it", is an especially fascinating full of feeling state. This is because of the destructive impacts of long-haul pressure, which can go from cerebral pains and disturbed

dozing to an expanded gamble of cardiovascular illnesses. Requesting position are a critical reason for pressure in individuals. Circumstances like continuous openness to risk, short cutoff times, thorough undertakings or even dreary errands are some pressure originators. Non-meddlesome pressure detecting instruments that persistently screen feelings of anxiety, with a negligible effect on specialists' regular routines, could be utilized to start pressure decrease mediations consequently. In upsetting work settings, these applications couldn't prompt more ideal and decreased cost mediations, yet in addition to additional useful conditions where laborers could all the more likely deal with their responsibility.

On account of understudies, research shows that scholarly pressure prompts less prosperity and an improved probability of creating nervousness or melancholy. Moreover, understudies who have scholarly pressure will generally do ineffectively in school. This demonstrates the way that this pressure can hold kids back from doing also as they could during assessments. The justifications for why the understudies get pushed are: trouble in getting sorted out work and in complying with time constraints and getting once again to study, strain of consolidating paid work and study, passing on tasks to the latest possible second, unfortunate using time effectively and crazy obligations. We characterize the demeanour of stress as outrage, disdain, or a blend of these two central looks. In this starter study, we consider that pressure is recognized if either outrage or loathing is identified continually inside a decent time span. General media information as individuals under pressure respond by giving different looks, SpeechSignal as pressure might influence discourse peculiarity.

The comprehension of the setting changes as individual earlier foundations contrast. The assessment of an individual turns out to be more significant while getting more information on track occasions. The misconception of introductory emotion happens when there is an earlier information hole between the data sender and the collector. c.

Singular emotion turbulence exists. The turbulence is influenced by outside moment negative or positive mood. Emotion changes alongside instant conditions for a similar occasion. For most people, it is a typical phenomenon in day-by-day life that outside conditions impact inner emotions. For instance, a melodic tweet can likewise be upsetting when one's work execution is judged contrarily. Stress is most normal issue is everyone's life these days. It causes physical and emotional well-being issues.

Stress is our body's reaction to pressure. It is a compressed feeling. Various circumstances or life occasions can cause pressure. Everyone manages pressure in an unexpected way. Their capacity to adapt to it relies upon their hereditary, early life occasions, character, and social what's more, monetary conditions. Nonetheless, an excessive amount of pressure can cause adverse consequences prompting sadness. As World Health Organization (WHO) says, Stress might be a mental state disadvantage moving the lifetime of one in four citizens. Human pressure results in mental besides a socio-monetary issues, absence of straightforwardness in work, poor working connections, gloom, and in the long run obligation to self-destruction in serious cases. It might in fact leave them in an extremely durable phase of consistent concern and fear. In long haul it can influence physical and psychological well-being severely. Therefore, individuals are unsettled regardless of flourishing. The pressure can be brought about by either profound, physical, or even mental.

One can isolate pressure into two kinds, Short-term, and the other Long-term or ongoing pressure. Momentary pressure is situational when the circumstance changes, the pressure is gone or over. Long haul pressure is a drawn-out issue. That is the reason it is hazardous. Now and again persistent pressure is generally genetic or qualities related moreover. It can make to end anyone's life. Unreasonable pressure drives one ridiculously. Tolerating pressure is the initial step to lead a calm blissful life. It is vital to recognize and oversee pressure before it turns intense simple cures are accessible at a reasonable expense.

## II. RELATED WORK

Expansion in feelings of anxiety additionally expands the gamble of cardiovascular sicknesses and physical grievances. Because of the unfriendly impacts of pressure our day-to-day existence, it is important to appropriately screen such an unfortunate state as soon as possible and treat it. There are numerous strategies for concentrating on pressure like biomedical means self-reporting survey and Biomarker's strategy. Nonetheless, these techniques are not exceptionally viable in that frame of mind for ongoing applications. Biomedical strategies are nosier and require explicit Instruments. Self-revealing survey strategies expect subjects to invest energy and exertion announcing side effects fairly. Biomarker's strategy sets aside some margin to gather and examination tests, which may not be appropriate. Many investigations lead to the improvement of a strategy by observing skin temperature to screen pressure state. The specialists joined visual proof and skin temperature as stress recognizing signals. Notwithstanding, the assortment of these information successions in day-to-day existence conditions is

extremely challenging for creating commonsense applications and meddling devices are not agreeable to individuals. The greater part of the chips away at FE centre around the programmed acknowledgment, yet covers pressure discovery are less.

[1] Pessimistic profound pressure should be visible as a physiological reaction to mental and actual difficulties. Openness to upsetting circumstances with quite a while can unfavorably affect individuals, for example, sorrow, which at last outcomes in self-destruction in extreme case, so it is essential to screen pressure progressively and treat it properly. In this paper, we propose another system for stress discovery continuously. The structure distinguishes pressure by perceiving three pressure related looks, outrage, dread and misery. We likewise propose an associated convolutional network, which joins low-level highlights with undeniable level elements to prepare the profound organization to perceive looks. Assuming the quantity of pressure related outlines surpasses an edge esteem, the structure "sick remind individuals to enjoy some time off to unwind. The investigation results exhibit that our proposed technique has better execution on look acknowledgment and acknowledges elite execution stress recognition.

Social media are utilized as primary conversation channels by a large number of people each day. The content people produce in every day social media-based miniature interchanges, and the movements in that communicated, may affect the emotional conditions of others. Here, [2] These days it is extremely typical for people to encounter gentle or direct mental pressure in an assortment of circumstances. A reasonable measure of pressure is really great for an individual, in any case, a lot of pressure influences individual's psychological well-being and is an underwriter for self-destructive dangers whenever left inconspicuous over a more drawn-out period. With the rising number of individuals going through pressure, it is critical to have the option to distinguish it at a beginning phase and help individuals understand and determine it before much harm is finished. The customary strategies for evaluating feelings of anxiety are by talking to the individual and by noticing the facial signals. Individuals under pressure respond by giving different looks. Research in the pressure discovery area has become very famous. There is an extent of progress in upgrading the precision of the outcomes acquired utilizing different techniques. The utilization of harmless methods for stress identification are very encouraging. This examination work proposes a framework to identify human mental pressure utilizing electroencephalogram (EEG) signals, discourse signs, and general media information. Stress is a state of mind that influences the cerebrum electrical movement to be unique in relation to the ordinary state. Neurological signs are mean a lot to quantify mental pressure. Different kinds of electrical activities connect with different states of the psyche. These signs can be utilized to get the supportive information that can be used in early area of some mental state. Discourse of individuals is the impression of the perspective. The proposed research will investigate discourse sign to perceive human mental pressure utilizing AI strategies. The framework will likewise have the option to

perceive pressure from the general media information [3] Stress is the body's normal response to outer and inner boosts. Notwithstanding being something normal, delayed openness to stressors can add to genuine medical issues. These responses are reflected physiologically, yet additionally mentally, converting into feelings and looks. In light of this, we fostered a proof of idea for a pressure locator. With a convolutional brain network fit for arranging looks, and an application that utilizes this model to group constant pictures of the client's face and consequently survey the presence of indications of stress. For the formation of the arrangement model was utilized exchange learning along with calibrating. Along these lines, we exploited the pre-prepared networks VGG16, VGG19, and Inception-ResNet V2 to tackle the central issue. For the exchange it was considered to learn process two classifier designs. After a few trials, it was resolved that VGG16, along with a classifier in view of a convolutional layer, was the applicant with the best presentation at ordering distressing feelings. The outcomes acquired are exceptionally encouraging and the proposed pressure location framework is painless, just requiring a webcam to screen the client's looks.

[4] Dissecting physiological signs is a solid indicator of stress. Such signals are gathered from sensors that are appended to the human body. An impediment of conventional AI calculations is the necessity for hand-created highlights. Precision diminishes assuming highlights are misidentified. To address this lack, two profound brain networks are created: chest-worn(1D) and wrist-worn(multi-layered). Profound brain networks don't need hand-created includes however rather remove highlights from crude information through the layers of the brain organizations. The profound brain networks examined physiological information gathered from chest-worn and wrist-worn sensors to perform two undertakings. Each brain organization to investigate information from either the chest-worn or wrist-worn sensors were custom fitted. The principal task was parallel order for pressure location, The subsequent errand was 3-class grouping for feeling characterization. The organizations were prepared and tried on freely accessible information gathered before.

Paper [5] Automatic stress detection evaluating models of facial action unit. Close to home pressure location can be examining different facial boundaries. This paper centres around the mechanized ID of facial Action Units (AU) as quantitative files to separate among unbiased and stress/uneasiness state. Subsequently, a model for programmed acknowledgment of facial activity units is proposed being prepared in two accessible commented on facial datasets, the UNBC and the BOSPHORUS datasets. Facial highlights, both mathematical (non-inflexible misshappenings of 3D state of AAM tourist spots) and appearance (Histograms of Oriented Gradients) were separated. The force of every AU was relapsed utilizing Support Vector Regression (SVR). The relating models of each dataset were melded to a joined model. This consolidated model was applied to the trial dataset (SRD'15) containing impartial states and inciting unpleasant states

connected with four kinds of pressure. The outcomes demonstrate that there is explicit AU applicable to push and the AU (Action unit) power are critical expanded during pressureprompting u more expressive human face.

### III. MOTIVATION

Feelings of anxiety in India remain exceptionally high contrasted with other created and arising nations like the USA, UK, Germany, France and Australia. Stress can be viewed as perhaps the most widely recognized medical care issue; each individual is known to battle with pressure either working or inside their private/public activities. Stress is the reaction to physical or mental difficulties. The pressure state might influence discourse peculiarity. The pressure recognition undertaking can likewise be formed as a look characterization issue as per the connection among stress and look. In this errand the goal is dole out a solitary look mark to each information outline. Assuming 66% of the marked casings are pressure related outlines, which mimics individuals under pressure for long time, the structure will remind individuals to have some time off to unwind. Stress is knowledgeable about each individual pretty much each and every day which is consequently connected with the interconnection between the climate and the actual individual. This pressure might be a risk sign for their lives. In this way, important individuals ought to know about the results of being over focused before it prompts some genuine medical problems. Stress is an underwriter for sorrow and self-destructive dangers whenever left inconspicuous over a more extended period. Research in the space of neuroscience has created lately with the rise of painless strategies for observing human mind work that can be utilized to concentrate on different parts of human way of behaving comparable to innovation and work, including mental responsibility, visual consideration, working memory, human-computerization communication, and versatile robotization.

### PROBLEM STATEMENT

Stress has been a significant issue of the general public. Near 82% Indians are experiencing weight by virtue of work, wellbeing and money related concerns, a worldwide prosperity study (2019) directed by medical care major Cigna Corporation has found. Distressing occasions, for example, family and relationship clashes, lawful issues and employment cutback frequently go before self-destructive way of behaving. Endeavors have been made for a really long time by the analysts to identify pressure utilizing different techniques so the pace of suicides and sorrow can diminish It was seen that general media information was not considered for the pressure discovery as stress was recognized for the most part from the discourse signal and the feeling acknowledgment was finished utilizing general media information. In any case, the aftereffects of the inclination state acknowledgment from sound visuals can be further developed utilizing profound learning strategies which will be additionally used to recognize pressure. It is principal to construct a framework to perceive pressure before it becomes persistent.



The proposed research work presents a framework in which, stress will be distinguished utilizing two methodologies:

- i) Visual information as individuals under pressure respond by giving different looks
- ii) Speech Signal and visual sound as pressure might influence discourse peculiarity.

The framework will investigate every possibility in acknowledgment of stress for the prosperity of human psychological wellness and therefore to serve the general public.

#### IV. METHODOLOGY

##### A. Proposed system

The utilization of discourse signals for distinguishing pressure enjoys benefits and disservices. Not at all like bio-signal based approaches, discourse signs can be effectively distinguished utilizing amplifiers, without straightforwardly appending them to the body. This component isn't just advantageous for clients yet additionally accommodating for building an enormous data set for use in a pressure discovery framework. Notwithstanding, the exactness of discourse based pressure location frameworks is for the most part more awful than that of bio-signal based calculations. In spite of this exhibition obstacle looked by discourse based pressure discovery frameworks, creating brain organization. Stress location from discourse signal is having a ton of utilizations. It is utilized in brain research to screen the different feelings of anxiety of patients with various pressure conditions and give vital medicines. The wellbeing and security of a framework can be laid out by checking the different feelings of anxiety of pilots, remote ocean jumpers and military authorities confronting policing. Stress recognition is additionally helpful in speaker distinguishing proof, trickiness discovery and ID of danger brings in couple of instances of wrongdoing. While getting ready to talk, an individual should conclude which grouping of words will best convey their planned message. Stress can influence these choices and change the phrasing, syntax, and timing of discourse, which can, thus, be utilized as vocal markers of stress. In any case, stress instigates different changes also. To create discourse, for instance, the body regulates the pressure of various muscles to compel air through the vocal creases and out the vocal plot to deliver sound waves. Stress increments both muscle pressure and breath rate, which thusly change the mechanics of discourse creation and, subsequently, the way that discourse sounds.

A voice-based pressure recognition framework, named Stress Sense is carried out on Android telephones to distinguish the feelings of anxiety from human voice. The pressure model is built under assorted conditions, testing various speakers and situations work-based methods by gathering a lot of information makes such frameworks seriously encouraging. Perhaps the best method for breaking down pressure in people is by video conferencing and looking for exhortations from particular specialists to go to important lengths, (for example, endorsing prescriptions or for additional treatment) to lessen feelings of anxiety. In our proposed philosophy, video conferencing gives a go-between stage where the patient can associate with the medicator straightforwardly.

In the proposed network, we will distinguish the facial land an imprint from constant video caught information with the assistance of the Haarcascade classifier and recognize the facial feeling of the subject. Once done with distinguishing the look with the assistance of profound brain network we will continue with that information to anticipate the anxiety of the subject [19,20]. When gathering photographs for preparing, partition them into classes like Anger, Happiness, Sadness, Surprise, Neutral, and Fear. Additionally, the dataset thought to be arranged by feeling class, and any photos that are unsure about the inclination thought to be taken out. Train the dataset with the CNN Algorithm and Classifying Emotions until it accomplishes most extreme precision.

Also, here by using audio signals, stress levels can be detected. Discourse is a sort of sign containing transient logical data and reliance between adjoining outlines. As a CNN structure takes advantage of a covered up express that goes about as a memory putting away data over the long haul, it can deal with logical data, like discourse, that shows explicit windowed outline variety.

##### B. Convolution Neural Networks

Convolutional Neural Networks: A convolutional brain network is class of profound brain organization, most ordinarily applied to break down visual imagery. A convolutional brain network comprises of an information layer, stowed away layers and any yield layer. CNNs are Deep Learning calculations that utilization visual contribution to figure out which credits and articles ought to be weighted and adjusted, which empowers them to be disengaged and arranged. The sum of pre-handling expected by a Conv Net is significantly less than that needed by other order techniques. While fundamental methodologies need hand-designing of channels, Conv. Nets can gain proficiency with these channels/attributes with sufficient preparation. CNN has fabricated a fundamental part in its essential structure: the convolutional layer. The boundaries of the layer are an assortment of learnable channels (or portions) that cover the information volume from the info layer to the result layer. The key contemplations of races and embodiment of Pooling, a sort of non-straight down-examining, is another key thought in CNNs. Pooling depicts the method involved with changing over information from a complex cluster to a one-layered exhibit that will be utilized in the following layer. To integrate a solitary long element vector, we utilize the smoothed result of the convolutional layers. Completely connected layer, frequently known as the last grouping model, is associated with this. Feelings have been investigated by analysts since the nineteenth 100 years, yet there is nusually perceived portrayal of what feelings are or the way in which they are shaped. Feelings and physiology, then again, have been connected for north of hundred years. Many investigations use physiological information including electro-dermal, cardiovascular, and muscle movement to survey members' close to home states, including feelings of anxiety. Full of feeling states can likewise be evaluated utilizing different apparatuses, for example, surveys and scales.

C. Modules

Admin

- Login
- Manage Doctor
- View User
- View Complaint
  - Send Reply

Doctor

- Register
- Login
- View appointment
  - View User details
- Make a Video call

User

- Register
- Login
- Camera/Record for stress detect
- View Doctor
  - Make Appointment
- View Appointment
  - Make Video call
- Send Complaint
  - View Reply

SYSTEM ARCHITECTURE

A. Flow Chart Diagram

In the proposed network, every element have separate undertaking to do so every substance acknowledges the information interaction the information and feed advances the information to one more element here our organization you can see that camera acknowledges the continuous video information and pre - process the information utilizing our face location calculation and it removes the facial elements from the info picture and these information is feed sent to our proposed calculation called feeling recognition these calculation by utilizing the model which we have prepared predicts the feeling and relates it with the 3 class of pressure (lowStress, highStress).

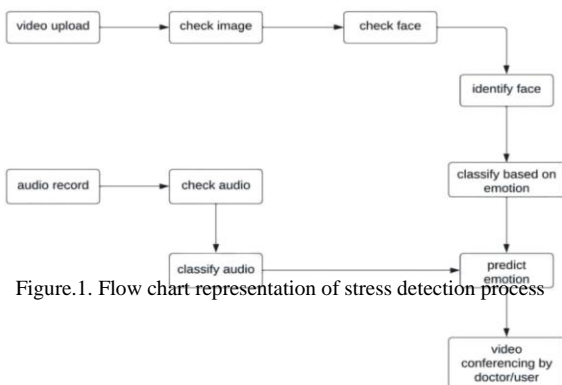


Figure.1. Flow chart representation of stress detection process

As the title proposes, here the stress is recognized using a facial affirmation. The dataset contains sentiments, for instance, Happy, Angry, Sad, Disgust, Surprise, Fear and Unbiased. The dataset is arranged using Convolutional Neural Networks (CNN). Here few convolutional layers are used to get ready the dataset. These layers were executed using Progressive Model. A camera is used to get the near front sight of the individual while they are working before the computer. Captured video is isolated into portions of the same length and a set of a near number of picture frames are isolated from each part correspondingly and are broken down using some image taking care techniques. The stress area module channels the twofold image. Emotions like Scared, Sad and Angry are assigned Stressed. The remaining sentiments are named not engaged. The tension is resolved using some mathematical calculation like normalization. The integrated decision of

individual housings over the long haul chooses the level of stress involved. If the nervousness is more than the suggested level it is checked as High Stress close by its level, else it is Low Stress close by its level.

Due to the benefit of convolutional brain organization (CNN) in programmed including realizing, this review is proposed to utilize CNN to accomplish precise and quick identification of stress. A CNN is a brain network that concentrates input picture highlights and another brain network arranges the picture highlights. The info picture is utilized by the element extraction organization. The extricated include signals are used by the brain network for classification. In our proposed approach, from Fig.1, to identify pressure from a transferred video, different pictures must be checked and it likewise really looks at the face and recognizes it. And afterwards, CNN arranges the picture highlights in light of feelings/emotions and expectations for feelings are finished. Also, in specific circumstances where the facial expressions couldn't be perceived to identify stress, we can utilize sound acknowledgement to recognize stress utilizing a recorded sound. Presently the following stage is to remove highlights from these sound portrayals, into CSV documents via preparing a dataset so our calculation can chip away at these elements and play out the errand planned for. If certain feelings/emotions can be found in these sounds are being anticipated.

Just both of these two strategies for example either by facial expression acknowledgement or by sound acknowledgement can be utilized at a time to detect stress. Whenever an individual is tracked stressed, then he/she can have a video meeting with a clinical professional/specialist.

B. Effects of stress on Human Face

An issue of incredible interest is the correspondence between data reflected in and conveyed by the human face furthermore, the person's simultaneous profound experience. Darwin contended that looks are all inclusive, for example most feelings are communicated similarly on the human face paying little heed to race or culture. There are a few ongoing investigations detailing discoveries that facial signs furthermore, articulations can give experiences into the investigation and arrangement of stress. The primary signs of

pressure on the human face include the eyebrow developments, squinting of the eyes and lip developments. Stress is identified by accepting contribution as an image from videocasings and result is additionally picture or qualities related to that picture. Picture process principally incorporates the resulting 3 stages:

- Bringing in the picture through picture obtaining devices.
- Dissecting and controlling the picture.
- Output report that is upheld picture examination.

C. Stress detection

Fig.2. and Fig.3 represents the indication of stress levels i.e., high stress and low stress respectively.

On testing stage, the CNN model got a picture arrangement from testing dataset, and yielded the anticipated articulation of

each and every casing by utilizing the last prepared network loads. Assuming the anticipated picture are pressure related articulations, we consider individuals is under pressure and advance notice him/her to enjoy some time off.

# Stress Detector API



# Stress Detector API



Figure.3. Indicating that the person is highly stressed

Figure.2. Indicating that the person is found less stressed

V. COMPARISON

Table.1. A brief comparison of existing systems

S No.	TITLE	KEY CONCEPTS	MERITS	DEMERITS
1	Detecting Negative Emotional Stress Based On Facial Expression In Real Time	Stress Detection; Facial Expression; Real-Time Recognition; Convolutional/ Neural Network	1. It is very easy to detect stress by using facial expression with higher performance and with less time consumption	1. Facial expressions can be suppressed or manipulated
2	Recognition Of Human Mental Stress Using Machine Learning Paradigms	Stress, EEG, Speech, Audio-Visual, Emotion, Machine Learning	1. Detect stress from electroencephalograph signals (EEG) with improved accuracy by testing various classifier.  2. Detect stress from audio-visual data by recognizing the emotion state.	1. Requires larger time for processing.  2. It consists of a complex design
3	Facial Expression Recognition System For Stress Detection With Deep Learning	Stress Detection, Emotion, Facial Expression Classification, Convolutional Neural Networks	1. In stressful work settings, FER could not only lead to timelier and reduced cost interventions, but also to more productive environments where workers could better manage their workload.	1. This will not permit to validate if the system correctly classifies stressful situations, thereby increasing the confidence in the association between negative emotions and stress.
4	Stress Detection Using Deep Neural Networks	Convolutional neural network, Emotion classification, Multilayer perceptron, Stress detection	1. Features are automatically deduced and optimally tuned for desired outcome.  2. Features are not required to extracted ahead of time.	1. Requires very large amount of data in order to perform better than other techniques.  1. No standard theory exists to guide in selecting deep learning tools.

5	Automatic Stress Detection Evaluating Models Of Facial Action Units	Stress, Facial action unit, Support vector regulation, Facial action coding system	1. The results indicate that there is specific AU relevant to stress and AU intensity are significant increase during stress leading to a more expressive human face.	1.The literature on AU stress analysis is limited, 2.AU temporal evolution was investigated achieving an average stress recognition accuracy of 75% for person-independent and 93% for person dependent analysis.
6	Stress Detection with Machine Learning and Deep Learning Using Multimodal Physiological Data	Photoplethysmography, stressors, Accelerometer, Dichotomous, Sudomotor Nerve activity, convex optimization	1.Automatically detect the stress condition of an individual by using the physiological data recorded during the stressful situations.	1.Due to the presence of lesser subjects, caution must be taken while interpreting the results.
7	Detection and Analysis of Stress Using Machine Learning Techniques	Stress Detection, Data Mining, SentiStrength, word sense disambiguation.	1.Speech disambiguation is analysed and the WSD overcomes by unigram, bigram and trigram to give better result on ambiguous words.	1.Stressed or depressed people try to be alone all the time. They avoid being active on social media, they show reluctance to talk to even close friends and relatives. It will be impossible for them to talk to strangers. So, the efficiency is poor
8	Mental Stress Detection Using Wearable Sensors and Machine Learning Techniques	Mental stress detection, machine learning, physiological signals, wearable sensor, feature extraction.	1.Data is trained using machine learning which helps automate the process of stress detection with the help of sensors.	1.The respiratory and EDA sensor module requires careful manual calibration at the beginning of each experimental session which is time consuming



9	Stress Detection Based on Human Parameters Using Machine Learning Algorithms	Decision tree, Random Forest Classifier, Decision Tree, Naive Bayes, Support Vector Machine, K-Nearest Neighbour, Machine Learning	<p>1.By adding more parameters, not only stress can be detected but also some of the disease existing in person can be identified.</p> <p>2.The rise or decrease in any of the parameter may help to detect whether the person is only in stress or is facing any sort of health issue too.</p>	1.Age parameter can be used to only recognise which age group is suffering from stress and age differs from young age to old age.
10	Stress Detection Using Natural Language Processing And Machine Learning Over Social Interactions	Decision tree, Latent Dirichlet Algorithm, Logistic regression, Machine learning, Natural Language Processing, Random Forest, Sentiment analysis, Topic modelling.	1.Paper aim to extend sentiment and emotion analysis for detecting the stress of an individual.	1.Requires very large amount of data
11	Stress Detection Using Machine Learning Algorithms	Electrocardiogram (ECG), Electromyogram (EMG), Galvanic Skin Response (GSR), Heart Rate, Machine Learning, Respiration, Stress.	1.The proposed systems have taken statistical data and have taken some attributes are Electrocardiogram, Electromyography, Galvanic skin response hand and foot, Heart Rate Respiration,which gives an accurate output.	1.Result is based on the statistical data train the dataset and compare with the threshold values and also use the classification algorithm from the machine learning techniques. Based on the threshold values the doctors will predict the person is in stress or not stress.by the ways it takes more time.
12	Machine Learning for Stress Detection from ECG Signals in Automobile Drivers	ECG signals, stress medicine, machine learning, classification, time series, physiological sensors, driving, driver monitoring	1.The results are obtained by looking at the variation in the ECG signals between states of rest and high stress in an individual	1.ECG is complex due to the constraints of the measurements requiring 16 leads and the possible imperfections of the resulting signals, which can fail to detect some heart beats.

13	Stress Detection in Working People	Stress,ECG,GSR, Machine learning,SVM , K-Nearest Neighbour (KNN)	1.Designed to enhance the generalization ability in stress detection of working individuals. 2.Automatic detection of stress minimizes the risk of health issues and improves the welfare of the society.	1.Accuracy may vary for special algorithms because, the dependency of facts is critical on implemented set of rules.
14	Machine Learning implementation for Stress Detection	Big Query, Cloud Computing, Clustering, Dynamic clustering algorithm, Google Cloud Platform, Health coaching, HRV-values, K-Means algorithm, Machine learning, Stress, Unsupervised learning.	1.The output of this project produces increased possibilities for a better performance for the stress-both in terms of being able to analyse customer data faster, and hopefully in the end, also more accurate.	1.This project is based on medical and stress related data, there is obvious risks when trying to classify and organize data points or customer characteristics into either risk groups or not.
15	Stress Prediction in IT Professional by Image Processing and Machine Learning	Machine learning, stress detection, periodic analysis, Electroencephalography (EEG), Heart rate (HR), facial electromyography (EMG), Galvanic skin response (GSR), Electrocardiogram (ECG), Blood Volume Pulse (BVP) and Electrodermal activity(EDA)	1.Stress Detection System enables employees with coping up with their issues leading to stress by preventative stress management solutions.	1.Different people may behave or express differently under stress and it is hard to find a universal pattern to define the stress emotion
16	Employing Multimodal Machine Learning for Stress Detection	Stress detection, machine learning, Artificial Intelligence, multi-modal fusion model, neural network, stress classifier	1.This model outperforms other present models, achieving state-of-the-art accuracy score, which can be credited to the use of multi-modal fusion techniques.	1.The model needs all the input parameters to produce the results and absence of any of these parameters can affect accuracy of the results produced.

17	Machine Learning Techniques for Stress Prediction in Working Employees	Stress prediction, Boosting, Bagging, Decision Trees, Healthcare, Machine Learning	1. Offers comfortable workplace for employees. 2. Applying ML techniques to analyse stress patterns in working adults.	There is also a scope for formulating a scoring system for different attributes based on their importance to create a uniform scale to measure the stress levels of an individual
18	Activity-Aware Mental Stress Detection Using Physiological Sensors	Mental stress, electrocardiogram, galvanic skin response, physical activity, heart rate variability, decision tress, Bayes net, support vector machine, stress classifier.	1.Data is collected from real-time sensors and a data set is created for different ages and male and female users.	1.Chronic stress can be detrimental to both physical and mental health. It is a risk factor for hypertension and coronary artery disease.
19	Survey on Data Mining Approaches for Healthcare	Convolutional neural network, Emotion classification, Multilayer perceptron, Stress detection	1. Features are automatically deduced and optimally tuned for desired outcome. 2. Features are not required to be extracted ahead of time.	1 Requires very large amount of data in order to perform better than other techniques. 2. No standard theory exists to guide in selecting right deep learning tools
20	Real Time Stress Using CNN	Kera's, OpenCV, Convolutional Neural Networks (CNN), TensorFlow, Facial Expression	1.The system analyse the stress levels by calculating eyebrow and lip movements using Machine Learning algorithms which generates the results that are more efficient	1.The limitation is, it is time-consuming and a bit expensive

VI. CONCLUSION

This work is helpful for the prosperity of one's psychological wellness. Stress is a developing issue in our general public, and these days work issues, including high jobs and need of variation to consistent changes, just deteriorate the issue. Individuals are experiencing medical issues got from too high feelings of anxiety, while significant misfortunes of cash are inspired in endeavours. Accordingly, it is essential to screen feelings of anxiety constantly to recognize pressure in its beginning phases and forestall the unsafe long-haul results. The requirement for the administration of constant pressure in people raised the idea of stress location. In this paper, we proposed a continuous pressure discovery system created by

face identification module, where the look is examined and discourse signal module where sound signs are dissected, likewise give highlights where the client can perform video conferencing with accessible specialists. The proposed approach is a decent beginning stage towards pressure recognition to work on the personal satisfaction. Moreover, stress is a creating issue in our overall population, and nowadays work issues, including high positions and need of variety to steady changes, simply weaken the issue. People are encountering clinical issues got from too high sensations of nervousness, while huge mishaps of money are propelled in attempts. Appropriately, it is fundamental for screen sensations of tension continually to perceive strain in its starting stages and hinder the perilous long stretch outcomes.

The necessity for the organization of consistent strain in individuals raised pressure area. In this paper, we proposed a ceaseless strain disclosure framework made by face ID module, where the look is inspected and talk signal module where sound signs are analyzed, similarly give features where the client can perform video conferencing with available trained professionals. The proposed approach is a fair early phase towards pressure acknowledgment to chip away at the individual fulfillment.

## VII. FUTURE SCOPE

The Future degree includes expansion of the regulator based equipment module to show the consequences of the constant qualities in view of the pulse, Galvanic Skin Response and respiratory sensors as indicated by the condition of the individual.

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## IX. REFERENCES

- [1] Recognition Of Human Mental Stress Using Machine Learning Paradigms - Mrs. Megha V Gupta, Research Scholar, Computer Engineering, Datta Meghe College of Engineering, .
- [2] Facial Expression Recognition System for Stress Detection With Deep Learning - José Almeida<sup>1</sup> and Fátima Rodrigues<sup>2</sup> <sup>1</sup>Polytechnic of Porto, School of Engineering, Rua Dr. António Bernardino de Almeida, Porto, Portugal <sup>2</sup>Interdisciplinary Studies Research Center (ISRC), Polytechnic of Porto, School of Engineering, Porto, Portugal.
- [3] Stress Detection Using Deep Neural Networks from The International Conference on Intelligent Biology and Medicine (ICIBM) 2020 Virtual. 9-10 August 2020.
- [4] Automatic Stress Detection Evaluating Models Of Facial Action Units - Giorgos Giannakakis<sup>1</sup>, Mohammad Rami Koujan<sup>2</sup>, Anastasios Roussos J and Kostas Marias<sup>1,3</sup>Institute of Computer Science, Foundation for Research and Technology Hellas (FORTH4CS), Greece <sup>2</sup> College of Engineering. Engineering, Hellenic Mediterranean University. Greece.
- [5] Stress Detection Through Speech Analysis -Kevin Tomba<sup>1</sup>, Joel Dumoulin<sup>1</sup>, Elena Mugellini<sup>1</sup>, Omar Abou Khaled<sup>1</sup>and Salah Hawila<sup>2</sup><sup>1</sup>HumanTech Institute, HES-SO Fribourg, Fribourg, Switzerland<sup>2</sup>AIR @ En-Japan, Tokyo, Japan.
- [6] Stress Detection with Machine Learning and Deep Learning using Multimodal Physiological Data -Pramod Bobade<sup>1</sup>Department of Computer Science and Engineering, National Institute of Technology, Karnataka Surathkal, India. Vani M., Department of Computer Science and Engineering, National Institute of Technology, Karnataka, Surathkal, India.
- [7] Detection and Analysis of Stress Using Machine Learning Techniques Reshma Radheshamjee Baheti, Supriya Kinariwala
- [8] Mental Stress Detection Using Wearable Sensors and Machine Learning Techniques SHRUTI GEDAM AND SANCHITA PAUL Department of Computer Science and Engineering, Birla Institute of Technology, Mesra, Ranchi 835215, India Corresponding author: Shruti Gedam (shrutgedam@gmail.com)
- [9] Stress Detection Based on Human Parameters Using Machine Learning Algorithms -Dr V.Sudhaa, S.Kaviyab, S.Sarikac, Dr.R.Raja...,a. Assitant Professor, Sona College of Technology, Salem, 636005, India, sudha.ece@sonatech.ac.in b,cFinal year UG, Sona College of Technology, Salem, 636005, India,kaviya.18ece@sonatech.ac.in, sarika.18ece@sonatech.ac.in Associate Professor, Muthayammal Engineering College, 637408, India.
- [10] Stress Detection Using Natural Language Processing And Machine Learning Over Social Interactions Tanya Nijhawan<sup>1</sup>, Girija Attigeri<sup>2\*</sup> and T. Ananthkrishna<sup>1</sup>
- [11] Stress Detection Using Machine Learning Algorithms V. R. Archana<sup>1</sup>, B. M. Devaraju<sup>2</sup> IPG Student, Department of Computer Science and Engineering, RNS Institute of Technology, Bangalore, India <sup>2</sup>Assistant Professor, Department of Computer Science and Engineering, RNS Institute of Technology, Bangalore, India
- [12] Machine Learning for Stress Detection from ECG Signals in Automobile Drivers N. Keshan, and P. V. Parimi Advanced Wireless Systems Research Center State University of New York at Oswego Oswego, NY 13126, USA patanjali.parimi@oswego.edu I. Bichindaritz Computer Science Department State University of New York at Oswego Oswego, NY 13126, USA ibichind@oswego.edu
- [13] Stress Detection in Working People Sriramprakash.S\*, Prasanna Vadana. D. O. V. Ramana Murthy <sup>a</sup>Department of Electrical and Electronics Engineering Amrita School of Engineering Coimbatore, India
- [14] Machine Learning implementation for Stress Detection- N. Madjar, F. Lindblom, Bachelor Thesis in Computer Science and Industrial Engineering and Management, Stockholm, Sweden 2020.
- [15] Stress Detection in IT Professional by Image Processing and Machine Learning- S.V. Pavan Kumar, Gogula Mounika, Immadisetty Pavithra, Uppu Kalpana, Kanamarlapudi Alekya, Sagabala Parameswara, Dept of Cse, Krishnachaitanya Institute of Technology & Sciences.
- [16] Employing Multimodal Machine Learning for Stress Detection Rahee Walambe<sup>1,2</sup>, Pranav Nayak<sup>1</sup>, Ashmit Bhardwaj<sup>1</sup> and Ketan Kotecha<sup>1,2</sup> <sup>1</sup>Symbiosis Institute of Technology, Symbiosis International (Deemed University), Pune 411215, India. <sup>2</sup>Symbiosis Centre for Applied Artificial Intelligence, Symbiosis International (Deemed University), Pune 411215, India.
- [17] Machine Learning Techniques for Stress Prediction in Working Employees -U Srinivasulu Reddy Assistant Professor, Machine Learning and Data Analytics Lab, Department of Computer Applications, National Institute of Technology, Trichy Aditya Vivek Thota B.Tech., ECE, National Institute of Technology, Trichy A Dharun B.Tech., ECE, National Institute of Technology, Trichy.
- [18] Activity-Aware Mental Stress Detection Using Physiological Sensors Feng-Tso Sun<sup>1</sup>, Cynthia Kuo<sup>1,2</sup>, Heng-Tze Cheng<sup>1</sup>, Senaka Buthpitiya<sup>1</sup>, Patricia Collins<sup>1</sup>, and Martin Griss<sup>1</sup> <sup>1</sup>Carnegie Mellon University {lucas.sun, hengtze.cheng, senaka.buthpitiya, patricia.collins, martin.griss}@sv.cmu.edu <sup>2</sup>Nokia Research Center cynthia.kuo@nokia.com
- [19] Survey on Data Mining Approaches for Healthcare
- [20] Real Time Stress Using CNN [1] A. Srinivas, [2] Sruthi Lanka, [3] Vijaya Varshini Kallepalli, [4] Divya Kalla, [5] Sruthi Nukala, [6] Shailaja Preethi Molleti [1] Assistant Professor, Department of Computer Science and Engineering, Vignan's Institute of Engineering for Women, Kapujaggarajupeta, Visakhapatnam, AP. [2][3][4][5][6] Student, Department of Computer Science and Engineering, Vignan's Institute of Engineering for Women, Kapujaggarajupeta, Visakhapatnam, AP