RECOGNITION OF HUMAN MENTAL STRESS USING RANDOM FOREST AND SVM

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Abstract: Human mental pressure is a significant issue these days, particularly among adolescents. The stress may the body both physically and mentally. Due to this type of stress the individuals may come across some problems like chronic stress and may affect their mental health. In this paper, human mental stress is identified by collecting their data sets. The data sets are being collected, processed, tested with feature extraction. Mental stress accuracy is calculated from support vector machine and random forest algorithm. These two algorithm are on the best algorithm in machine learning. Predicted data sets are processed using JAVA and identified mental stress of human. Consistently a huge number of individuals experience the ill effects of sadness and not many of them get legitimate treatment on schedule. In this way, it is critical to distinguish human pressure and unwinding naturally by means of web-based media on an opportune premise. It is vital to recognize and oversee pressure before it goes into a serious issue. A colossal number of casual messages are posted each day in person-to-person communication destinations, web journals and conversation discussions. Stress increments these days prompts numerous issues like despondency, self-destruction, coronary episode, and stroke. In this paper, we are ascertaining the psychological pressure of individuals using their ECG report. Two calculations Random Forest and SVM are applied and the stress levels are utilized as an exhibition boundary. The exactness and execution of information are additionally upgraded by applying 10-Fold cross-approval.

Keywords: SVM, Random Forest, Mental Pressure, ECG.

1. INTRODUCTION

Mental stress is a major issue nowadays among everyone, which may lead to many problems like depression, suicide, stroke and heart attack. In the current days, circumstance stress is most quickly expanding. This is the reason individuals are disturbed regardless of thriving. Stress is a compressed inclination. The pressing factor can be either enthusiastic, physical or even mental. Any idea, any circumstance can cause pressure, which is found in every single character. To dissect pressure of the relative multitude of humans at various focuses of their life. This type of stress may cause chronic illness which may lead to abnormal activities of individuals in their everyday life. The predictions of stress can be analysed using brain sensors and smart wearable devices. As these devices cost high developers go with image processing and machine learning. Over the year machine learning has played a vital role in predictions. The predictions are in form of different categories. The predictions are analysed using machine learning algorithm. In this stress prediction we have used SVM (Support Vector Machine) and Random forest algorithm. There are different types of stress which includes emotional stress, environmental stress, relational stress, work stress. The effects emotional stress may cause poor concentration, lack of relationship troubles. The high impact of mental stress needs to get necessary treatment to maintain a healthy life.

2. RELATED WORK

Ankita patil, et al, proposes an enhanced stress detection for IT professionals using machine learning. This is developed using MATLAB which is application based with an efficient GUI. Where this application will be capturing the face expressions of the IT professionals working infront

of the computer system. The proposed methodology leads to increasing time to reach the optimal solution.

Khalid masood, et al, introduced a modelling mental stress detection using deep learning. In this proposed method where the stress level can be detected using brain sensor at any certain point. This system uses hardware components like brain sensor, EDA sensor for stress detection. The cost of the brain sensor is high where it is not affordable for everyone to buy and test their stress level when in need.

Megha V Gupta, et al, discussed the recognition of human mental stress using machine learning paradigms. This system is easy to implement and can deal with continuous data, but it will be slower in progress when it comes to continuous data which need to be analysed.\

Norizam sulaiman, et al, introduced an evaluation conducted between human stress questionnaires with the power spectrum of alpha and beta band. The PSS stress scale was used as stress questionnaires. The EEG recordings were carried out immediately after answering the stress questionnaires. The score from the stress questionnaires were calculated with the ratio of band power.

Murad Shibli, et al, designed a system consists of two transducer, micro-controller chip along with LCD display along with interfacing circuits. An simple algorithm was developed to classify and measure the human stress conditions. This system identifies three states of stress namely Stressed, half stressed and relaxed. The simple classification rule can detect and examine 60% of stress.

B. Padmaja, et al, developed a system to evaluate in a real time environment by gathering data from IT sectors and other sectors in india. It uses a physical activity tracker device developed by FITBIT, which works on a real time environment.

3. PROPOSED WORK

In this proposed model, the mental pressure is recognized by gathering the informational collections of dataset. we have used Random Forest and SVM to identify the increasing stress level among individuals and to predict the stress beforehand and be able to predict the major damage to their life before happening. This model includes Previously trained dataset collection, pre-processing, feature extraction and applying machine learning algorithm. In this system ECG and RESP values are taken from dataset and the stress levels are detected using some machine learning algorithms like Random Forest, Support Vector Machine. This calculation are on the best calculation in machine learning. Anticipated informational indexes are handled utilizing JAVA and distinguished mental pressure of people. we utilized ML to distinguish the expanding feeling of anxiety in the understudies and to anticipate the pressure already and have the option to stop the significant harm to their life prior to occurring. The degree of stress was affirmed by the endeavour execution. The proposed model incorporates ECG dataset assortment, pre-handling and highlight extraction and applying ML calculation (Random Forest, SVM) and looking at them on two execution parameters. We tracked down that out of the proposed calculations SVM is performing better as its mathematical method of arrangement and measure of information is likewise less. Analysing and discovering the dataset with more exact outcomes and less expense can help improve the psychological well-being of people and make our kin intellectually solid. ML finishes the assignment of gaining from information with explicit contributions to the machine. It's critical to comprehend what makes Machine Learning work and, hence, how it very well may be utilized later on. The Machine Learning measure begins with contributing preparing information into the chose calculation. To test whether this calculation works accurately, new information is taken care of into the Machine Learning calculation. JAVA is an undeniable level language, which implies that java code is written into a great extent. The significant level nature and clear language structure of java make it an important device for any individual who needs to figure out how to program. Here we have used java environment to work with and to get desired output.

3.1 Classification architecture design

In this process, the human ECG report are taken from the pretrained dataset and are being trained and tested. The trained and tested data are classified using random forest and SVM algorithm, also the accuracy of the stress levels are calculated. The testing data are prepared according to the quality, assortment, and amount of the preparation information decide the achievement of your ML models. The structure and substance of the preparation information frequently alluded to as marked or human named information or ground truth dataset is intended for to prepare explicit ML models with an end application in context. This data sets consist of target, ECG, EMG, Foot GSR, Hand GSR(MV), HR (BPM) and RESP (MV). Here we use ECG and RESP values which will be processed using support vector machine and random forest algorithm to identify Mental stress.

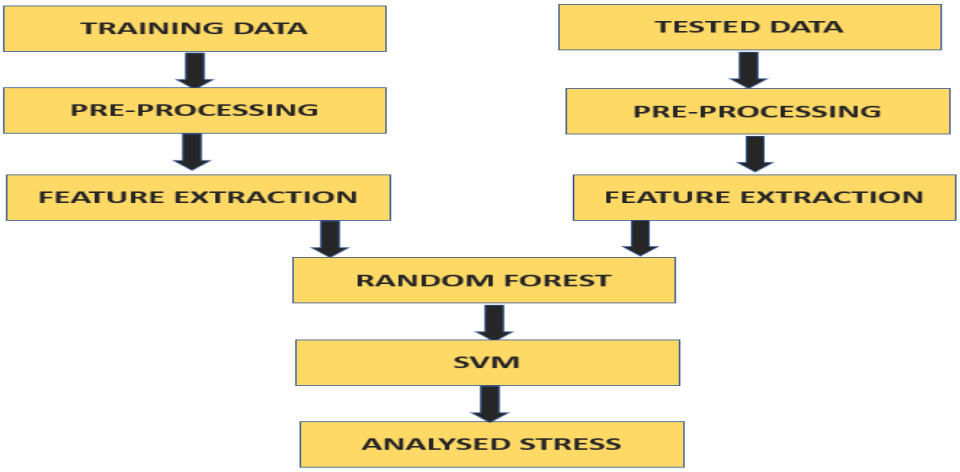

Figure 1 Architecture of stress detection

4. RESULTS AND DISCUSSIONS

The development of the proposed model is done by using JAVA and machine learning. In the proposed system, we have enhanced algorithms like random forest and SVM to detect the stress levels. The simulation of the proposed model is done by using JAVA environment. In the proposed system we have detected the mental stress level of the human using ECG and RESP values, from pretrained dataset.

4.1 Training data and Testing data

In the training data, the dataset values get trained according to the input values given. And the quality, variety, and quantity of the training data determine the exact outcome. For the testing data the trained dataset values get tested accordingly.

	ECG	EMG	HR	RESP	Seconds
0	-0.001974	-0.004737	77.815789	10.801842	12.529684
1	0.002935	-0.004457	101.978261	10.750609	30.503500
2	0.006745	-0.003426	104.957447	10.557234	52.523021
3	-0.004043	-0.002532	87.702128	10.640128	74.402170
4	0.012745	-0.004426	88.829787	10.699319	96.219617

Figure 2 Trained sample dataset

4.2 Pre -processing and Feature Extraction

Trained data sets will be pre-processed by cleaning, mixing and changing the data to produce best parameters set which include accuracy, target, min max scaling through machine learning. Where pre-processed data will undergo feature extraction which shows detailed classification report. The machine automatically learns the train data by tested data for feature extraction. It is a unique type of feature extraction to get tested data for identification of mental stress.

4.3 Home Page

The home page in the proposed system has been improved than the existing system. Here in this page there are two fields where ECG, RESP values are entered for search. The values are entered and pre-processing is done accordingly, where the input of data separation is done.

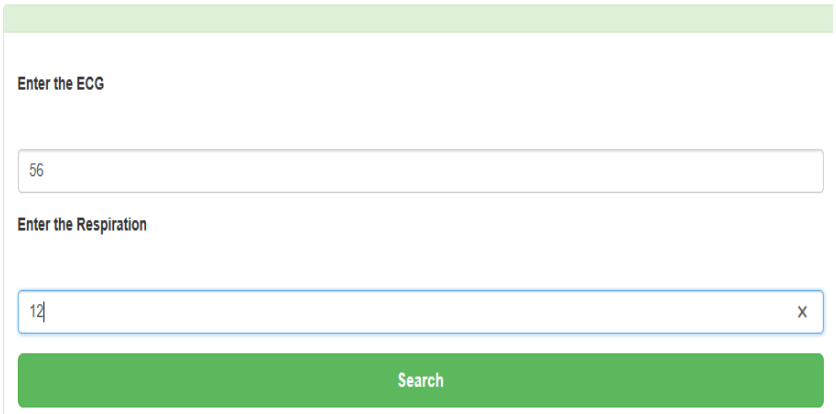

Figure 3 Home page

4.4 Stress Prediction

In this page when the values entered matches with the dataset the list of people with the same heart rate with their stress level displays. For the prediction of stress level we have used their age, gender, height, weight, heartrate. The level of stress differ for each and every person according to their height and weight. The stress level ranges from 0 to 25 is resting state where 26 to 51 is low stress, 52 to 75 is medium stress and 76 to 100 is noted as high stress. In figure 4 the prediction of stress is analysed for the people under the same heart rate category. As such different ECG, RESP values can be used for stress detection.

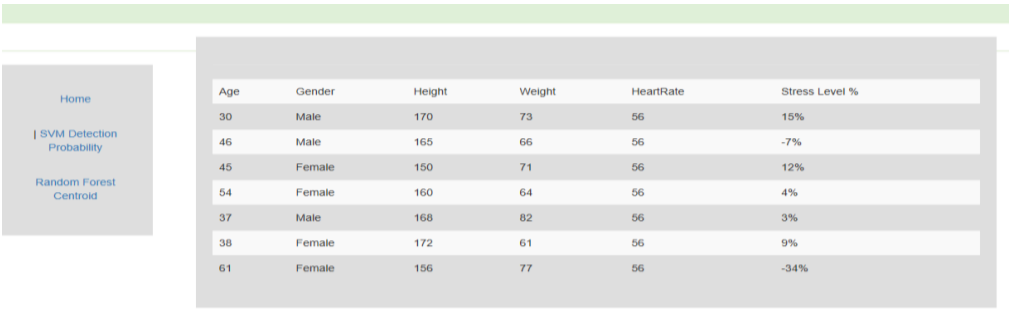

Figure 4 Stress Prediction

4. 5 SVM Detection probability

The SVM detection probability graph denotes the stress level in form of bar graph, where the age is considered as the main factor. The maximum and minimum age peak is calculated and analysed in form of graph, where same heart rate peoples are clustered into a group. Here the stress detection is calculated based on SVM algorithm.

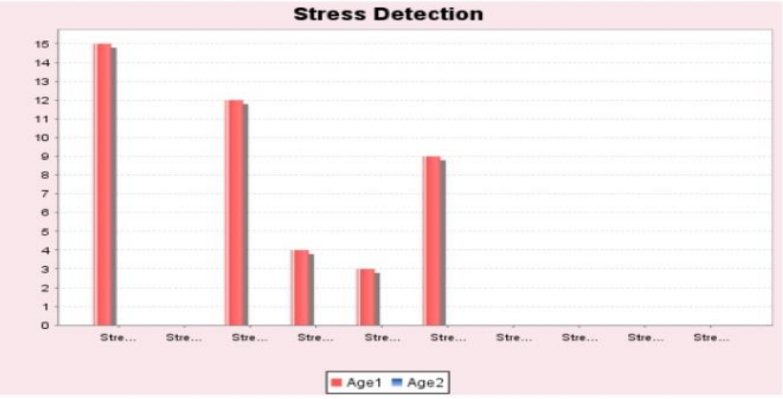

Figure 5 SVM Detection probability

4.6 Random Forest Centroid

In the random forest centroid detection it denotes the stress level in form pie graph, where the duplication values are removed using the random forest algorithm. The graph gets change according to the input values given by the user. The centroid graph is divided into clusters according to the similar heart rate. peoples are clustered into a group.

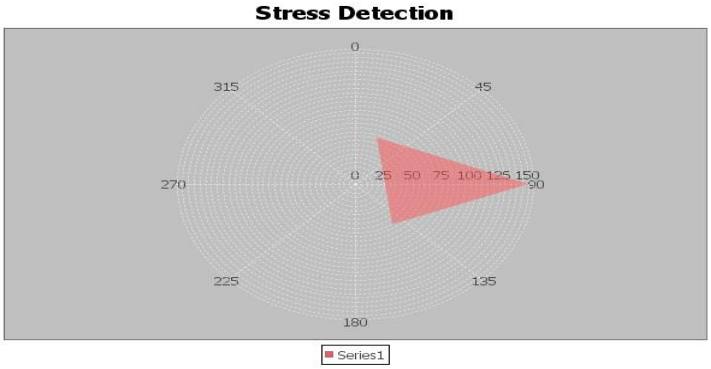

Figure 6 Random Forest Centroid

5. CONCLUSION

The anxiety and therefore the stress of the human could be a column stone in characterizing of any framework's convenience and its effectiveness. We have proposed a system for human stress detection using machine learning algorithms like random forest and SVM. The goal of this work is to detect the stress among individuals and to stop the major damage to their life before happening. Stress likewise depends upon the manner followed by the shopper for instance from issue to arrangement or the opposite manner around. Characterizing the sensation of tension of the shopper one will prepare the framework

in order that it could not simply acknowledge the shopper's level however will likewise modify itself fitly consequently to expand the convenience of the framework and moreover decreasing the pressure of the shopper later increasing the client fulfilment.

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