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STRESS DETECTION USING MACHINE LEARNING AND IMAGE PROCESSING

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ABSTRACT

Stress is a major health issue that imparts major impact on the stability of mind. With the extension of various social media platforms, an expansion of number of different platforms enabled people to interact and share their experiences. These provided a large dataset for identification of common traits among depressed people and identify them using various machine learning algorithms. The limit to which we can identify the depressed traits of the person is necessary to determine the level of depression. The classification plays a major role in determining the kind of help a depressed person needs and also, the person with suicidal thoughts need to be identified and helped according to his condition. Machine learning has been introduced into the medical field as a means to provide diagnostic tools capable of enhancing accuracy and precision while minimizing laborious tasks that require human intervention. There is mounting evidence that the technology fueled by ML has the potential to detect, and substantially improve treatment of complex mental disorders such as depression. By developing a framework capable of detecting depression with minimal human intervention: Artificial Intelligence Mental Evaluation, it is possible. AiME consists of a short human-computer interactive evaluation and artificial intelligence, namely deep learning, and can predict whether the participant is depressed or not with satisfactory performance. Due to its ease of use, this technology can offer a viable tool for mental health professionals to identify symptoms of depression, thus enabling a faster preventative intervention. Furthermore, it may alleviate the challenge of interpreting highly nuanced physiological and behavioral biomarkers of depression by providing a more objective evaluation. Thus this seminar will be useful in providing information about the use of machine learning techniques in the analysis of depression detection.

Keywords: Facial Expressions, K- Nearest Neighbor Classifier, Stress, Stress Prediction.

I. INTRODUCTION

Stress management systems are necessary for detecting stress levels that affect our socio-economic situation. According to the World Health Organization, stress is a mental health disorder that affects one out of every four people (WHO). Mental and financial troubles, as well as a lack of clarity at work, bad working relationships, despair, and, in extreme situations, death, are all symptoms of human stress. This necessitates the pro- vision of therapy to help stressed people manage their stress. While it is impossible to totally eliminate stress, taking preventative measures may help you cope. Only medical and physiological peoples can now deter- mine whether or not someone is de- pressor (stressed). A questionnaire is one of the most used methods for detecting stress. This technique relies primarily on individual responses; people will be hesitant to communicate whether or not they are worried. Automatically detecting stress lowers the likelihood of health problems and improves society's well-being. This involves the creation of a scientific approach for assessing stress levels in people using physiological markers. Since stress is such a significant societal contribution, a variety of approaches for detecting it have been investigated. It enhances people's quality of life, according to Ghaderi Tal. Stress was assessed using data from respiration, heart rate , face electromyography , Galvanic skin response foot, and GSR hand, with the finding that parameters related to the respiratory process are critical in stress detection. Maria Vituperate al. present a method for anticipating mental stress that relies only on GSR as a physiological sensor and uses a standalone stress detecting device. Electrocardiograms alone were utilized by David Liu and colleagues to predict stress levels . The effectiveness of multimodal sensors in detecting stress in

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working individuals is investigated experimental- Sensor data from pressure distribution, heart rate, blood volume pulse , and electro dermal activity is used in this investigation . In addition, an eye tracker sensor is used, which analyses eye movements in connection with stressors such as the Stroop word test and information regarding pick-up tasks.

II. METHODOLOGY

Stress Detection in social media by Analyzing User's Sentiment

For this problem statement our aim is to predict early signs of depression through Social Media text mining and sentiment analysis. In Machine Learning, there are many ways for sentiment analysis such: decision-based systems, Bayesian classifiers, support vector machine, neural networks and sample-based methods. After reading some papers about using different Machine Learning and artificial intelligence techniques to detect depression on social media, I decided to apply sentiment analysis through a powerful theorem from probability theory called Bayes' Theorem. The model will be written in python and it will tell whether a given tweet is depressive or not. The aim of sentiment analysis for depression based on Twitter posts is to analyze linguistic markers in social media posts and creating a model that can give an Invidia insight into user's mental health.

Sentiment Analysis:

Sentiment is an opinion or view that is based on an exaggerated feeling of something (contrary to the judgment of the mind). Every human being will generally express a response related to an event / situation based on his experience which is the cumulative result of the thought process to the input that has been received by him so far. These responses can generally be categorized into three major groups, namely positive, negative and neutral. Sentiment Analysis itself is one of the techniques in extracting information in the form of views (Sentiment) of a person towards an issue or event. Sentiment analysis can be used to uncover public opinion on an issue, service satisfaction, policy, stock price prediction and competitor analysis based on textual data. However, the phenomenon exponential growth of data to be new challenges in the sentiment analysis process. Approach conventional is no longer the right answer to reveal and determine the type of sentiment in the textual data. Employing humans to classify types of sentiment from a textual data set that is very large and varied. To categorize stress, the suggested System Machine Learning techniques, such as KNN classifiers, are used. The employee's picture is provided by the browser, which acts as input, and Image Processing is employed at the first step for detection. Picture processing is used to improve an image or extract relevant information from it by converting the image to digital form and executing operations on it.

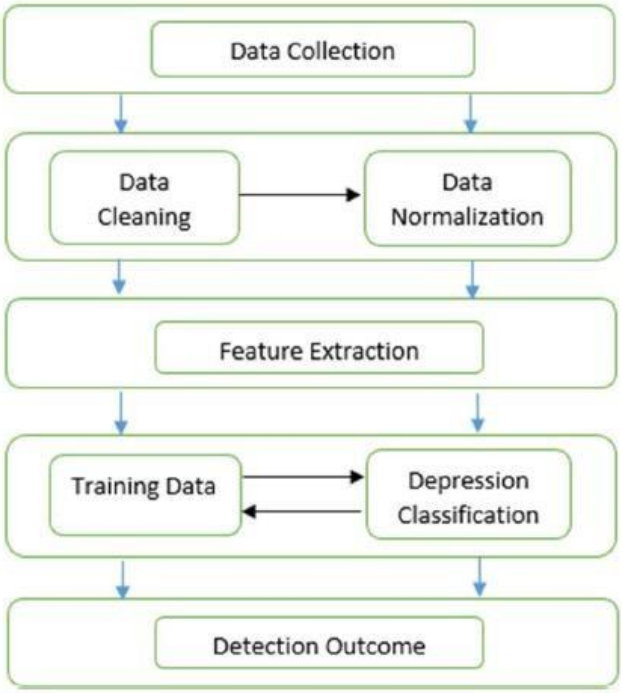

Fig 1. Proposed framework

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By taking an image as input and producing an image or image- related qualities as output. On the rounder box, the emotions are represent- ed. Angry, Disgusted, Fearful, and Sad are all stress indicators. no small cost. Imagine if we had 100,000 thousand tweets per day which must be determined one by one based on one kind of sentiment, definitely not only need a long time, but also requires a lot of very large resources. Therefore, a new technique is needed to sentiment analysis that can automatically extract information from data quickly and be responsible.

III. MODELING AND ANALYSIS

Machine Learning: K-Nearest Neighbors (KNN) is a classification and regression analysis algorithm. It's a supervised learning system for determining whether or not a person need therapy. The dependent variable is classified by KNN based on how similar it is to a comparable instance from previously collected data. KNN A statistical model with a binary dependent variable is known as classification. KNN is used to estimate the parameters of a KNN model in classification analysis. A bi- nary KNN model, mathematically, contains a dependent variable with two potential values, which is represented by an indicator variable, with the two values labelled "0" and "1".

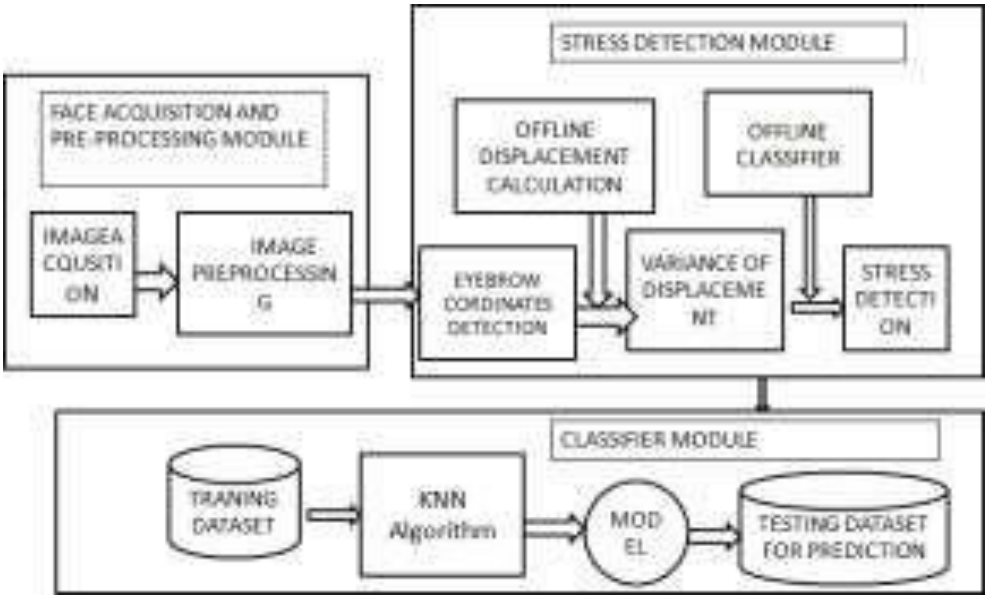

Fig 2: Architecture

Data Pre-process: Dataset contains a grid view of an existing dataset with numerous proper- ties; however, Property Extraction produces a newly designed dataset with only numerical in- put variables as a result of Principal Component Analysis feature selection, which transforms to six principal components: Condition (No stress, Time pressure, Interruption), Stress, Physical Demand, Performance, and Frustration.

IV. RESULTS AND DISCUSSION

This research article focuses on emotional procedure, language base, and temporal features for the prediction of data analysis as an online web media post. The separate classifiers can perform independently such as decision tree, support vector machine, Random Forest, Naïve Bayes method, and our proposed hybrid techniques combined with probability statistics. Image capturing is automated, so it collects photographs whenever a typical behavior occurs. The detecting of system will be fooled. If the picture is distorted while being captured, the system will provide incorrect findings. Continued picture capture results in massive, useless datasets. Detection will become more time demanding or incorrect as a result of the auto collected picture datasets.

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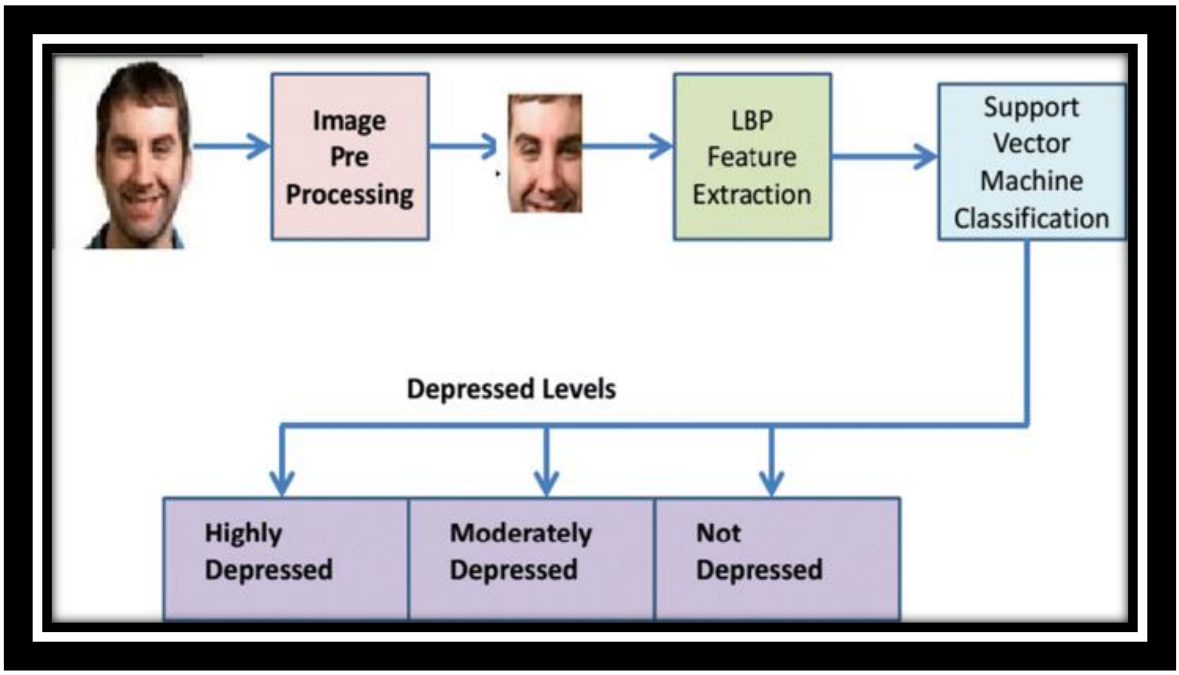

Fig 3: Final Result

It adversely affects the physical health of a patient, such as increased aches and pain, insomnia or oversleeping and weight problems. According to the Harvard Mental Health Letter, Heart disease is linked to Depression. Recurrence of cardiovascular problems is linked more closely to depression than to smoking, diabetes, high blood pressure, or high cholesterol. If untreated, depression raises the risk of dying after a heart attack.

V. CONCLUSION

In our project we detect Stress and avoid breakdown tendency. We use system camera to detect person face using Haar Cascade algorithm. The person face expression images use as dataset which will gives results that shown beat-to-beat accuracy of person stress. Text based emotion ML model has successfully been applied to the task of depression detection using Twitter data. The results delivered in this report are at par with the previous results achieved in this domain. Supervised learning classification have a limitation and cannot grant a human level accuracy in prediction of depression through text data. Moreover there is significant noise in the Tweets collected before pre-processing, which eliminates about a third of the data due to third person and news references. In future, a layer of expert-based suggestion can be added to the model to reduce number of false positives. This would increase the precision of sentiment analysis for Stress detection.

VI. FUTURE DIRECTIONS

In future, we are intrigued to expand the work with some profound learning models, for example, Neural Networks or convolution neural networks or the use of stacked LSTMs coupled with CNN. We plan to go beyond mobility features and explore detecting depression using smartphone-sensed data types and modalities including voice, social interactions, smartphone communication patterns, and browsing patterns. We also plan to apply our approach to smartphone sensing of other ailments such as Traumatic Brain Injury (TBI or concussions) and infectious diseases. We plan to explore the robustness of our approach by applying it to depression data gathered from other user populations. Future research can use larger datasets which is more significant to the target with the context of depression as well as adding tuning features to model parameters to compare each parameter which one is the nicest to wear. Accuracy in the use of the Naive Bayes algorithm is more higher than using the Support Vector Machine because more datasets are used. Besides that, misclassification occurred in Support Vector Machine due to the weight value in the test data has similarities with positive training data weight value. This results in data that should be classified as negative data misinterpreted by the Support Vector Machine. This accuracy level can also be increased by adding data for training and also by balancing the ratio between positive classes and negative, with a minimum difference ratio of 3:7.

We can also implement a depression detector model in a wearable device (Apple Watch, Garmin) or home device (Amazon Echo). That device could prompt us to answer a simple question in the morning and a simple question before bed on a daily basis. This model could store our predicted depression score and track it over time, such that the model can learn from our baseline (using a Bayesian approach). If a threshold is crossed, it will notify us to seek help, or in extreme cases, notify an emergency contact to help us help ourselves.

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