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Stress Prediction Via Keyboard Data

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Abstract - *Stress is one of the most pressing challenges in today's society. It's possible for people to be unaware of their stress levels. It's vital to recognize stress early and precisely. In this scenario, stress detection could be postulated as a classification problem. A classification technique for stress prediction is put forth in this research. Furthermore, the suggested machine learning framework has been used to predict the stress levels of computer users using keyboard data. Two distinct phases of the experiment comprised the acquisition of various physiological parametric data, which was then interpreted through an effective machine learning framework. Individuals can avoid a variety of stress-related medical conditions by utilizing the multimodal dataset recorded from wearable physiological and motion sensors in this paper's suggestion of numerous machine-learning algorithms for stress identification in humans. A healthcare dataset is mined for information on sensor modalities, such as blood pressure, body temperature, oxygen levels, and pulse rate, for the two physiological conditions of stress and non-stress states. Two-class (stress vs. non-stress) classification accuracy has been assessed using machine learning algorithms like KNN and Euclidean Distance.*

***Key Words*: Euclidean Distance, KNN, Stress prediction.**

1. INTRODUCTION

Stress is the body's reaction to a stressful circumstance that is marked by high anxiety or pressure. Stress may be defined clinically to encompass severe mental health conditions like depression or anxiety attacks. Stress is a psycho-physiological condition that causes a person tremendous pain and suffering. Everybody experiences times of stress in their daily lives. It acts as the body's emergency escape mechanism. But stress turns unhealthy at a certain point. On the other side, it starts to have a detrimental effect on a person's health, emotional state, productivity, and quality of life. Stress.

1.1 Motivation

In general, a mismatch between situational needs and a person's incapacity to take advantage of challenging circumstances can lead to stress. The complex homeostasis or equilibrium of the human is challenged by the presence of many states, which can be restored by a number of distinctive adaptive response mechanisms coordinated by the central nervous system (CNS). The term "stress response system" is used to describe it. Work pressure is one of several reasons that might lead to stress, bereavement, a traumatic incident, etc. Extreme stress decreases productivity at work and results in a number of ailments and negative emotions. Multiple internal organs are harmed by ongoing stress, leading to a wide range of illnesses. Epithelial, gastrointestinal, musculoskeletal, cardiovascular, and mental illnesses are brought on by these conditions. The effort to foresee diseases before they appeared emerged as a result.

In the past, they conducted their research on stress prediction in a lab setting. On the other hand, current research is concentrating on creating non-invasive strategies to predict stress using wearable technology. Because stress patterns vary greatly from person to person and are highly subjective, stress prediction models typically do not produce accurate results. Person-dependent models may thus achieve greater accuracy. These models, however, need to be trained using information gathered over a comparatively longer time frame.

1.2 Need of the topic

In general, a mismatch between situational needs and a person's incapacity to take advantage of challenging circumstances can lead to stress. The complex human homeostasis or balance is challenged by the condition of difference, which can be restored by a variety of exceptional adaptive response mechanisms coordinated by the central nervous system (CNS). A stress response mechanism is what is being used here. Numerous things, such as work pressure, sadness, a traumatic experience, and others, can lead to stress. Extreme stress decreases productivity at work, as well as causing a number of ailments and unfavourable feelings. Multiple internal organs are harmed by ongoing stress, leading to a wide range of illnesses.

Epithelial, gastrointestinal, musculoskeletal, cardiovascular, and mental illnesses are brought on by these conditions.

This has led to efforts to foresee diseases before they manifest. Research on stress prediction has typically been done in a lab setting. On the other hand, current research is concentrating on creating non-invasive strategies to forecast stress using wearable technology. Because stress patterns are highly subjective and differ from person to person, stress

prediction models typically do not produce accurate findings. Person-dependent models may therefore be more accurate. However, these models need to be trained using information gathered over a comparatively longer time frame.

2. Literature Survey

According to [1] a brand-new supervised learning model that naturally supports these features for text classification. SS3 was created to be a broad framework for addressing ERD issues. On the CLEF's eRisk2017 pilot challenge for early depression identification, we assessed our model. The majority of the 30 submissions to this competition utilised cutting-edge techniques. For the knowledge base of these intelligent systems, knowledge engineers are typically required to manually code all the facts and regulations obtained from human specialists through interviews (KB). Nevertheless, this manual method is exceedingly costly and prone to mistakes because a genuine expert system's knowledge base (KB) has thousands of rules.

According to [2] the automatic detection of depressive symptoms in text messages from Russian VKontakte users. We outline the process of creating a dataset of user profiles and suggest psycholinguistic and stylistic indicators of depression in literature. We assess machine learning techniques for identifying depressive symptoms in social media posts. accomplished a sadness detection task using text messages from 1020 users of the Russian-language social network Vkontakte. We created a sample of 248 users' posts collections with binary depression/control group classification by examining Beck Depression Inventory scores and processing the raw data. We extracted fresh psycholinguistic features from user writings and formed tf-idf and dictionary-based feature sets.

According to [3] the scraped data obtained from SNS users is processed using machine learning. Depression may be more easily and effectively detected using Natural Language Processing (NLP), categorized using Support Vector Machine (SVM) and Naive Bayes method. An isolating hyper plane serves as the formal identifier of a Support Vector Machine (SVM), a discriminative classifier. In other words, the method produces an ideal hyper plane that classifies new models given tagged training data (supervised learning). This hyper plane may be a line that divides a plane into two portions in two-dimensional space, with one class on each side of it. The term "naive Bayes classifiers" refers to a group of characterization methods based on the Bayes theorem. It's a single method, or rather a collection of algorithms, where each algorithm adheres to a common criterion, such as the requirement that any two highlights in a group be independent of one another.

According to [4] a systematic literature review (SLR) is a procedure for locating, evaluating, and interpreting the sources that are accessible in order to provide responses to a number of research questions. It is possible to detect depression early on social media due to the existence of specific characteristics in how these subjects use their social media, according to analysis done to address questions about text-based mental illness detection based on the social media activity of people with mental disorders. This SLR discovered that the majority of studies employ deep learning models like RNN on the early diagnosis of depression cases because to the limited availability of data, despite the little quantity of research utilising a text-based technique.

According to [5] Reddit users' postings to see if there are any indicators that might show how relevant online people feel about depression. To do this, we train the data using Natural Language Processing (NLP) methods and machine learning techniques, and then test the effectiveness of our suggested strategy. We find a vocabulary that is more prevalent in narratives of depression. The results demonstrate that the performance accuracy of our suggested strategy may be greatly increased. Bigram, along with the Support Vector Machine (SVM) classifier, is the best single feature for detecting depression with 80% accuracy and 0.80 F1 scores. The Multilayer Perceptron (MLP) classifier has the best performance for depression identification, thereby demonstrating the power and usefulness of the combined features (LIWC+LDA+bigram)..

3. Proposed Methodology

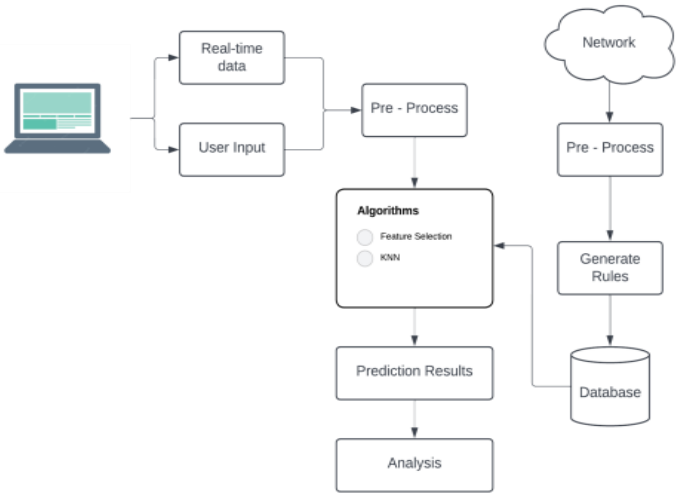

Fig-1 System Architecture

The input provided to the system is a summation of real-time data and user input data. The real-time data consists of parameters such as typing speed, error rate, whereas the user input consists of user body temperature, heart rate, etc. Upon collection the input is stored in a csv file and is further treated as the dataset. Pre-processing is done on the dataset, and it is split into training and testing data. KNN algorithm is used to train the model and further on the performance of the model is evaluated using the testing dataset. This is done iteratively to achieve a robust KNN based prediction model.

User input is then given trained model and the received output is the stress predicted. This prediction is further stored in the database and added to the existing csv file to improve the accuracy rate of the model. Simultaneously feedback is provided to the user depending upon the level of the predicted stress.

4. CONCLUSION

We have proposed a sentiment classification approach based on product aspects. The modules for this include Preprocessing Module and Sentiment Classification. The preprocessing module contains the sub-modules in the stress detection dataset, there are a lot of missing values and incorrect values like ``Null'' and imbalance attributes in the dataset. The proposed system describes personalized-based stress detection from social media. In the initial research system evaluate the system performance with this dataset and measure the accuracy. However, there is still an opportunity for enhancement, by affecting a hybrid model using various features selection approaches. In this case, in emergency cases, patients will contact the 24X7 doctor with internet technology and be notified. We can control blood pressure, body temperature, oxygen levels, and pulse rate, stress indicators and many other such parameters by the proposed system, which are essential to my exact heart health, including vascular age and cardiac index for the same.

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