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Human Stress Level Prediction using Decision-based SVM

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Abstract: Stress is the root causes of every internal problem. There are numerous ways to describe the stress situation, which has been show to have a negative impact on the human body. Hence, stress has a server impact on the life of a working professional due to advanced prospects of the operation, time, it promotes depression and anxiety traps. We use a brain signal for dissection of stress. We introduced a noisy data with smoothing wind empirical function to overcome the threat of over fitting in prognosticate target variables. SVM methods were independently trained, tested, and redounded into certain accuracy.

Keywords: EEG Signal, Data cleaning, Django server, Backend development and SVM.

1. INTRODUCTION

Stress detection insights, driven by data science and machine learning, aims to forecast stress level in individuals**.** By analyzing a variety of data sources, such as physiological measurements, behavioral data, and environmental factors, predictive models can identify patterns and risk factors associated with stress.

2. OBJECTIVES

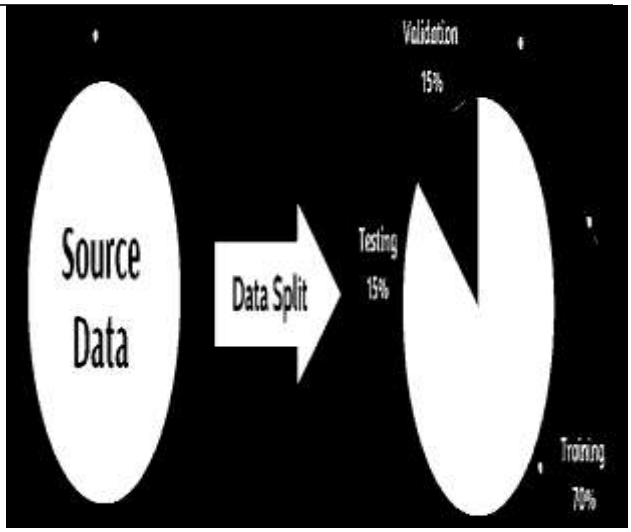
1.The stress is a supporter of depression and anxiety risks, left ignored for a long span of time. The physiological parameters help to identify the stress related issues.

2.Machine learning is one of the fast-growing areas of interest in artificial intelligence adopted by professional in every sphere of **life** that uses algorithms with data to systematically learn patterns and improve from experience.

3.METHODOLOGY

3.1 DATA PREPROCESSING

Standardize the data to ensure that each features contributes equally to SVM . Choose features that are most indictive of stress .If the stress level is categorial encode them numerically for the model.



3.2.SPLITTING DATA

Split the dataset into multiple subsets for training testing and evaluating machine learning models .It provides fair evolution of the model performance on unseen datasets.

3.3.DATA CLEANING

The process of fixing or removing incorrect, corrupted, incorrectly formatted, duplicated, or incomplete data within a dataset. The combination multiple data source, there are many opportunity for data to be duplicated .

3.4.DATA COLLECTION

The process of collecting and evaluating information or data from multiple sources to find

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answers to research problems, answer questions, evaluate outcomes, and forecast trends and probabilities.

4.EVALUATION AND OPTIMIZATION

Human stress is a physiological and psychological response to external pressures, demands, or threats. It can have a significant impact on an individual's well-being, productivity, and overall health. Evaluating and optimizing stress management involves understanding how stress is experienced, measured, and mitigated in various settings (e.g., workplaces, educational environments, daily life).

5. PSYCHOLOGICAL ASSIGNMENT

5.1. SELF-REPORT QUESTIONNAIRES

1.Perceived stress scale is commonly used scale to measure the perceived level of stress. At the same time state trait anxiety inventory as both temporary(state) and chronic(trait) anxiety levels.

5.2.HEART RATE VARIABILITY(HRV)

HRV measures the variation in time between heartbeats. Low HRV is associated with chronic stress and poor stress resilience.5.3BLOOD PRESSURE AND CORTISOL LEVELS

1.Elevated blood pressure can be an indicator of acute or chronic stress.
2.Cortisol, a stress hormone, can be measured through blood, saliva, or hair samples to assess the body's stress response over time.

5.4. ELECTROENCEPHALOGRAPHY

The EEG modality has some advantages such as high temporal resolution, low cost, and ease of use. Hence, it is the most used technique to analyze mental states including stress.

5.5. TIME MANAGEMENT AND PRIORITIZATION

Training in time management helps individuals handle work pressures and deadlines more effectively. Strategies like breaking tasks into smaller parts, setting achievable goals, and learning to delegate can alleviate stress.

6. SECTIONS

Stress management is a multi-faceted approach that involves various strategies to reduce and cope with stress, improve resilience, and promote well-being.

Figure. 1 Example for the selection process

7.DATA SOURCES FOR STRESS PREDICTION

7.1.PHYSIOLOGICAL DATA

This includes heart rate variability (HRV), blood pressure, skin conductivity, respiratory rate, and even facial muscle activity. These physiological signals are often captured using wearable devices like smartwatches, fitness trackers, and sensors embedded in clothing.

7.2. BEHAVIORAL DATA

Stress levels are often influenced by cognitive and emotional states. Data from questionnaires, interviews, or real-time self-reports (e.g., the Perceived Stress Scale) can provide insights into an individual's mental.

7.3. ENVIRONMENTAL FACCTORS

stress can also be triggered by external factors, such as noise levels, environmental temperature, or even situational stressors like deadlines and workload. Data from environmental sensors or apps that track external conditions can be used to refine prediction.

8. CONCLUSION

This stress level prediction model effectively used physiological, behavioural, and environmental data to assess stress. Leveraging machine learning, it holds potential for applications in healthcare, workspace wellness, and personal well-being. The model can be improved with more diverse datasets and refined algorithms. Future work will focus on enhancing accuracy and exploring personalized stress management solutions. This research contributes to a deeper understanding of stress and supports the development of better mental health tools. Ultimately, it aims to help individuals manage stress more effectively.

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