



Comparative Analysis Of Various Types Of Stress Test Used In Machine Learning

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	Abstract
	<p>Stress is state of worry or tension caused by a difficult situation. Sometimes stress may be positive or negative. The stress changes the behavior of person. Stress is an action in which body reacts to any kind of threat. Stress automatically effects on a person's life, family life, and social life. Stress is detected using various factors. Various supervised, and unsupervised machine-learning algorithm are being used to detect stress efficiently and effectively among a huge population. Supervised learning algorithms are used for mental stress detection, however the accuracy of the algorithm depends upon the training data. This paper reports, the various tests required for detecting stress level like Perceived Stress Scale (PSS), Holmes and Rahe Stress Scale/SRRS, Daily Hassles Scale/ Hassles and uplift scales(HUPS), Depression, Anxiety, and Stress Scale (DASS), Perceived Stress Reactivity Scale (PSRS) test.</p>
CC License CC-BY-NC-SA 4.0	Keyword: PSS, SRRS, Daily Hassles Scale, Depression, Anxiety, and Stress Scale (DASS).

1. Introduction:

Every day, everyone faces an issue: stress. Stress plays a crucial role in our daily lives.[8] The keyword stress defines the state of mental or emotional changes that are subject to pressure or tension.[6] Existing research has shown that physical and mental stress can be detected by the physiological factors and psychological factors of human beings.[2] The physiological factors, which can be detected biological or physiological sensors, usually includes Electrocardiogram (ECG), Galvanic Skin Response (GSR), Electromyogram (EMG), Respiration (RESP), Finger Temperature (FT), Skin Temperature (ST) and blood volume pulse (BVP). The psychological information focuses on various factors, usually including happiness, sadness, anger, social factors, communication patterns, increased anxiety, difficulty concentrating, changes in sleep patterns, lack of interest, etc.

2. Types of Stress Test:

Stress is defined as the physical response to excessive pressure faced by an individual. The stress could be induced due to any psychological or social scenario. Stress is harmful for human health. [10] Stress avoidance is impossible but preventive actions help to overcome the stress. Detection of stress level are very important for help in taking preventive measures to decrease the chance of a stress. [5] The supervised learning and unsupervised learning algorithms are used in many stress detection systems. Supervised learning algorithm are used in detection problem in a particular domain but the accuracy of the algorithm depends upon the data fed into machine whereas unsupervised learning algorithm focuses on spotting patterns and similar behavior problem. [7]. Many supervised learning techniques like Random forest, K Nearest Neighbor (KNN), Support Vector Machine (SVM), CNN are used. There are various types of stress test for detecting stress level like Perceived Stress Scale (PSS), Holmes and Rahe Stress Scale/ Social Readjustment Rating Scale, Daily Hassles Scale/ Hassles and uplift scales (HUPS), Stress Vulnerability Scale, Depression, Anxiety, and Stress Scale (DASS), Perceived Stress Reactivity Scale (PSRS) test. Stress level are depending on various scale factors. Human stress leads to mental as well as social factors. Questionnaire is one of the traditional method to detect stress. This method completely depends on the answers given by the individuals will be tremulous to say whether they are stressed or normal. Stress tests are categorized based on their purpose. The various tests are outlined as follows:

2.1 Holmes and Rahe Stress Scale:

The Holmes and Rahe Stress Scale, also known as the Social Readjustment Rating Scale (SRRS), is a tool developed by psychiatrists Thomas Holmes and Richard Rahe developed in 1967 consists of 43 life events. It measures stress by evaluating major life events experienced by individuals over a specific period. Each event is assigned a score, and the total score indicates the overall level of stress. The Holmes and Rahe Stress Scale is a prediction tool for measuring the amount of stress in human being. SRRS test can help you to see if you are at risk of illness due to the combined stress you face. [13]

The scale assigns a numerical value, known as Life Change Units (LCUs), to various life events based on their perceived impact on an individual's life. The total LCU score is calculated by summing the values of the selected events. Each life event on the scale is assigned a numerical value, typically ranging from a few units for less impactful events to several hundred units for major life changes.

2.2 Daily Hassles Scale:

The Daily Hassles Scale, also known as the Hassles Scale, by Psychologists Richard S. Lazarus and Susan Folkman developed in the 1980. The Daily Hassles Scale is a psychological assessment tool designed to measure the frequency and perceived severity of minor daily stressors or hassles that individuals may encounter in their everyday lives. Daily Hassles are considered to be relatively minor stressors, but their cumulative impact can contribute to overall stress and well-being. [4]

The scale was developed as part of the broader stress research to complement other stress assessment tools like the Life Events Scale. While life events scales focus on major life changes, the Daily Hassles Scale allows for the assessment of ongoing, day-to-day stressors that individuals may face. [14] The primary objective of the Daily Hassles Scale is to capture the frequency and perceived impact of common, everyday stressors.

2.3 Perceived Stress Scale (PSS):

The Perceived Stress Scale was developed by psychologists Sheldon Cohen, Tom Kamarck, and Robin Mermelste in year 1983. PSS scale used to measure the degree of stress in life. It consists of a series of questions rated on a Likert scale. The Perceived Stress Scale (PSS) is a widely used psychological instrument designed to measure the perception of stress in a human life. It is a self-report questionnaire that assesses how unpredictable, uncontrollable, and overloaded individuals find their lives. [11]

The Perceived Stress Scale typically consists of a series of questions that individuals answer based on their feelings and thoughts during a specific time frame, often in the last month. A standard version of the Perceived Stress Scale consists of 10 items, with respondents rating each item on a Likert scale ranging from 0 (never) to 4 (very often). The total scores of PSS test can range from 0 to 40, with higher scores indicating a higher level of perceived stress. PSS have different versions with different numbers of items (e.g., PSS-10, PSS-14). PSS contain self-report questionnaire, meaning that individuals provide responses based on their own subjective experiences of stress. The responses are usually on a Likert scale, ranging from 0-Never, 1-Rarely, 2-Sometimes, 3-Often, 4-Very Often.

PSS Test have two common versions: PSS-10 and PSS-14

PSS-10 (10-item version): The PSS-10 is a shorter version of the Perceived Stress Scale, consisting of 10 items. Respondents rate how often they have experienced certain thoughts and feelings during the past one or more months. PSS-10 includes questions about feeling of being in control of important things in life.

PSS-14 (14-item version): The PSS-14 is a longer version with 14 items. It is similar to the PSS-10, respondents provide ratings of how often they have experienced certain stress-related thoughts and feelings over the past month. It provides a more comprehensive assessment of perceived stress. Both items are widely used in research and clinical settings to measure individuals' perceptions of stress. Scores for each subscale (Depression, Anxiety, and Stress) are calculated independently, providing separate measures for each dimension of emotional well-being.

2.4 Depression, Anxiety, and Stress Scale (DASS):

The Depression, Anxiety, and Stress Scale (DASS) was developed by researchers in Australia, specifically by Lovibond and Lovibond in year 1995. This test measures the severity of symptoms related to depression, anxiety, and stress. It helps in identifying the specific emotional states experienced by individuals.

The Depression, Anxiety, and Stress Scale (DASS) is a widely used self-report questionnaire designed to measure the severity of symptoms related to depression, anxiety, and stress.

The DASS is a self-report questionnaire, meaning individuals rate their own experiences based on a set of statements related to depression, anxiety, and stress. There are different versions of the DASS, such as the DASS-21, which is a shorter version with 21 items, making it quicker to administer while still providing reliable results.

It's important to note that the DASS is not a diagnostic tool, and any clinical interpretation should be conducted by qualified professionals. The scale is valuable for assessing symptom severity and tracking changes over time, enabling the monitoring of psychological well-being.

2.5 Perceived Stress Reactivity Scale (PSRS):

PSRS developed by Schlotz, Yim, Zoccola, Jansen, & Schulz in 2011. Perceived stress reactivity with 6 different subscales. The author of the current study built on validation work with this scale by evaluating patterns of the convergent and discriminant validity of scores on its 6 substantially correlated subscales. [3] Examination of the relationships between the 6 PSRS subscales and other variables (personality, depressive affect, eudemonic well-being, environmental demands, and aspects of work) indicated some differentiation between the different facets of stress reactivity. [9] PSRS is a useful and easy-to-administer instrument to assess perceived stress. The PSRS may be useful when studying the combined effects of stress exposure and individual stress reactivity on disease outcomes.

3. Review Research Work:

Stress-related factors are calculated by using physiological and psychological ways. Allen D. Kanner et al. in 1981 studied spanning ten consecutive months with a community sample of middle-aged adults, researchers constructed and administered Hassles and Uplifts Scales. The study also established a modest relationship between hassles, uplifts, and positive and negative affect, offering discriminant validation in comparison to emotion measures. [1]

Women are suffering from high levels of stress. In 2022, Lorena M. Soria-Reyes et al. use PSS-10 tools for screening and comparing stress levels across various populations, including cancer patients. In this paper, analysis of the psychometric properties of the PSS-10 specifically in breast cancer patients. The findings supported a correlated two-factor structure of the PSS-10: perceived helplessness (comprising six negatively worded items) and perceived self-efficacy (comprising four positively worded items). The scores of these two factors were 0.87 and 0.73, respectively. [12]

Henrik Schou Pedersen in 2024, tried to implement model with the help of PSS. Perceived Stress Scale (PSS) is a widely used patient-reported outcome measure individual perceived stress level. Comprising ten items, with six negatively and four positively phrased, the study employed confirmatory factor analysis and analysis to evaluate the validity and reliability of two versions of the scale. The research involved 326 respondents for the PSS and 306 for the modified PSS. Results indicated that a two-factor model best fit the data for the PSS, revealing under-discrimination in the first positively formulated item. While the PSS showed higher measurement precision, both versions displayed evidence of local dependence. [15]

4. Conclusion:

This paper analyses the various test related to detect stress level. The Holmes and Rahe StressScale test is historical tool in stress research. It has some limitations and insights into the connection between major life events and stress. Daily hassles used for individually find minor stress. The Depression, Anxiety, and Stress Scale (DASS) serves as a valuable instrument for assessing symptom severity and monitoring changes overtime in psychological well-being. It is essential to note that the DASS is not a diagnostic tool, and qualified professionals should conduct any clinical interpretation. As per review, conclude that PSS test is more accurate than other test. Machine learning implementation for stress detection use of PSS test.

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