iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** V **Month of publication:** May 2024

DOI: https://doi.org/10.22214/ijraset.2024.62048

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue V May 2024- Available at www.ijraset.com

Stress and Mental Health Detection using Machine Learning

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Abstract: ***The precise determination of psychological health and stress levels substantial involvement in the course of a patient's therapy, Especially during the initial phases of the condition, it's crucial to remain vigilant as there's a potential for health risks to emerge for the patient. Deep Learning (DL) has emerged as a prevalent technique utilized to detect stress and mental health conditions, aiding in their identification. in a timely manner. Here, we provide mental health prediction utilizing KNN, Random Forest, and Logistic Regression whereas CNN for stress detection to aid in the timely identification of the illness. The website we created compiles the patient/person dataset. It aids When forecasting the outcome of the event, patient's or person's mental health and stress levels once the necessary training procedures have been completed.***

Keywords: Machine learning, Random Forest, Convolution Neural Network.

I. INTRODUCTION

Stress and Mental health issues are widespread problems that touch people all over the world and have a big influence on general wellbeing. One possible way to detect and track stress levels and mental health issues is through the incorporation Using a range of data sources and advanced algorithms, machine learning (ML) techniques can be employed to aid in the timely detection, tailored therapies, and enhanced handling of mental health issues. Diverse data sources are utilized by artificial intelligence models Created with the aim of stress evaluation and mental well-being detection.

Even though ML shows potential in detecting in the realm of mental wellness concerns, there exist a number of obstacles and moral issues that need to be taken into account. Careful consideration must be given to issues pertaining to data privacy, algorithmic prediction bias, and the possibility of unforeseen consequences. For these technologies to be used responsibly and fairly, a balance between algorithmic precision andmoral implications of mental health prediction must be found.

II. LITERATURE SURVEY

1) *Jetli Chung and Jason Teo, IEEE "Mental Health Prediction Using Machine Learning: Taxonomy, Applications, and Challenges", JAN2022*

Many algorithms and methods have been proposed, used, and examined to explore and examine treat mental health concerns. It still leaves room for improving on current solutions. Additionally, a great deal of the problems and difficulties in the area of one's psychological state's well-being have not yet been investigated and put to the test in various contexts utilizing machine learning. Considering that mental health data classification is unavoidably complicated. A recent systematicstudy Using various methods of machine learning techniques for mental health problem prediction is presented In this document. We will also talk about the difficulties, restrictions, and potential uses Utilizing machine learning within the realm of mental health. By looking through reputable databases, we gather studies and research articlesabout machine learning techniques for mental well- being concern prediction

2) *J. Vamsinath, B. Varshini, T. Sandeep, V. Meghana, B. Latha, "A Survey on Stress Detection through Speech Analysis Using Machine Learning", JUL-AUG 2022*

The aim of this test was to better understand the trends in stress detecting techniques. To accomplish or fulfill a task, perform a more comprehensive analysis, a retrospective examination of the previous years was carried out in order to witness the changing landscape. In Analyzing speech to determine stress. The importance of Extracting features and selecting models in the stress detection process are emphasized throughout this endeavor. The objective of the project is to develop a speech-based human stress detection model. We present a system based on deep learning psychological stress detection model based on voice signals. Theprimary goal is to Differentiate between presentations that induce stress and those that do not. Convolutional Neural Network (CNN), the name of this deep learning system, is made up of several interconnected layers.

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3) *Aleena Ann1, Prof. Rajitha P R2, Dr.T. Mahalekshmi 3 "Stress Detection in IT Professionals Using Real-Time Videos" DEC2021*

The paper introduces a comprehensive approach toautomatically recognizing facial emotions through the utilization in the field of visual computing and algorithms for machine learning. These computational methods are formulated to fulfill their intended purpose. to categorize eight distinct emotions. Various classification algorithms were experimented with, and the most accomplished among them was identified as support vector machines, achieving an accuracy of approximately 94.1%. The findings suggest that achieving user-independent, fully automatic, real-time coding of facial expressions in continuous video streams isfeasible with current computer capabilities, particularly in scenarios where frontal view scan be assumed using a webcam. The authors suggest that this machine learning-based system for recognizing emotions be expanded to a system based on deep learning that utilizes CNN with numerous layers. This could lead to even better results. accuracy, coming in at about 99.5%.

4) *Chang Su1, Zhenxing Xu1, Jyotishman Pathak1 and Fei Wang1 "Deep learning inmental health outcome research: a scopingreview." SEP 2020*

DL methods and algorithms have becomeprevalent in more and more popular in the healthcare and medical fields recently. This study explores the body Investigating how deep learning techniques can be applied to examine mental health results, the findings derived from this exploration highlight the usefulness and promise of DL in improving the identification and classification of the care of people with mental health issues. The paper also clarifies the many obstacles that are now in theway of making DL algorithms clinically useful for routine healthcare. It also suggests that there exists a situation where much optimism for future advances. More targeted, trustworthy, and well-reported research as well as tighter methodological requirements are needed in this arena to provide evidence in favor of NPTs. This will help validate the scope and upper limitations of the Advantages linked to various kinds of NPT.

5) *R. Swarna Malika1, Ravi "Stress DetectionUsing Machine Learning Techniques" MAR 2023*

This research investigates how different approaches Machine learning methods play a crucial role in stress detection. This study evaluates the performance of three algorithms— Decision Tree, Random Forest, and Logistic Regression—in this domain. The accuracy of each algorithm is analyzed, leading to the selection of Random Forest for stressprediction stress detection, with successful outcomes. Subsequent studies might concentrate on improving performance using extra measurements like k-fold cross-validation, which would affect improvement metrics. Furthermore, using big data technology and real- Healthcare-related temporal information agencies and businesses, it may be possible to automate the process of identifying stress. With the use of sensors, this method's streaming data enables real- time patient monitoring and stress detection performance using extra measurements like k-fold cross-validation, which would affect improvement metrics. Furthermore, using big data technologyand Live healthcare information agencies andbusinesses, It's possible that possible to automate the procedure of identifying stress.

III. PROPOSED SYSTEM

A. Problem Statement

The project aims to develop a web-based application that can detect stress and the application utilizes machine learning methods to address mental health concerns. It aims to furnish users with a platform to input text, such as journal entries or social media posts, and receive feedback on their mental health status. The system will analyze Process the text Analyze input through natural language processing. (NLP) techniques to identify patterns indicative of stress or mental health issues. Additionally, the application will provide resources and recommendations for users to manage their mental health. The objective is to establish a user- friendly and accessible tool for individuals to monitor and improve their mental well-being. The project focuseson creating a machine learning-driven website for stress and mental health detection. It aims to provide users with a platform to input text, such as journal entries or social media posts, and receive feedback on their mental health status. The system will employ natural language understanding (NLP) techniques to analyze the input text and identify patterns indicative of stress or mental health issues. The website will offer a user-friendly interface for inputting text and receiving feedback, making it accessible to individuals seeking to monitor and improve their mental well-being. Additionally, the application will provide resources and recommendations for managing stress and Improving mental health, increasing its effectiveness as a comprehensive resource for promoting mental well- being awareness and support.

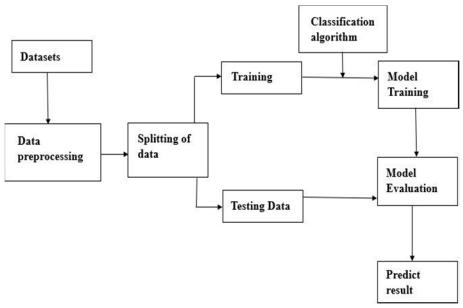


Fig.1: Architecture of the proposed system

The project aims to address the growing concern around Promoting mental health leveraging machine learning to provide accessible and timely support. Through the website, Users will have the capability to confidentially input their thoughts and feelings, allowing the system to analyze their mental state based on established psychological models and sentiment analysis.

B. Implementation



Fig.3: Level-0 model

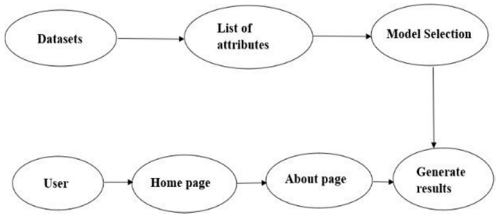


Fig.4: Level-1 model

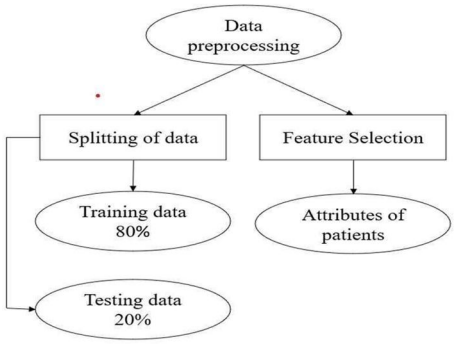


Fig.5: Level-2 model



Fig.6: Level-3 model

Display basic information about the website and its purpose. Provide a brief overview of stress and mental health detection. Introduce the team behind the website and their expertise. Explain the motivation for creating the website. Describe the machine learning-based services offered by the website. List the types of stress and mental health conditions detected. Provide a list of tools available for detecting stress and mental health conditions. Include brief descriptions and links to each tool. Offer resources such as articles, videos, and books related to stress and mental health. Provide links to relevant external websites and organizations. Feature articles written by experts on stress and mental health. Allow users to comment and engage with the content.

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IV. DATASET

The dataset utilized in this investigation, named "Mental Health Survey," consists of responses from over 200 individuals who participated in a survey assessing their mental health. The survey includes responses to 10 questions designed to evaluate variousaspects of mental well-being. The survey participants represent diverse demographics in regards to age groups, gender, and other categories. All participants are right-handed.

A. Out of the Surveyed Individuals

1) A total of 120 participants are characterized as having no significant mental health concerns.
2) 80 participants are characterized as having some level of mental health issues.
3) Among the participants initially categorized as having no significant mental health concerns.
4) 20 individuals were reclassified as having mental health issues in subsequent assessments. These persons fall into the category of "Converted" category.

V. ALGORITHM

In machine learning, Random Forest is a well-liked ensemble learning technique that is utilized for is employed in reference to regression and classificationproblems. Although it is founded on the idea of decision trees, it excels them byassembling a "forest" of trees and integrating their results to generate predictions that are increasingly accurate, reliable andaccurate.

A. Steps Involved in this Algorithm

1) *Gathering Data:* First, we collect our training data, comprising data entry features and their corresponding labels (outputs).
2) *Building Trees:* Numerous decision trees make up Random Forest. A portion of The training dataset is employed for construct each decision tree. The trick is that, in addition to using various data subsets, we also select a subset of features at random for every tree. Each tree can concentrate on different parts of the data because to this selection.
3) *Training Trees:* Recursively dividing the dataBased on the information provided by the chosen features allows each decision tree to be trained to generate predictions. To accomplish lower entropy (uncertainty) regarding the labels, splits were selected. When a node reaches a stopping point— that is, when all of its data points possess identical label— or when more splitting cannot provide better predictions, we stop.

VI. RESULT

Present the performance metrics from the device learning model(s) used for stress and the Identifying mental well-being issues. This evaluation may encompass metrics For instance, precision, recall, F1- score, and The AUC, or the area beneath the ROC curve, is a measure used to assess the performance of classification models, allowing for a comparison of performance different models or approaches, if applicable. Highlight the advantages and disadvantages of each approach. Discuss the significance of different features or variables in the model(s) for detecting stress and mental health conditions. This Might be beneficial in understanding the underlying factors contributing to these conditions. If available, include user feedback on the detection tools or services provided.

VII. CONCLUSION

This The study explores the substantial potential Our research showcases the utilization of machine learning methods in identifying mental health issues and detecting stress. This investigation illustrates the effectiveness of machine learning algorithms in these areas, especially those utilizing supervised learning algorithms, exhibit promising results in precisely identifying different mental health conditions and stress levels using diverse datasets. In summary, the utilization of Utilizing artificial intelligence for psychological well-being and stress detection offers significant promise for enhancing early detection, personalized treatment, and overall well-being.

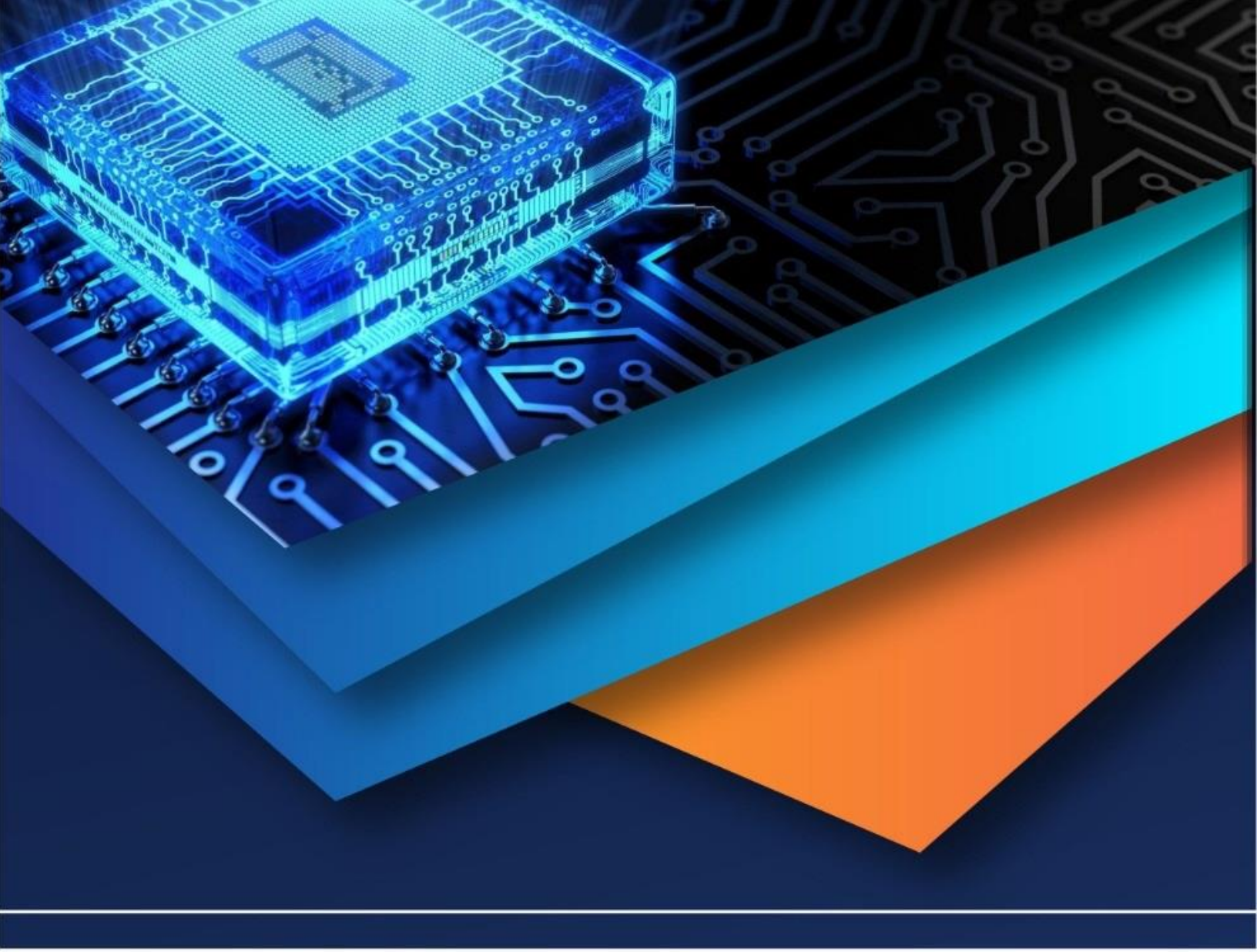
VIII. ACKNOWLEDGMENT

We are grateful to Mrs. Sushmitha Suresh, Assistant Professor, for serving as our project guide and for her capable leadership in making this project work a success.

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