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A REVIEW ON PREDICTED HEALTH PROBLEMS IN YOUNG GENERATION USING ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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Abstract:

The outbreak of human health problems has became a social issue, thereby affecting people. Nations from the world have made great efforts to control the inducing stresses which are troubling the public health. Artificial intelligence computer systems are applied extensively as a remediation, to collect data from patient disabilities thereby making them enable through the use of medicine from a written prescription. Machine learning using computer control systems in medical sciences is more advantageous one that helps in prediction, diagnosis of a disease. Applications involving diagnosing patients, end-to-end drug discovery, further health progress and possible development in humans.

Work describes the review of research made by the the researchers and study of applications of aroused technology artificial intelligence systems and machine learning systems, to predict human health aspects and overcoming the detected problems.

This study aims to analyse past research results investigated by the researchers and to interpret the role of Artificial Intelligence systems, that be able to prevent and treatment of diagnosed problems.

Keywords: Artificial Intelligence computer controlled systems, clinical diagnosis, human health prediction, Research review and Machine learning systems

I. INTRODUCTION

From centuries together in medical sciences, the technology has been driven out and driving at a faster rate, to predict the right cause of the soon health damages at ages and early ages in humans. Though one side it is serving its best but rising problems increasing day wisely and facing with new unknown health problems. Technology, decades earlier back used to diagnose human health problems but amazingly today, it is too advanced even in overcoming them by improving the health in a better way, with the applications of AI and ML Computer Assisted controlled systems, is appreciable.

Mental health problems suing physical health periodically in people kept increased and increasing, resulting in depression, stress induction, ill health and etc., affecting entire

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respiratory systems with sort of rigorous pain for hours and days. Effecting results are the sources of the cause in formation of damages which can even cause considerable losses and burdens to the education of young generation, family economy, social security and society.

Artificial Intelligence is a branch of science concerned with building machines capable of performing works and basic types of AI as shown in fig. 1 and flow chart as depicted in fig. 2 below.

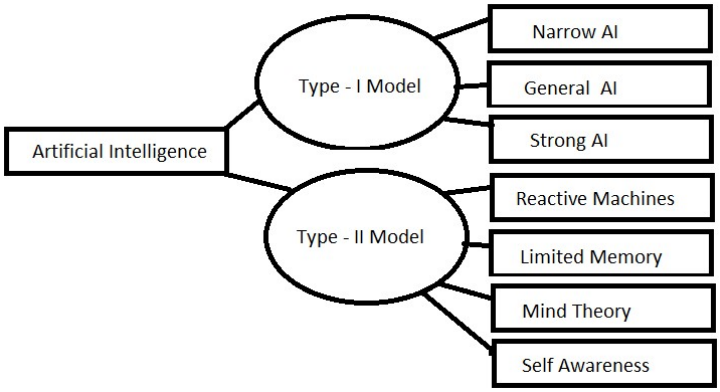

Fig: 1. Flowchart of Artificial Intelligence

Artificial intelligent computer assisted controlled systems (AI), plays a significant role in medical imaging, health sciences, clinical data, with predicted input parameters, drug development and telephonic consulted medicine. Therefore, AI is an extreme powerful tool, one that can serve the suitable and considerable purposes and it helps in solving complicated problems.

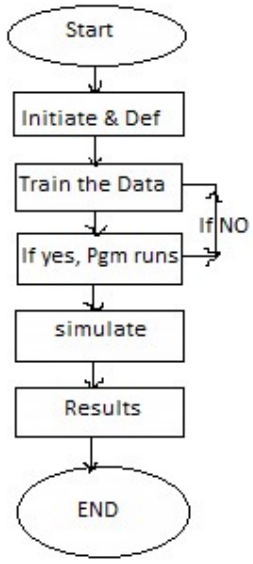

Fig: 2. Flowchart of Artificial Intelligence

Machine Learning is a field devoted to building and understanding methods one that 'learns' is a method that leverage information to improve efficiency on sets of some work. Machine learning, types of Ml and Flow chart have depicted in fig. 3 and 4 below.

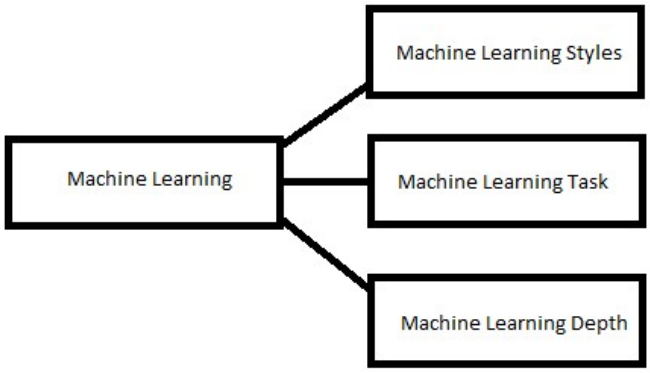

Fig: 3. Machine Learning Types

Machine Learning is the recent method to approach to find existing diseases in human system in an easier way and simpler manner. Machine learning algorithms like random forest and set decision tree, which are employed on the provided data set for prognosis the disease.

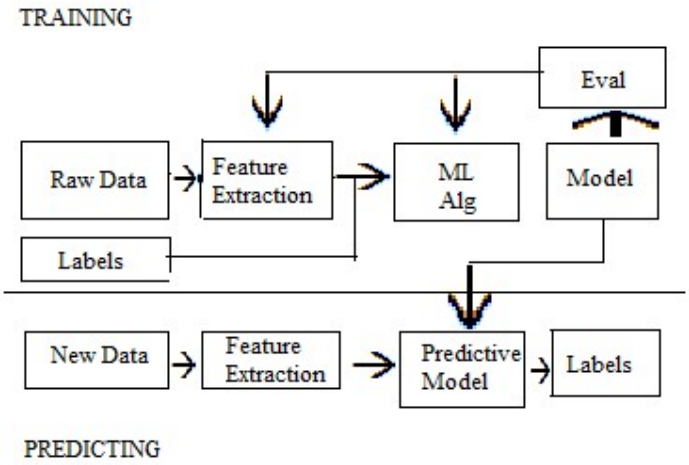

Fig: 4. Flowchart of Machine Learning

The main objective of the present work is to study the research carried out by the expert researchers, in applying the current technology for diagnosing the problems affecting health in human systems.

The following contribution of the work carried out as stated below:

1. Studying the objectives of the work
2. Studying the carried input parameters

3. Study of the predicted diagnosing data
4. Study of the outcome of the proposed work
5. Study of the author stated conclusion

Organization of this paper as follows:
Section II - Literature survey of the work carried out by the research professionals
Section III - Discussions, a statement (matter in brief) among the related works
Section IV - Conclusion on research, concludes about the review and future scope of the work

II. LITERATURE SURVEY

Ashley E. Tate, ryan C. Mc Cabe, Henrik Larsson, Sebastian Lundstrom, Paul Lichtenstein and Ralf Kuja-Halkola et.al., [1] studied a developed model which can predict mental health problems in and for the age of mid-adolescence and studied the impact of machine learning techniques to investigate the model that outperform logistic regression. For investigation, from the database of health insurance and labour market study twins data recorded and concluded to focus on 15 years age adolescence group data through the strengths and difficulties questionaires followed by prosocial behaviour, parent-rated emotional symptoms, emotional symptoms, conduct problems, peer relationship problems and hyperactivity such measures be taken as a dataset. From the observations made for the prevention of the cause of negative mental health in adolescence with properly timed interventions is risk free.

Gomula, Jerzy, Krzysztof Pancerz and Jaroslaw szkola et.al., [2] made investigation on classification of MMPI profiles of patients with mental disorders-experiments with attribute reduction and extension, in which dataset is applied by the algorithms to find the optimistic and accurate results.

Thomas davenport and Ravi kalakota et al., [3] studied the potential abilities of artificial intelligence algorithms in healthcare by increasing the functional capabilities which enable current technology better for making tests and things more simpler. Provided that with increase in technology the rise in opportunities may grew.and increase in professional productivity which may results in simplicity. Work carried out with the study of diagnosis and treatment applications using algorithms of AI

Ahmad Rauf Subhani, Wajiz Mumtaz, Mohammed Naufal Bin Mohammed Saad, Nidal Kamel and Aamir Saeed Malik et.al., [4] Al., Applied the Machine learning framework for the detection of mental stress at multiple levels - in investigation of stress, analysis was conducted 3 cases firstly, 4 l4v4ls of stress were individually identified in comparison with the 2 class problem. The stress identified for the framework proposed was found to be maximum 94.6% accuracy between 2 stress levels and 83.43% between stress and other stress levels author concluded with better results.

Kipli. Kuryati, Abbas Z. Kouzani and Isredza Rahmi A. Hamid et.al., [5] Investigated machine learning techniques for detection of depression using structural MRI volumetric features to detect hidden stress in humans

Christopher k jelly, Alan Karthikeshalingam, Musthafa Suleyman, Greg Corrado and Dominic King et al., [6] provided key challenges and salient features with functionalities for delivering clinical impact with Artificial Intelligence. Studied the existing potentialities of Artificial Intelligence in healthcare sciences, made a study on retrospective versus prospective a key challenge in which data traced is applied to test the algorithms. Studied accidentally fitting confounders versus true signal and challenges in generalisation to new populations and settings observed and data on developing a better understanding of interaction between human and algorithm

Akshanda kene and Dr. Shubhada Thakare et.al., [7] Predicted mental stress level based on machine learning to experiment conducted with 2 models of machine learning technique as SVM and RF to understand the precise and accuracy using matrix confusion in which he concluded that SVM models tested with high accuracy than RF

Tanev G, Saadi D. B, Hoppe K, and Sorrensen et.al., [8] Describes the classification of accute stress using linear and non-linear heart rate variability analysis derived from sternal ECG in which incorporation of naive bayesian classifier be seen to classify the data and information gathered to analyse the stress accutely. Thus stress can be minimised with the system adopted.

Aftab khan, georgios kalogridis, stefanos vatsikas alexandros zenonos et al., [9] "healthy office: mood recognition at work using smart phones and wearable sensors", certain steps were taken to achieve recognition of mood and experiments conducted efficiently and accurately

U.S Reddy, A. V. Thota and A. Dharun et.al., [10] explains the machine learning techniques for stress prediction in working employees in which methods adopted like Logistic regression, decision trees and Random Forest Classifier were applied to increase number of attributes thus customized the taken survey data inorder to procure resposes

Muhammad Adnan , Asad Habib, Jawad Ashraf, Shafaq Mussadiq, Arsalan Ali Raza, Muhammad Abid, Maryam Bashir, And Sana Ullah Khan et.al., [11] Predicting at-Risk Students at Different Percentages of Course Length for Early Intervention Using Machine Learning Models explains the proposed models from which Random forest gives best results with feasible averaged recall, averaged accuracy and averaged precision with 0.6, 0.79, 0.84, 0.9 and 0.92 in percentages

Nisha Raichur, Nidhi Lokanadi, and Priyanka Mural et.al., [12] reveals detection of stress using image processing and machine learning techniques in which integration of image processing and deep learning to detect ongoing stress to minimise future health risks

Luca chittaro, viviano capurso, Ricardo sioni, franco fabbro, cristiano cresentini et.al., [13] explained psycological and physiological responses to stressful situations in immersive virtual reality: differences between users who practise mindfulness meditation and controls in computers in human behaviour, work describes the models with significant paremeters which affecting the possible factors to find accurate and precise values

G.Giannakakis, D. manosus and F. Chiarugi et.al., [14] describes stress and anxiety detection using facial cues from videos in which face ROI Detection for detecting wide variety of semi

voluntary face expressions and Data preprocessing is applied for uploading gathered traditional facial information to conclude the level of anxiety in humans

Setha pan-ngum and Pasin Israsena Noppadon Jatupaiboonet.al., [15] reveals the Real time EEG-Happiness Detection System, one in which two machine learning models considered were tested to find optimistic results

Vishal R. Shinde, shubam mamane, Priya Thakare, and Vibha Vishe et.al., [16] explained the stress detection in IT Professionals by image processing and machine learning in which stress detection system based facial analysis through face expressions. The system works when they sat infront of the camera then it will be able to detect expression and in run in real time.

Sumathi M. R and B. Poorna et.al., [17] explained the predicted mental health problems among children using machine learning techniques in which eight machine learning techniques and has compared their performances on different measures of accuracy in diagnosing five basic mental health problems.

Masri R. Y and Jani H. M et.al., [18] proposed a mental health diagnostic expert system to assist the psycologists in treating and diagnosing their mental patients. Three artificial intelligence techniques viz., rule based Reasoning, fuzzy logic and fuzzy genetic algorithm were used for diagnosis and suggestion of treatment plans.

U srinivasulu Reddy, Aditya Vivek Thota and Adharun et.al., [19] "Machine learning techniques for stress prediction in working employee" explains the stress identified in software engineers. Techniques applied for detecting stress are boosting, packing and decision trees and etc. The authors have adopted open sourcing mental illness survey datalist 2017 from tech industry. The dataset subjected to various strategies of mechine learning and dataset hold labels such as age, gender and family background. From the study it is concluded that 75% of them may undergo mental illness problems at early ages

Prakruthi Manjunath, Twinkle S, Pola Shreya and Vismaya Ashok et.al., [20] describes the Predictive Analysis of student stress level using Machine Learning, one that gathered the amounts of stress and their levels through application of KNN and Graphical Analysis methods among the 15 students out of 91 test records found no stress, 26 were identified with 1% to 25% of stress, 29 students are found having range from 25% to 50% of stress and students found 50% above stress levels in them, In analysis - considered dataset consisting of different students records from the data, the dataset has been encoded as integers under each of twelve labels

Disha Sharma, Nitika Kapoor and Sandeep Singh Kang et.al., [21] explained the stress prediction of students using machine learning, in which Baye's Net classifier gives the highest accuracy of 88.5965% found upon techniques applied for predicting stress levels are Naive Baye's, Baye's Net, Logistic Regression and Muti layer perception Random Forest with types of parameters considered for detection are Kappa, statistic, MCC, Mean absolute error, ROC Area, false positive, true positive, Recall and RSME.

Norizam and Sulaimanet.al., [22] describes the Determination and classification of human stress index using non-parametric analysis, in which decision tree algorithm was applied to dataset and determined levels of stress at beginning and end of semester. Results of levels of

stress are compared across the beginning and end of the semester I.e., when compared, stress was found to be maximum when they reached end of the semester

Paolo Melillo, Marcello Bracale and Leandro Pecchia et.al., [23] Nonlinear Heart Rate Variability features for real-life stress detection. Case study: students under stress due to university examination, tudy investigates the variations of Heart Rate Variability (HRV) due to a real-life stressor and proposes a classifier based on nonlinear features of HRV for automatic stress detection.

P. karthikeyan, M. Murugappan and S. Yaacob et.al., [24] Detection of human stress using short-term ecg and hrv signals explains the introduces a method for resolving the problem of human stress detection through short-term (less than 5 min) electrocardiogram (ECG) and heart rate variability (HRV) signals. The explored methodology helps to improve the stress detection rate and reliability through multiple evidences originated in same sensor. In this work, stress-inducing protocol, data acquisition, preprocessing, feature extraction and classification are the major steps involved to detect the stress.

III. DISCUSSIONS

The ongoing applications of algorithms and approaches from the current running technology throughout the fields is enormous and informative. Researchers conducted experiments based on the arising problems related to mental health and preventing them in young generation with the input dataset is worth enough to apply to get the opmimistic results from the reviews made in Machine learning framework for the detection of mental stress at multiple levels (have been tabulated below, in Table 1) to find optimum results to make the work simple and easy as it analyse accuracy between levels of depression, between stress and other stress levels more predominantly.

Table.1: Work of Reasearch Review and Discussions

Sn	Author	Title	Classifier	Classification	Accuracy
1	Ashley E. Tate, Ryan C. Mc Cabe, Henrik Larsson, Sebastian Lundstrom, Paul Lichtenstein and Ralf Kuja-Halkola	Predicting mental health problems in adolescence using machine learning techniques	RF and SVM	Stress and normal	95%
2	Gomula, Jerzy, Krzysztof Pancerz and Jaroslaw szkola	classification of MMPI profiles of patients	SRG	mental disorders	Good and Improved

		with mental disorders-experiments with attribute reduction and extension			
3	Thomas davenport and Ravi kalakota	The potential for artificial Intelligence in healthcare	AI and ML	Stress and etc	Ref-
4	Ahmad Rauf Subhani, Wajiz Mumtaz, Mohammed Naufal Bin Mohammed Saad, Nidal Kamel and Aamir Saeed Malik	Machine learning framework for the detection of mental stress at multiple levels	LR, SVM and CV	Stressed and Normal	94.6% and 83.4%
5	Kipli. Kuryati, Abbas Z. Kouzani and Isredza Rahmi A. Hamid	Investigating machine learning techniques for detection of depression using structural MRI volumetric features	SVM-EM and IG-RT	Stressed and Normal	85.23%
6	Christopher k jelly, Alan Karthikeshalingam, Musthafa Suleyman, Greg	key challenges for delivering clinical	AI and ML	Stress and etc	Ref-

	Corrado and Dominic King	impact with artificial intelligence			
7	Akshanda kene and Dr. Shubhada Thakare	Prediction of mental stress level based on machine learning	KNN	Stressed	94%
8	Tanev G, Saadi D. B, Hoppe K, and Sorrensen	The classification of accute stress using linear and non-linear heart rate variability analysis derived from sternal ECG	Through ECG reports	Stress and normal	90% for Neutral stage 80% for both acute stress and baseline stage
9	Aftab khan, georgios kalogridis, stefanos vatsikas alexandros zenonos	Healthy office: mood recognition at work using smart phones and wearable sensors	KNN, DT, BE-DT and P-BL	Stress with Moods	70.60%(Personalised) and 62.14% (Generalized) Max with BE-DT
10	U.S Reddy, A. V. Thota and A. Dharun	The machine learning techniques for stress prediction in working employees	KNN, LR, DT, RF, BG and BST	Stressed and Normal	75.13%
11	Muhammad Adnan , Asad Habib, Jawad	Predicting at-Risk Students at	RF and others	Stressed	averaged precision = 0.60%, 0.79%, 0.84%, 0.88%,

	Ashraf, Shafaq Mussadiq, Arsalan Ali Raza, Muhammad Abid, Maryam Bashir, And Sana Ullah Khan	Different Percentages of Course Length for Early Intervention Using Machine Learning Models			0.90%, 0.92%, averaged recall = 0.59%, 0.79%, 0.84%, 0.88%, 0.90%, 0.91%, averaged F-score = 0.59%, 0.79%, 0.84%, 0.88%, 0.90%, 0.91%, and average accuracy = 0.59%, 0.79%, 0.84%, 0.88%, 0.90%, 0.91% at 0%, 20%, 40%, 60%, 80% and 100% of course length
12	Nisha Raichur, Nidhi Lokanadi, and Priyanka Mural	Detection of stress using image processing and machine learning techniques	IP	Stressed and Normal	Good
13	Luca chittaro, viviano capurso, Ricardo sioni, franco fabbro, cristiano cresentini	Psycological and physiological responses to stressful situations in immersive virtual reality: "Differences between users who practise mindfulness meditation and controls	IVE	Stressed	Good through awareness and acceptance components of mindfulness

		in computers in human behaviour			
14	G.Giannakakis, D. manosus, F. Chiarugi	stress and anxiety detection using facial cues from videos	RT and VRFC	Neutral, Relaxed and Stressed/Anxiety	good
15	Setha pan-ngum and Pasin Israsena Noppadon Jatupaiboon	Real time EEG-Happiness Detection System	SVM	Stressed and Non Stressed	75.62% and 65.12%
16	Vishal R. Shinde, shubam mamane, Priya Thakare, and Vibha Vishe	stress detection in IT Professionals by image processing and machine learning	IP	Stressed	effficient
17	Sumathi M. R and B. Poorna	The predicted mental health problems among children using machine learning techniques	MLP, MC and LAD Tree	Stressed and Normal	80% and 90%
18	Masri R. Y and Jani H. M	Mental health diagnostic expert system to assist the	ES	Stressed and Normal	---

		psycologists in treating and diagnosing their mental patients			
19	U srinivasulu Reddy, Aditya Vivek Thota and Adharun	Machine learning techniques for stress prediction in working employee	KNN, LR, DT, RF, BG and BST	Stressed and Normal	75.13%
20	Prakruthi Manjunath, Twinkle S, Pola Shreya and Vismaya Ashok	Predictive Analysis of student stress level using Machine Learning	KNN	Low, medium and high	94.99%
21	Disha Sharma, Nitika Kapoor and Sandeep Singh Kang	Stress prediction of students using machine learning	BN, NB, MP, LR, RF and J48	Stressed and Non Stressed	88.5965 %
22	Norizam and Sulaiman	Determination and classification of human stress index using non-parametric analysis of EEG Signals	KNN	Stressed and Normal	88.89% and 88.67%
23	Paolo Melillo, Marcello Bracale and Leandro Pecchia	Nonlinear Heart Rate Variability features for real-life	Linear	Stressed	86%, 90% and 95%

		stress detection. Case study: students under stress due to university examination			
24	P. karthikeyan, M. Murugappan and S. Yaacob	Detection of human stress using short-term ecg and hrv signals	PNN and KNN	Stressed and Normal	91.66% and 94.66%

IV. CONCLUSION

Present Work and review progress have been made and formulated on the literature carried out and discussions done efficiently are given based on the goals reached by the writing professionals. The input data set taken to function the system is well worthy and suitable for fitting the computer controlled systems. Methodology considered is applicable for better running the system with possible approaches, plays a predominant role in the work. The outcome achieved based on the strategy made in proposed system and optimisaion is another factor to make a work simple, easy and effective.

The summary of the work explains the data based information from the existing references are to optimize the causing mental health problems in young generation was formulated through algorithms.

REFERENCES

1. Ashley E. Tate, Ryan C. Mc Cabe, Henrik Larsson, Sebastian Lundstrom, Paul Lichtenstein and Ralf Kuja-Halkola, " Predicting mental health problems in adolescence using machine learning techniques", PLOS ONE | April 2020 | 0230389| pp: 1-13

2. Gomula, Jerzy, Krzysztof Pancerz and Jaroslaw szkola, " classification of MMPI profiles of patients with mental disorders-experiments with attribute reduction and extension," springer berlin heidelberg 2010 | pp: 411-418

3. Thomas davenport and Ravi kalakota, " The potential for artificial Intelligence in healthcare" - Future healthcare Journal 2019 | vol 6 | No: 2 | pp: 94-98.

4. Ahmad Rauf Subhani, Wajiz Mumtaz, Mohammed Naufal Bin Mohammed Saad, Nidal Kamel and Aamir Saeed Malik, "Machine learning framework for the detection of mental stress at multiple levels", IEEE Access 2017 |Vol 5|pp: 13545-13556

5. Kipli. Kuryati, Abbas Z. Kouzani and Isredza Rahmi A. Hamid, " Investigating machine learning techniques for detection of depression using structural MRI volumetric features," IJBBB | 3.5 | 2013 | pp: 444-448
6. Christopher k jelly, Alan Karthikeshalingam, Musthafa Suleyman, Greg Corrado and Dominic King, "key challenges for delivering clinical impact with artificial intelligence". - BMC Medicine (2019) 17:195| pp: 1-9.
7. Akshanda kene and Dr. Shubhada Thakare, " Prediction of mental stress level based on machine learning" - 2019 |vol 2|No: 3 |pp: 1-6.
8. Tanev G, Saadi D. B, Hoppe K, and Sorrensen, The classification of accute stress using linear and non-linear heart rate variability analysis derived from sternal ECG, 2014.
9. Aftab khan, georgios kalogridis, stefanos vatsikas alexandros zenonos, "healthy office: mood recognition at work using smart phones and wearable sensors", in the second IEEE International workshop on sensing systems and applications
10. U.S Reddy, A. V. Thota and A. Dharun, "The machine learning techniques for stress prediction in working employees," | IEEE CONFERENCE | ICCIC | 2018 | pp: 1-4
11. Muhammad Adnan , Asad Habib, Jawad Ashraf, Shafaq Mussadiq, Arsalan Ali Raza, Muhammad Abid, Maryam Bashir, And Sana Ullah Khan,"Predicting at-Risk Students at Different Percentages of Course Length for Early Intervention Using Machine Learning Models," Jan-2021|vol 9|IEEE Access|pp: 7519-7539
12. Nisha Raichur, Nidhi Lokanadi, and Priyanka Mural et.al., "detection of stress using image processing and machine learning techniques," July 2017| vol 09 | no: 3S.
13. Luca chittaro, viviano capurso, Ricardo sioni, franco fabbro, cristiano cresentini, Psycological and physiological responses to stressful situations in immersive virtual reality: "Differences between users who practise mindfulness meditation and controls in computers in human behaviour," 2016
14. G.Giannakakis, D. manosus, F. Chiarugi,"stress and anxiety detection using facial cues from videos," | Jan 2017 | vol 31 | pp: 89-101
15. Setha pan-ngum and Pasin Israsena Noppadon Jatupaiboon, "Real time EEG-Happiness Detection System", in hundawi publishing corporation the scientific world journal vol 2, 2013; pp: 12.
16. Vishal R. Shinde, shubam mamane, Priya Thakare, and Vibha Vishe, "stress detection in IT Professionals by image processing and machine learning," 2021| vol-7 | ISSN No: 2454-9150 | pp: 07-11
17. Sumathi M. R and B. Poorna et.al., explained the predicted mental health problems among children using machine learning techniques 2016, IJACSA; | vol 7 | No: 1 | pp:552-557.
18. Masri R. Y and Jani H. M et.al., proposed a mental health diagnostic expert system to assist the psycologists in treating and diagnosing their mental patients 2012, ICCIS | vol: 1 | No: 2 | pp: 495-499
19. U srinivasulu Reddy, Aditya Vivek Thota and Adharun, "Machine learning techniques for stress prediction in working employee," 2018 IEEE - ICCICR.

20. Prakruthi Manjunath, Twinkle S, Pola Shreya and Vismaya Ashok, " Predictive Analysis of student stress level using Machine Learning," NCCDS 2021 Conference proceedingsm, IJERT | vol 09 | Issue 12 | pp: 76-80
21. Disha Sharma, Nitika Kapoor and Sandeep Singh Kang, "Stress prediction of students using machine learning," Jun-2020, IJMPERD | Vol 10 | Issue 3 | pp: 5609-5619
22. Norizam and Sulaiman, "Determination and classification of human stress index using non-parametric analysis of EEG Signals - 2015
23. Paolo Melillo, Marcello Bracale and Leandro Pecchia, Nonlinear Heart Rate Variability features for real-life stress detection. Case study: students under stress due to university examination, 2011 - pp:1-13.
24. P. karthikeyan, M. Murugappan and S. Yaacob, Detection of human stress using short-term ecg and hrv signals, Journal of Mechanics in Medicine and Biology Vol. 13, No. 2 (2013) - pp: 1-29