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A SURVEY ON MEDICAL AND DISEASES PREDICTION USING MACHINE LEARNING

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ABSTRACT
Machine learning is a subfield of AI and computer science that seeks to mimic human learning by enhancing its accuracy via exposure to more data and more complex algorithms. To improve software's predictive abilities, it doesn't need to be expressly coded to use machine learning (ML). Predictions from machine learning algorithms are based on past data. Machine learning has the ability to shake up the healthcare sector by providing novel approaches to managing healthcare data, reshaping patient treatment, and reducing back-end administrative tasks. Medical professionals and hospital administrators may benefit financially from the use of machine learning to deliver data-driven clinical decision support (CDS). Better health outcomes can be achieved with the help of machine learning thanks to increased patient participation in the treatment process. When applied to the IoMT, ML can collect more precise patient data and automate message alerts that prompt patients to take action at just the right time.
KEYWORDS: Machine learning,Medical, Disease, Clinical Decision(CD), Internet of Medical Things

1.INTRODUCTION

Machine learning is the study of algorithms that can automatically adapt to new situations by analysing past examples (ML). It is being regarded as an element of AI. Machine learning algorithms create a model using training data in order to produce predictions or choices without being explicitly trained to do so. Because more data may be used to construct a more robust model, which in turn yields more accurate predictions of the output, the amount of data has a direct bearing on the reliability of the projected result.

1.1 Machine Learning Features

- ✓ ML employs data to find distinct patterns in a given dataset.
- ✓ It can learn from prior data and advance itself automatically.
- ✓ It is a technology that is powered by data.
- ✓ Machine learning is related to data mining in that it deals with massive amounts of data.

1.2 DIAGNOSIS OF DISEASES

ML will be used in healthcare because of the benefits it provides in the diagnosis and treatment of illnesses. Quickening the decision-making process and decreasing the number of false positives during a medical diagnostic are two benefits that may be achieved with the help of machine learning algorithms. Included are explanations of the Support Vector Machine, K-nearest neighbours, Naive Bayes, and Decision Tree ML algorithms. The likes of cancer, diabetes, epilepsy, and heart attacks are all diagnosed with the use of these algorithms. An F1 score, recall, accuracy, and precision metric derived from a machine learning technique are utilised to provide a diagnosis.

2. LITERATURE SURVEY

According to the research of VishuMadaanand Anjali Goyal [1], the human body's constitution (prakriti) determines what is in tune with human nature and what will throw it out of whack, leading to sickness. The model is trained using commonplace techniques in machine learning for

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classification analysis. These include Artificial Neural Networks (ANN), K-Nearest Neighbors (KNN), Support Vector Machines (SVM), Naive Bayes (NB).

This paper, by El ArbiAbdellaouiAlaoui, Stéphane Cédric KoumetioTekouabou, Zuherman Rustam, and Hassan Silkan [2], posits that sarcomas can arise in the connective, sustaining, and surrounding tissues of the body. The proposed strategy for tumour classification relies on machine learning. Our proposed machine learning strategy involves an unique preprocessing step for transforming data into features, resampling techniques for eliminating bias and the instability deviation, and classifier evaluations with the Support Vector Machine (SVM) and Decision Tree (DT) algorithms. Using a computer-aided diagnosis system based on our model may also prove to be more efficient and effective than depending just on a radiologist's visual assessment and state-of-the-art models.

The purpose of this work, by Chang-Sik Son, Won-Seok Kang, Jong-Ha Lee, and Kyoung Ja Moon [3], was to develop accurate and interpretable machine learning models for three psychomotor delirium-related behaviours in hospitalised adult patients. The logistic regression (LR) model has been widely used in studies assessing the risk of delirium in the ICU due to its ease of analysis.

In healthcare, clinical decision-making is already influenced by the forecasts or suggestions provided by data-driven technologies, as suggested by a machine learning model developed by Farah Shamout, Tingting Zhu, and David A. Clifton [4]. This study provides a survey of recent advances in the fields of data processing, inference, and model assessment as they pertain to the development of outcome prediction models employing EHR data. This work intends to provide a technical evaluation of current literature on clinical outcome prediction models in order to shed light on the numerous issues that have been the subject of investigation. Clinical deterioration, such as cardiac arrest, death, or admission to the critical care unit, can be detected with the use of ML applications that predict clinical outcomes.

Alessio Gilberti, Cristoforo Decaro, Giovanni Battista Montanari, and Riccardo Molinari [5]. This study shows how visible spectra of blood may be used to predict hematic parameters during ex-vivo treatments using machine learning methods. The outcomes show that both the SVM.

In order: Wonsik Yang, MinsooJoo, Yujaung Kim, Se Hee Kim, and Jong-Moon Chung [6] In this paper, we offer a novel machine learning (ML) model for reliably distinguishing between Temporal Lobe Epilepsy (TLE) and Benign Epilepsy with Centrotemporal Spikes (BECTS). To pick features,

In addition to Jiongming Qin, Lin Chen, Yuhua Liu, Chuanjun Liu, and Changhao Feng [7], The prevalence and severity of chronic kidney disease (CKD) make it a major public health concern worldwide. Patients with CKD who are diagnosed early often benefit from more effective therapy that can delay the disease's development. Machine learning models can greatly assist therapists in this endeavour because of their speed and accuracy in pattern identification. Our findings show that a machine learning strategy would be useful for detecting CKD. Logistic regression, random forest, support vector machines, k-nearest neighbours, naive Bayes classifiers, and feed forward neural networks

As stated by Eike Petersen, YannikPotdevin, Esfandiar Mohammadi, and Stephan Zidowitz [8], The purpose of this paper is to offer an overview of the challenges and possible solutions associated with developing medical machine learning systems in a responsible manner, taking into account the current regulatory environment, the likely future regulatory environment, and the current technical best practises..

Byung-Won On, Waqar Aslam [9], Furqan Rustam, Aijaz Ahmad Reshi, Arif Mehmood, Predicting perioperative outcomes using machine learning (ML)-based forecasting techniques has been shown to be useful for improving decision-making moving forward. Machine learning (ML) algorithms are demonstrated here for their efficacy in estimating the future number of people who may contract the COVID-19 virus, which is now recognised as a global danger. In this study, four standard forecasting models—linear regression (LR), least absolute shrinkage.

People like Usama Ahmed, Shabib Aftab [10] Diabetes is a worldwide epidemic and one of the most lethal diseases. This paper presents a model for diabetes prediction that makes use of a hybrid machine learning approach. The conceptual framework is comprised of SVM and ANN models (Support

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Vector Machines and Artificial Neural Networks, respectively). These algorithms analyse the data to determine the reliability of a diabetes diagnosis. The membership function generated by these models is fed into the fuzzy model as an input, and the final verdict on whether or not a patient has diabetes is made via fuzzy logic. The combined models are stored in the cloud for further use. The current medical records are used by the fused model to diagnose diabetes. The effectiveness of the suggested fused ML model.

As stated by AlexandruLavric, Valentin Popa, Hidnori Takahashi, and SiamakYousefi [11], The purpose of this research is to develop and test a machine learning system for early detection of keratoconus. A support vector machine (SVM) method achieved a 94.1% accuracy rate by using a subset of eight corneal characteristics with the highest discriminating strength.

Xiaomei Li, Ershi Qi, Man Xu, Ling Li, Bo Gao [12], Na Liu, To overcome the shortcomings of traditional classification algorithms, this work proposes a unique three-stage ensemble learning paradigm for medical diagnosis using imbalanced data. The three stages of data analysis, training of a foundational classifier, and ensemble The goal of this research was to develop a new ensemble learning paradigm for medical diagnosis that achieves comparable or better results than state-of-the-art baseline methods.

Sotiris Alexiou, Nikos Fazakis, Konstantinos Moustakas [13], Nikos Fazakis, Otilia Kocsis, To that end, this paper proposes a worker-centric, IoT-enabled, AI-enhanced system for tracking users' health, happiness, and functional capability. KNN, Decision Trees,

The authors Pronab Ghosh, Sami Azam, F. M. Javed Mehedi Shamrat [14], Heart disease is one of the most common serious health problems affecting people today (CVD). The focus of this study is to develop a method that can accurately predict the onset of heart disease, especially Coronary Artery Disease and Coronary Heart Disease. Hybrid classifiers,

Elisabete Aramendi, Mohamud R. Daya, Unai Irusta, and ErikAlonso are cited in [15]. In this research, the authors introduced a machine learning framework for identifying a patient's pulse during cardiac arrest outside of a medical facility. A unique feature extraction methodology was devised using the combined information in the ECG and TI, which resulted to a large improvement in performance when compared to prior methods. This was achieved by the methodical use of machine learning techniques.

Karen Anthony [16], Mahmood Khalsan, Eman Salih Al-Shamery, Suraj Ajit, In addition to aiding in the early detection of cancer, the discovery of novel gene signatures may also aid in the identification of patient subgroups that are at risk for acquiring the illness or are resistant to a specific treatment. In order to evaluate the efficacy of the suggested method, it was subjected to three different classification procedures

Abhijith Reddy Beeravolu, MirjamJonkman [17], Linta Antony, Sami Azam, Eva Ignatious, RyanaQuadir, The onset, prevalence, and development of CKD have evolved is the focus of this research. Data from clinical studies will be classified as either "CKD" or "Non-CKD" using this approach. A preliminary diagnosis can also be verified with this model.

As a group, TurkerTuncer, Sengul Dogan, Fatihzyurt, Samir BrahimBelhaouari, and Halima Bensmail [18]. Despite the fact that voice anomalies are on the rise because to improved medical diagnostics, they are often overlooked. The primary result of this research is an innovative multileveled textural feature extraction approach with iterative feature selection for multiclass-pathologic speech classification. Our solution is a straightforward and effective voice-based algorithm that makes use of a ternary pattern with many centres and thresholds (MCMTTP).

A group of people named Misba Sikandar, RafiaSohail, Yousaf Saeed, Asim Zeb, Mahdi Zareei, Muhammad Adnan Khan, Atif Khan, Abdallah Aldosary, Ehab Mahmoud Mohamed, and Atif Khan [19], Identifying the genes responsible for a disease is essential for comprehending its origin.

Dr. Kamrul Hasan, Dr. Ashraful Alam, Dr. Dola Das, Dr. Eklas Hossain, Dr. [20] In this paper, we present a reliable framework for diabetes prediction that makes use of outlier rejection, data normalization.

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P. Thirumoorthy, K. S. Bhuvaneshwari, C. Kamalanathan, P. Sunita, E. Prabhu et al.[21] This paper proposed a key agreement-based Kerberos protocol for secure transmission of M-health data in wireless networks. Doctors and caregivers can access the patients' processed data on a cloud server. The proposed protocol is used to access data transfer between patients, servers, and doctors in order to maintain the confidentiality and integrity of authentication. The proposed algorithm's efficiency is compared to that of existing protocols.

K.Shanmugapriya, C.N.Marimuthu, N.Sridhar, S.Sameema Begam.[22] The proposed anomaly detection framework in this work is intended to screen IoT vulnerabilities and alert the executive or service administrations in an organisation. The proposed system fine-tunes parameters in a distributed network using a K-Nearest Neighbor (KNN) unsupervised machine learning algorithm and a Random forest (RF) supervised machine learning algorithm. As a result, this system maximises model performance without overfitting and employs Cross Validation to implement a fit and a metric score (CV).

D.Vanathi, S.Prabhadevi, P.Sabarishamalathi, Mohanraj.K.P [23]. The distributed collaborative-based privacy-preserving scheme is critical for achieving private collaboration. IDSs (Intrusion detection structures) are critical units that can mitigate threats by detecting malicious behaviours. One critical impediment to collaborative research is that the privatisation situation nodes alternate facts among themselves.

Avadhesh Kumar Dixit, S Karuppusamy, Sonu Kumar, Jyothi N M [24]. Dermal sensors networking used throughout comprehensive medical technologies create a very large volume of information knowledge which has must be constantly handled but also saved current analysis but also subsequent use. Digital technology, notably in conjunction with the underlying idea of networked information (IoT), represents a relatively contemporary development involving the management of personal information of electronic instruments, but also interpretations.

Dr.D. Vanathi, P. Uma, M. Parvathi and K. Shanmugapriya. [25] In recent years, recommender systems have become extremely common. Companies such as Amazon and eBay have created an enormous variety of products to satisfy customers' vastly different desires. Customers have an increasing number of options to choose from. As a result, during this new level of customization, customers should frame a model or method from the massive amount of data provided by businesses in order to find what they actually need. Recommender systems are one solution to this problem.

3. COMPARATIVE ANALYSIS

S.No	Title	Techniques & Mechanisms	Parameter Analysis	Tools	Future Work
1.	Predicting Ayurveda-Based Constituent Balancing in Human Body Using ML Methods	Boosting algorithm	Accuracy	Decision-making expert tools.	Anyone, healthy or not, may utilise this method to learn about the state of their body's components without having to visit an Ayurvedic doctor.
2	Improvement in Automated Diagnosis of Soft Tissues	Support Vector Machine (SVM) and Decision Tree (DT) algorithms.	Kernel	Magnetic Resonance Imaging	Our methodology will be further developed in the future to adapt to the automated diagnosis of additional disorders, such as glaucoma, by merging weak algorithms.

	Tumors Using ML				
3.	ML to Identify Psychomotor Behaviors of Delirium for Patients in Long-Term Care Facility	LR,GAM,RF,ANN,KNN,SVM, NB	Hyper parameters	Evaluation tools	Our enhanced prediction models will be included into the clinical workflow of some LTC institutions in future works to solve the constraints.
4	ML for Clinical Outcome Prediction	Clustering algorithms(CA)	Hyperparameter tuning	Patient monitoring tools	In order to maximise productivity and reduce error rates while working with EHR data, future research should focus on expanding this type of training.
5	ML Approach for Prediction of Hematic Parameters in Hemodialysis Patients	Spectroscopic techniques	Hematic parameters	Clinical tool	Machine learning is used in conjunction with a cheap and easy spectroscopic setup to track blood's hematic characteristics.
6	Hybrid ML Scheme for Classification of BECTS and TLE Patients Using EEG Brain Signals	Signal decomposition techniques	Inverse Gaussian (NIG)	Evaluation tools	Implement the HML diagnostic blockchain database into the hospital system and broaden the ML model's use beyond BECTS and TLE in order to classify further forms of epilepsy..
7	A ML Methodology for Diagnosing Chronic Kidney Disease	LR,RF	Diagonaising parameter	Clinical tool	In order to increase the model's generalisation performance and enable it to recognise the severity of the condition, a substantial amount of increasingly complicated and representative data will be collected for training purposes.
8	Responsible and Regulatory Conform ML for Medicine	Clustering algorithms	Bayesian priors	Adversarial Robustness	With the goal of ensuring that this is done in a responsible manner and in accordance with existing and future rules.
9	COVID-19 Future Forecasting Using	Machine learning technique	Evaluation parameters	Clinical tool	Methodology for making predictions based on the most recent dataset and employing the most effective and relevant ML techniques for doing so

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	Supervised ML Models				
10	Prediction of Diabetes Empowered With Fused ML	Machine-learning techniques	SVM,ANN	Weka tool	The Future Is Work Diagnosis and treatment of diabetes at an early stage reduces the disease's mortality rate.
11	Detecting Keratoconus From Corneal Imaging Data Using Machine Learning	Diagnostic techniques,detection algorithm	Corneal parameter	Clinical tool	Streamlining the keratoconus diagnosis process and the detection of this illness at an early phase, thus saving lives.
12	A Novel Ensemble Learning Paradigm for Medical Diagnosis With Imbalanced Data	SMOTE, CVCF technique	SVM parameter	Clinical intelligent diagnosis tool	Help doctors make better, more informed judgments in the future.
13	ML Tools for Long-Term Diabetes Risk Prediction	IoMT and big data analytics(BDA) techniques	Physiological parameters	AI tools	Research in the future will focus on detecting diabetes in senior persons who are still eager to contribute to society
14	Efficient Prediction of Cardiovascular Disease Using ML Algorithms With Relief and LASSO Feature Selection Techniques	Relief and LASSO	hyper-parameter tuning	Clinical tool	Designing the model in a way that is both unique and valuable, and can be easily used in real-world contexts, is a major goal.
15	A ML Framework for Pulse Detection During Out-of-Hospital Cardiac Arrest	Pulse detection algorithm	SVM hyperparameters	Capnography tool	Future research will focus on creating a home-based pulse detector that is both sensitive and accurate.
16	A ML Approaches	SVM, RF, LR, Mrmr	Accuracy	MICRO ARRAY	Research based on these challenges has the potential to

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	Applied to Gene Expression Analysis for Cancer Prediction			& RNA-SEQ	yield novel insights that will enhance cancer categorization and, ultimately, individualised therapies.
17	A Comprehensive Unsupervised Framework for CKD Prediction	K-Means Clustering, DB-Scan, I-Forest, and Autoencoder	Eps (the neighborhood radius) and minPts	Graphical tool	Clinicians will be responsible for future work in managing large numbers of patients and making earlier and more accurate diagnoses of CKD in regional clinics. enabling prompt diagnosis for patients in far areas.
18	New Multi Center and Threshold Ternary Pattern Based Method for Disease Detection Technique Using Voice	maximum pooling technique,KNN AND SVM algorithm	Accuracy	Multimedia Tool	Most of the next generation of real-time applications will benefit from faster voice illness prediction in the future.
19	Analysis for Disease Gene Association Using Machine Learning	Random Forest, PART	Evaluation parameters	Computational tools	In the future, features can be hidden from external modification by taking into account biological and topological characteristics.
20	Improvement in Automated Diagnosis of Soft Tissues Tumors Using ML	Bagging ensemble techniques, RF algorithm	Hyper parameter	Clinical tool	This suggested trained model will eventually be utilised to create a web app with an intuitive UI.
21	Improved key agreement based kerberos protocol for m-health security	CP-ABE technique	Health parameters	Kinit	The future of this work is to extended with other security protocols that use biometrics.
22	Anomaly Detection of IoT Using	K-Nearest Neighbor (KNN),	Hyper-parameter, Fine tuned parameter	Scikit-Learn’s Randomized	Intended to detect IoT flaws and alert an organization's executive or service administrations

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	Machine Learning	Random forest (RF)		Search CV method tool	
23	Machine Learning Based Collaborative Privacy-Preserving Intrusion Detection System for VANETs	K-means algorithm, allies technique	Privatives parameter	Computing tool	Future work is to creates a trained classifier to detect VANET intrusions.
24	Applications of IoT Principles in Healthcare	Digital Technology; Broadband technology	Sensor	Sensor tool	Future work contains demonstrating how the new IoT methodology can be used for ubiquitous medicine
25	Review of Recommendation System Methodologies, International Journal of Psychosocial Rehabilitation	Clinical technology	Accuracy	Clinical tool	In future analysis covers a wide range of progressive deep recommendation systems.

4. CONCLUSION

Strong analytic capabilities are one of the many benefits of using machine learning in healthcare informatics. As a result, the quality of the electronic data made available to clinicians is steadily rising. Parameters like the danger of having a heart attack, stroke, or renal failure may be quickly accessed by doctors. Many blood pressure measurements, gender, family history, race.

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