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Artificial Neural Networks in Medical Sciences

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I. INTRODUCTION

The use of artificial intelligence has currently been largely utilised in medical diagnostic programs. these strategies are adaptive processing algorithms which might be capable of examine multiple and heterogeneous kinds of clinical information a good way to combine them into categorised outputs. in this examine, we in short review studies papers bearing on the problem and talk the idea, opportunities and applicability of artificial neural network techniques for scientific diagnosis. This study focuses on clinical researches from 2010 to 2021. Most of the papers studied in this review in particular targeted on bodily illnesses regardless of mental sicknesses, the utility of ANN in mental and comorbid disorders have no longer been thoroughly studied, ANN fashions and algorithms specifically don't forget homogeneous input records resources and now not heterogeneous enter records resources, and ANN models on multi-target output systems are few in comparison to single-output ANN fashions.

analysis is one of the fundamental tasks of all docs, and its importance for humans cannot be overemphasized. In analysis, medical doctors are tasked with inferring sure sicknesses or formulating treatments based on specific signs and symptoms and symptoms or observations and expertise. Defined diagnosis as "the system of assigning a label to a disorder or different trouble via examining observations and signs and symptoms." absolutely positioned, diagnostics is classed by using experts as a rigorous, complicated and multifaceted task this is related to many issues. some of those troubles encompass disorder signs and symptoms that are not unique to simplest one disease and occasionally overlap with the signs and symptoms of different diseases with a indistinct or inadequate description of ways and what the patient feels within the body because of memory or voice loss; have extreme mental conditions that impair cognitive abilities; ailment incidence; and hazard elements consisting of age, intercourse, and body mass index (BMI), which affect each the sample of dependencies between signs and diseases. Others encompass wrong and premature interpretation of data provided by using sufferers and pointless delays and mistakes in the evaluation of laboratory effects, loss of device, bad technicalities and unbalanced ratio of sufferers to docs inside the fitness quarter in particular in growing countries, and so on. no longer enormously, they claim that fifty% diagnoses are incorrect.

This paper takes a look and review based on clinical research papers related to the software of artificial neural network (ANN) strategies. especially, it makes a study of applicable literary works.

II. LITERATURE STUDY

Paper Title	Problem discussed/Technique	Framework setup	Result	Drawback
Baxt, W. G (1991) artificial neural network applied in diagnosing myocardial infarction [1]	Author research shows that large aspects of clinical data which has been produced regularly that possess small & accurate info as well as variations, low level concepts of biochemistry	The statistical AI generated framework can handle very large amounts of data and categorized outputs	Use of easy process of diagnosis and error free techniques, artificial intelligence techniques can be used for diagnosis with regards to artificial neural networks.	The method studied in this can only be used by practicing and highly qualified physicians
Eladia Maria Pena Mendez, Artificial neural Networks in	To streamline the diagnostic process in daily routine and avoid misdiagnosis, Artificial intelligence methods can be discussed	BPNN and ANFIS	ANN's represent a powerful tool to process large amounts of data, reduced likelihood	The research did not show the categorization of types of ANN techniques and the

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medical diagnosis [2]			of overlooking relevant information & reduction of diagnosis time	different hybrid methods.
Egba. Anwaity Fraser, Okonkwo, Obikwelu R. Artificial Neural Networks for Medical Diagnosis: A Review of Recent Trends [3]	Discussion and review of concepts, The use artificial neural network techniques in medical sciences through consideration of collection of physical and Mental diseases.	MLP or multilayer perceptron	Adaptability and flexibility of the systems; Timely diagnosis of Diseases. Ability to process from voices, images symptoms, text messages etc, Improved accuracy.	the study needto improve on these limitations and applying the scope method and should give more weightage on mental and social health problems.
IHPME, University of Toronto, Toronto Health Economics Technology Assessment University Health Network Uses of artificial neural networks in health care organizations with scope review method [4]	The big goal of this review is to provide a much-needed comprehensive guide of the various applications of ANN in health care organizational decision-making at the low, medium, and high levels. The levels relate to decisions made on the (low) level of individual patients, or on a (medium) group level where patient preference may be important but not essential; and on a wider (high) level by large groups or public organizations related allocate resources regarding interests of society.	A feed-forward network is used which is single-layered (Perceptron, ADALINE) and multi-layered (Multilayer Perceptron, Radial Basis Function)	The study of this lists comprehensive searching ways involving many databases. selection of data were done on things with similar structure and scope.	Studies included in this review did not always use standardized reporting measures and included publications of lower quality.
The University of Warwick, UNITED KINGDOM Artificial Neural Networks in Health Care [5]	Competitive networks, Kohonen's self-organizing maps, Hopfield networks	Using complex adaptive systems (CAS) theory to understand the functionality of AI	The study found artificial neural networks can be applied across all levels of health care organizational decision-making. They found ANN-based solutions applied on the low and medium level of decision-making	This study requires the reader to be already well acquainted with the subject of ANN therefore is not understandable for a novice reader

			suggesting the promise of its use in contexts involving complex, unstructured or limited information. implementation and adoption of the said technique may need an improved understanding of the societal, and economic implications of ANN in health care organizations	
Noura Ajam Heart Diseases Diagnoseds using Artificial Neural Network [6]	In this paper, the use of ANN has been made for Disease Diagnosis with high accuracy.	Frameworks such as Feed Forward back propagation neural network is used as a tool to distinguish between absence and presence of disease	The result shows that the network is able to classify 88% of the cases in the testing set.	Lack of thorough examination of the testing methods mentioned.
B. Tarle, S. Jena Artificial Neural Network with Classified Algorithms for Diagnosis of Heart Disease [7]	The overarching aim of this paper is presenting a model for classification of medical data.	Back Propagation algorithm for better prediction of result	The result shows that using ANN gives accurate results so it may be used in the therapeutic area for finding diseases like swine flu and heart disease.	Insufficient sample size for statistical measurements.
A. Muñoz, E. Palomo, A. Jeréz-Calero Use of an ANN Valuation of MTF & Melatonin on Children with ADHD [8]	The use of an ANN for unsupervised learning called the Growing Neural Forest (GNF), which is a variation of the Growing Neural Gas (GNG) model where a set of trees is learn instead of a general graph so that input data can be better represented.	The GNF and SOM (self – organizing map) Models.	Experimental results demonstrate that sleep was not affected by administrating drugs (MFT and melatonin)	The findings of this study have to be seen in light of some limitations like limited sample size etc.

III. CONCLUSION

The research papers studied above gives us the conclusion of growing interest in computer science, especially artificial neural networks (ANNs), whose models and algorithms are becoming standard tools for decision support systems and expert systems. ANN is undoubtedly a powerful tool to help doctors, other healthcare professionals, and stakeholders implement diagnosis, prognosis, and other enforcement measures.

The various advantages of ANN as found by the studies are listed below:

1) flexible and prone to adaptiveness regarding a system
2) Can process huge amounts of medical data
3) Overlooking of information which is relevant is reduced significantly
4) Diagnosis of diseases in a timely manner
5) processing of datasets from various sources not limited to symptoms etc.

This will be an important computational model in the development of modern clinical decision support and expert systems. The studies reviewed here suggest that ANNS has been shown to be useful in the satisfactory medical diagnosis of both physical and mental illness. Their use has improved the accuracy and reliability of the diagnosis, which in turn has improved patient satisfaction. Protecting patient privacy in all the methods discussed in the above paper is a major issue that needs to be addressed. Also, despite the widespread use of ANN and other intelligent computational algorithms, this tool is only considered as an intermediary in the final decision of the physician with the ultimate responsibility for critically assessing ANN's output.

LIMITATIONS OF ANN

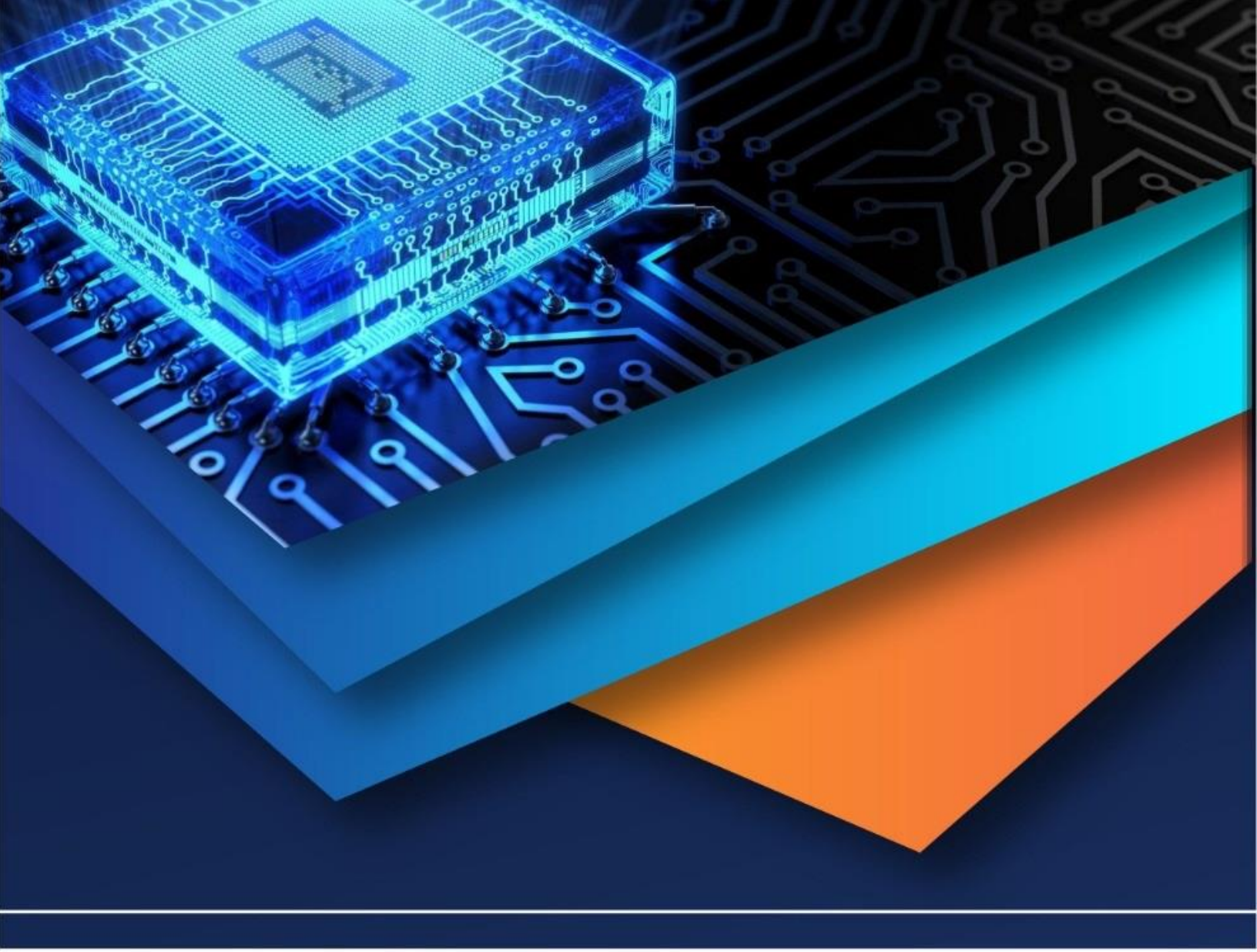
This study shows that limitations are still there in all of these methods and ANN models which are employed to the solving of the problem of diagnosis of diseases.

a) *Hardware Dependency:* Due to its structure, artificial neural networks require processors with parallel computing power. Therefore, the version depends on the device.
b) *Unexplained Network Function:* This is the main problem with ANN. If ANN provides an exploratory solution, the reason and method will not be given. This reduces confidence in the network.
c) *Ensuring Proper Network Structure*: There are no specific rules for determining the structure of artificial neural networks Appropriate network structure is realized by experience and trial and error.
d) *Difficult To Show Problems On The Network*: ANN can handle numerical information. Before deploying to ANN, you need to convert the problem to a number. The display mechanism determined has a direct impact on network performance. This depends on the skill of the user.
e) *Network Duration Unknown:* The network is reduced to a certain value of the error on the sample means that the training has been completed. The value does not give us optimum results.

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