



Application of Multi Layer Neural Network in Medical Diagnosis: an Efficient Survey

¹Arti Rana, ²Arvind Singh Rawat, ³Himanshu Bahuguna, ⁴Anchit Bijalwan

¹Research Scholar, Uttarakhand Technical University, India

²Department of Electronics & Communication Engineering, Uttaranchal University, India

³Department of Computer Science & Engineering, Shivalik College of Engineering, India

⁴Department of Computer Science & Engineering Uttarakhand University, India

Abstract

A enormous extent of facts is presently accessible to medical proficient; diverge from information of medical signs to a assortment of varieties of biological facts as well as imaging machines' results. All kind of facts gives statistics that which is assessed as well as allocated for exacting pathology throughout the investigative procedure. For restructuring the analytical procedure on a day-to-day basis practice and evade misdiagnosis, artificial intelligence techniques (artificial neural networks, computer aided diagnosis) are able to employ. These adaptive learning techniques could be hold different kinds of medicinal facts and amalgamate them into characterized outcomes.

In this paper, we have concisely analyzed and deliberated about competencies, philosophy as well as restrictions of ANN in medicinal analysis concluded elected paradigms.

Keywords: Neural network, cardiovascular diseases, cancer.

1. Introduction

Applications of ANN is increasing day by day in different field of physics as well as chemistry like prophecy of the performance of manufacturing apparatuses[5], optimization of electrophoretic techniques[6], categorization of agricultural products i.e., varieties of onion[7]. Normally, extremely various facts for example categorization of organic substance, chemical kinematic facts are being controlled effectively.

The main purpose of this paper is to present the general perspectives for the use of ANNs in diagnosis in the medical field and in diagnostic advances through preferred instances, manuscript the huge inconsistency of data that can serve as inputs for ANNs.

According to [16], a neural network is an enormously analogous dispersed workstation made up of straightforward components, which have a natural preference to accumulate tentative facts and figure and creating it accessible for more orientation.

2. Artificial Neural Networks

ANNs are extended in the basis of brain structure. Similar to the brain, ANNs can recognize patterns, handle facts and figures and be trained. They are prepared by artificial neurons which employs the quintessence of genetic neurons.

- It acquires a quantity of inputs (from unique data or from output of erstwhile correlated neurons). Each input approaches through a connection, which is called synapses and which has a weight. A neuron also has a threshold value. If the summation of the weights is higher than this value, than the neuron is stimulated.

The stimulation indication constructs the output of the neuron. This output can be the result of the problem or can be measured an input for another neuron. To construct an artificial neural network is required to put collectively a number of neurons. They are arranged on layers. A network has an input layer (which holds the values of outside capricious) and an output layer (the forecasts or the final outcomes). Inputs and outputs communicate to sensory and motor nerves from human body. The network also consist one hidden layer(s) of neurons, which performs an internal function in the network. All these neurons are interconnected to each other.

3. Ann Used in Medical Diagnosis

In the development of biomedicine and medicinal informatics ANN has done appreciably advance work. By the arrival of modern calculating expertise as well as apparatuses, the intricacy for embryonic medicinal diagnosis field to proceed as conclusion sustenance has improved. Since Artificial Neural Network affords diverse tools that possibly will be used expansively in this field to categorize data, acquire, acclimatize and adapt datasets. The latest mechanism in medical diagnosis shows that ANN were applied to identify heart valve syndromes, to diagnose breast cancer, in lung cancer analysis, to diagnose diabetes patients and in cardiovascular disease.

A. Cardiovascular Disease

The model that executed with the preeminent precision (94.3%) was the one that integrated inherited and non- inherited features interrelated to the disease. Although these promising outcomes, it should be eminent that for certain models the accuracy was lower than 90%. An average accuracy of 99.75% and 99.1% was

obtained by two several models developed by for the diagnosis of arrhythmias. Consequently ANNs can be applied to the medical diagnosis of utterly diverse diseases, for instance recognition of arrhythmias, which are most important reasons of death worldwide. Classification accuracies higher than 90% are classically obtained, even beyond 99% in some cases. As an outcome, ANNs have significant prospective in CVD diagnosis.

B. Cancer

American Cancer Society says that more than 1.7 million cancer cases are identified in US in 2014. A quick and accurate diagnosis is necessary for the medical organization of cancer, with the assortment of the most appropriate salutary approaches. The use of artificial neural networks in distinctive particular cancer types or the prophecy of cancer advancement appeared in the late 1990s as a capable computational-based diagnostic tool with the use of diverse inputs.

C. Diabetes

Diabetes shows a severe health dilemma in developed countries, amid predictable facts and figures reaching 366 million diabetes cases worldwide in 2030. Mostly the normal kind of diabetes is type II, where cellular retort to insulin is damaged foremost to interruption of tissue hyperglycemia and homeostasis. The typical in diabetes diagnosis or observing is expressive dimension of glucose attentiveness in blood samples. Non-invasive techniques based on near-infrared to observe glucose stages were developed in 1992 and these days are even accessible as a smart phones application. The ANNs extrapolate glucose meditations from ethereal curvature, hence facilitating expedient observation of diabetes during daily actions.

4. Steps Included in Ann based Medical Diagnosis System

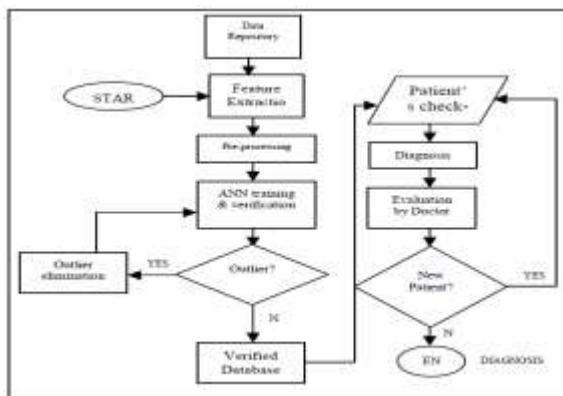


Fig. 1: Framework of ANNs-based medical diagnosis.

Figure 1 represents the fundamental steps of artificial neural network in medical diagnosis. In above diagram firstly the network receives data of patients through data repository to forecast the diagnosis of an assured disease. Afterward the objective disease is recognized, after that the following step is to accurately extract the features (i.e. signs of patients, laboratory, and influential data) that afford the evidence required to distinguish the diverse health circumstances of the patient. This process can be completed in several methods. Tools and techniques recycled in chemometrics permit eradication of features that afford merely redundant evidence. Consequently, cautious assortment of appropriate features requisite to be conceded out in the very initial stage. In another following step, the database is constructed, authenticated and “scoured” of outliers. Afterward the training and verification, the network can

be used in training to envisage the diagnosis. At the end, the expected diagnosis is appraised and assessed by medical doctors.

5. Conclusion

ANNs have confirmed appropriate for acceptable analysis of diverse syndromes. Trendy accumulation, the exploit constructs the analyze extra consistent as well as reliable and consequently amplifies patient contentment. Though, in spite of their plenty use in recent diagnosis, ANN should be measured merely as an instrument to assist the concluding resolution of a clinician, where they are eventually answerable for decisive valuation of the ANN outcomes. Tools and techniques of brief and intricate on instructive, helpful and brainy facts are incessantly refining significantly to efficient, accurate, as well as rapid medicinal analysis.

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