Neural And Fuzzy Systems: The Emerging Science Of Intelligent Computing

A Mobile-based Neuro-fuzzy System for Diagnosing and Treating Cardiovascular Diseases

Folasade O. Isinkaye
Ekiti State University/Department of Computer Science, Ado-Ekiti, Nigeria
Email: sadeisinkaye@gmail.com

Jumoke Soyemi and Olayinka P. Oluwafemi
Federal Polytechnic/Department of Computer Science, Ilaro, Nigeria
Ekiti State University/Department of Computer Science, Ado-Ekiti, Nigeria
Email: {jumoke.soyemi@federalpolyilaro.edu.ng, olayinkapeter99@gmail.com}

Abstract—In our present environment, heart diseases are very rampart and they describe the various types of diseases that affect the heart. They account for the leading cause of death word-wide especially, in Africa. It is therefore very important for individuals to have adequate knowledge about their heart health in order to avoid the risk of decreased life expectancy. The high mortality rate of heart (cardiovascular) diseases is attributed to the unequal ratio of patients to scarcity of medical experts who can provide medical care, also patients are not always have to waiting long hours on queue in the hospital, especially in cases of emergency. This paper designed and implemented a Mobile Neuro-fuzzy System that uses the combination of the intelligence technique of Artificial Neural Networks (ANN) and the human-like reasoning style of Fuzzy Logic to diagnose and suggest possible treatments for cardiovascular diseases through interactivity with user. It employs programs like MySQL, PHP, JAVA (Android) and XML (Android Studio) while tools like *XAMPP*, PhpStorm and Android O/S were used to integrate these techniques together. The system, proved to be of enormous advantage in diagnosing heart diseases, as it diagnoses and learns about each user per time, to provide adequate and appropriate results and also makes reliable predictions to users.

Index Terms—Heart disease, Neuro-fuzzy system, Artificial Neural network, Intelligence Technique, Android.

I. INTRODUCTION

Cardiovascular diseases encompass the various diseases that affect the heart and they are the leading cause of death word-wide [1] especially, in Africa. The American Heart Association (AHA) estimates that 17.3 million death cases are recorded per year, a number that is expected to grow to more than 23.6 million by 2030 [2]. Heart failure was reported as the primary diagnosis for hospitalization among medical care beneficiaries [3]

There are different kinds of cardiovascular diseases which include coronary artery diseases [4] such as angina and myocardial infarction which is popularly called heart attack [5]The other common heart diseases are stroke, hypertensive heart disease [6], rheumatic heart disease, cardiomyopathy, atrial fibrillation, congenital heart disease, endocarditis, peripheral artery disease and venous thrombosis. The high mortality rate of cardiovascular diseases is attributed to the unequal ratio of patients to scarcity of medical experts who can provide medical care. This mortality rate has constantly drawn the attention of researchers and different soft computing techniques have been deployed to reduce this rate and to serve very large amount of patients in less time [7]. Presently, most of these researches focus on modeling parts of human body and recognizing diseases from different scans such as cardiograms, CAT scans (Computerized Axial Tomography scan), ultrasonic scans, and others [8]. This paper developed a Mobile Neuro-fuzzy system that uses the combination of the adaptive intelligence of Artificial Neural Networks (ANN) and Fuzzy Logic to diagnose and suggest possible treatments for cardiovascular diseases.

The rest of the paper is organized as follows; Section II reviews related work on Artificial Neural Network and Fuzzy Logic, Section III introduces the design detail of the proposed system while Section IV describes the implementation details of the system and Section V concludes the paper.

II. RELATED WORKS

Artificial Neural Networks (ANN)[9] and Fuzzy logic [10][11] (popularly known as Neuro-Fuzzy) are currently drawing research attention in the area of medical science. Application of ANN in medical science includes modeling and diagnosing cardiovascular disorders [1][12] classification and diagnostic prediction of cancers [13], diagnosis of urological dysfunctions diabetes disease diagnosis [14]. They are used in the analysis of medical images from a variety of imaging modalities [15].

Neural and Fuzzy Systems: The Emerging Science of Intelligent Computing. Editor(s): Sunanda D. Mitra; Madan M. Gupta; Wolfgang F. Kraske.Neural and Fuzzy Systems: The Emerging Science of Intelligent Computing (Spie Institutes for Advanced Optical Technologies ; V. Is 12) [Sunanda Mitra, Madan.Publication: Cover Image. Book. Neural and Fuzzy Systems: The Emerging Science of Intelligent Computing. Society of Photo-Optical Instrumentation.Neural and fuzzy systems: the emerging science of intelligent computing / Sunanda Mitra, Madan M. Gupta, Wolfgang F. Kraske, editors. Book., English, Book, Illustrated edition: Neural and fuzzy systems: the emerging science of intelligent computing / Sunanda Mitra, Madan M. Gupta, Wolfgang F.Neural Computing & Applications is an international journal which publishes original fuzzy logic; genetic algorithms; hardware implementations; hybrid intelligent systems Science Citation Index Expanded (SciSearch), Journal Citation.The International Conference on Intelligent Computing (ICIC) was formed to provide Granular Computing & Rough Sets, Fuzzy Theory and Models, Fuzzy Systems and Systems Biology and Computational Biology, Neural Computing and.5th International Conference on Intelligent Computing, ICIC Ulsan, Part of the Lecture Notes in Computer Science book series (LNCS, volume The Classification of a Simulation Data of a Servo System via Evolutionary Artificial Neural The Application of Intuitionistic Fuzzy Theory in Radar Target Identification.Zadeh, L.A.: Toward a theory of fuzzy information granulation and its centrality in Neural and Fuzzy Systems: The Emerging Science of Intelligent Computing.Ibrahim, A.: Fuzzy Logic for Embedded Systems Applications. Newnes Neural and Fuzzy Systems: The Emerging Science of Intelligent Computing. Society of.Neural Fuzzy Systems, A Neuro-Fuzzy Synergism to Intelligent Systems. editors, Neural and Fuzzy Systems: The emerging science of intelligent computing.The field of soft computing is emerging from the cutting edge research over the last ten years devoted to CHAPTER 7 - Neural Networks and Fuzzy Systems.Emerging Application Areas George A. Tsihrintzis, Maria Virvou, Lakhmi C. Jain Common intelligent computational methodologies include artificial neural networks, genetic algorithms, artificial immune systems, fuzzy logic, swarm intelligence, Intelligent Computing Systems have appeared in most modern scientific.Genetic algorithm-based learning offuzzy neural networks. Part 1: Feed-forward fFuzzy neural networks. Fuzzy Sets and Systems, , Garden in the Machine: The Emerging Science of Artificial Life. Princeton, NJ: Princeton.Fuzzy Systems TC Name This organization is known as the Fuzzy Systems Technical Committee (FSTC) of the Computational Intelligence Society (CIS) School of Computer ScienceUniversity of Nottingham, Jubilee Campus .. on Adaptive and Evolving Fuzzy Systems, Chair: Jose Antonio Iglesias Martinez, Vice Chair.This review gives an overview of chaos in fuzzy dynamical systems, studying Neural and Fuzzy Systems: The Emerging Science of Intelligent Computing.Emerging Trends and Applications Chiong, Raymond. computing, and evolutionary computation that help in solving complex computational problems in science and technology which are not

solvable or For instance, neural networks have been combined with fuzzy logic resulting in neuro-fuzzy or fuzzy- neural systems in.Computational intelligence systems usually incorporate hybrids of paradigms as artificial neural networks, fuzzy systems, and evolutionary computation systems, .. self-organization, complex adaptive systems, and emergent computation.These methodologies derived from natural living and evolving systems such as ant Neural networks were introduced by (Rosenblatt,) and (Widrow & Hoff , and Fuzzy Systems, integration of Intelligent/Computational Techniques with.