

Chapter 12

Determining Headache Diseases With Genetic Algorithm

Gaffari Celik

Agri Ibrahim Cecen University, Turkey

ABSTRACT

Currently, medical diagnosis has a strong relation with the artificial-intelligence-oriented approaches. Because it is practical to employ intelligent mechanisms over some input data-expert knowledge and design effective solution ways, even the biomedical engineering field is interested in taking support from artificial intelligence. If applications in this manner are taken into consideration, we can see that medical diagnoses have a big percentage. In the sense of the explanations, the objective of this chapter is to use genetic algorithm (GA) for diagnosing headache diseases. As a popular and essential technique benefiting from evolutionary mechanisms, GA can deal with many different types of real-world problems. So, it has been chosen as the solution way/algorithm over the headache disease detection problem, which shapes the research framework of the study. The chapter content gives information about the performed diagnosis application and the results.

INTRODUCTION

Our life is currently run over many technological developments directing the scientific literature in a fast way. This fast way of improvements and changes are of course associated with some past discoveries and inventions, which have important roles on changing our life. Today, individuals can experience very different lives according to the ones experienced by their past ancestors. It is clear that this situation is connected with innovative developments occurred as in fields of especially electrics, electronics and computers. When it is thought about current life standards, it can be easily expressed that the standards are highly directed by computer systems supported with strong environmental technologies. In this sense, especially software and hardware components have remarkable roles to make everything better for individuals while they are interacting with computer systems. At this point, there are currently also some important scientific fields and technologies having great roles on both changing the ways of problem solving within computer systems and introducing new research literatures to the scientific community. Artificial Intelligence is known widely as one of them.

DOI: 10.4018/978-1-5225-4769-3.ch012

Artificial Intelligence has been always a remarkable, strong scientific field to solve different kinds of real-world based problems. In detail, it is possible to indicate that it has reached to a multidisciplinary scope as a result of successful results achieved so far for different problems of different fields (Pannu, 2015). Today, this field is even separated into different research areas – topics such as Machine Learning, Swarm Intelligence and even Cybernetics (Alpaydin, 2014; Jordan & Mitchell, 2015; Kline, 2015; Magin, 2017; Merkle & Middendorf, 2013; Michalski et al., 2013; Sayre, 2014; Waldner, 2013; Yang et al., 2013). At this point, it is also associated with all fields in our life by having stronger connections with also some of them. Medical is one the most remarkable fields in which we can see many problem solution applications of Artificial Intelligence. Although there are different kinds of problem areas of medical as Artificial Intelligence is often employed, diagnosis oriented studies are among the most popular ones nowadays.

Medical diagnosis has always been a remarkable problem solution approach of the field of medical. As a result of changed technologies and problem-solving approaches, even it has improved and evaluated in time. It has been even connected with the latest technological factors appeared in time within the scientific literature. Currently, medical diagnosis has a strong relation with the Artificial Intelligence oriented approaches. Because it is practical to employ intelligent mechanisms over some input data-expert knowledge and design effective solution ways, even Biomedical Engineering field is interested in taking support from Artificial Intelligence. If applications in this manner are taken into consideration, we can see that medical diagnosis have a big percentage.

In the sense of the explanations done so far, objective of this study is to use Genetic Algorithm (GA) for diagnosing headache diseases. As a popular and essential technique benefiting from evolutionary mechanisms, GA can deal with many different types of real world problems. So, it has been chosen as the solution way - algorithm over the headache disease detection problem, which shapes the research framework of the study. Briefly, the formed approach has used a simple function to run from codes of GA particles having weights for different disease symptoms, as similar to an interesting way followed by Tezel and Kose (2011) before. On the other hand, the research done here will be of course a contribution to the associated literature including different examples of medical diagnosis (Some remarkable, recent ones are: Amato et al., 2013; Chattopadhyay et al., 2013; Chikh et al., 2012; Ghumbre et al., 2011; Kharya, 2012; Lavanya & Rani, 2011; Oniśko & Druzdzel, 2013; Prasadl et al., 2011; Qasem & Shamsuddin, 2011; Shankaracharya et al., 2010; Shiraishi et al., 2011; Tripathy et al., 2013; Wall et al., 2012). In detail, the paper content gives information about the performed diagnosis application and the results.

Based on the chapter subject and the research scope, the remaining content is organized as follows: The next section is focused on the Genetic Algorithms (GA) and some information on headache diagnosis. Following that section, the third section is devoted to some brief information about the developed headache diagnosis approach with the support by GA in this study. This section also provides some information about diagnosing performances (classification success) of different GA systems with different specific parameters to enable readers for understanding how the GA based system was good at diagnosing headache disease. Finally, the chapter is ended by focusing on conclusions and some future work ideas under the last section.

12 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/determining-headache-diseases-with-genetic-algorithm/201816

Related Content

Towards an Intelligent Biomedical Engineering With Nature-Inspired Artificial Intelligence Techniques

Utku Kose (2018). *Nature-Inspired Intelligent Techniques for Solving Biomedical Engineering Problems* (pp. 1-26).

www.irma-international.org/chapter/towards-an-intelligent-biomedical-engineering-with-nature-inspired-artificial-intelligence-techniques/201805

Intelligent Biomedical Engineering Operations by Cloud Computing Technologies

Hasan Armutlu (2018). *Nature-Inspired Intelligent Techniques for Solving Biomedical Engineering Problems* (pp. 297-317).

www.irma-international.org/chapter/intelligent-biomedical-engineering-operations-by-cloud-computing-technologies/201819

Artificial Intelligence Ethics in Biomedical-Engineering-Oriented Problems

Alice Pavaloiu (2018). *Nature-Inspired Intelligent Techniques for Solving Biomedical Engineering Problems* (pp. 219-231).

www.irma-international.org/chapter/artificial-intelligence-ethics-in-biomedical-engineering-oriented-problems/201814

Coupling of Optimization Algorithms Based on Swarm Intelligence: An Application for Control of Heroin Addiction Epidemic

Kamalanand Krishnamurthy and Mannar Jawahar Ponnuswamy (2018). *Nature-Inspired Intelligent Techniques for Solving Biomedical Engineering Problems* (pp. 27-50).

www.irma-international.org/chapter/coupling-of-optimization-algorithms-based-on-swarm-intelligence/201806

Artificial Intelligence Applications on Classification of Heart Sounds

Huseyin Coskun and Tuncay Yigit (2018). *Nature-Inspired Intelligent Techniques for Solving Biomedical Engineering Problems* (pp. 146-183).

www.irma-international.org/chapter/artificial-intelligence-applications-on-classification-of-heart-sounds/201811