Chapter 9
Diabetes Diagnosis System Based on Support Vector Machines Trained by Vortex Optimization Algorithm

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ABSTRACT

Artificial intelligence is widely enrolled in different types of real-world problems. In this context, developing diagnosis-based systems is one of the most popular research interests. Considering medical service purposes, using such systems has enabled doctors and other individuals taking roles in medical services to take instant, efficient expert support from computers. One cannot deny that intelligent systems are able to make diagnosis over any type of disease. That just depends on decision-making infrastructure of the formed intelligent diagnosis system. In the context of the explanations, this chapter introduces a diagnosis system formed by support vector machines (SVM) trained by vortex optimization algorithm (VOA). As a continuation of previously done works, the research considered here aims to diagnose diabetes. The chapter briefly gives information about details of the system and findings reached after using the developed system.

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INTRODUCTION

Artificial Intelligence is widely used in many different fields having remarkable role on increasing the amount of scientific developments. We cannot see any field that has not at least indirect support from intelligent approaches, methods, and techniques of Artificial Intelligence. It is possible to briefly just focus on how a different field is vital for us and how it can be improved efficiently thanks to the field of Artificial Intelligence. The research fields meeting under the framework of medical – health are known as such type of fields. When we consider the associated literature, we can see that there is a popular interest in i.e. designing diagnosis oriented systems to support doctors or any other workers in the fields of medical services (Choi et al., 2017; Jiang et al., 2017; Khubchandani et al., 2017; Kononenko, 2001; Stoitsis et al., 2006; Waal, 2017). When it comes which intelligent techniques to use for medical purposes, there is a great diversity of available Artificial Intelligence techniques.

Today, it can be observed that the diagnosis approach of Artificial Intelligence is generally based on using some past data – experiences to train an intelligent system and enabling that system to diagnose the objective disease(s) by using new data that may be new for the system. Because of the 'training mechanism' mentioned here, intelligent diagnosis systems are generally based on Machine Learning techniques. For example, Artificial Neural Networks or Support Vector Machines are some typical Machine Learning techniques used for diagnosis purposes (Abbass, 2002; Akay, 2009; Al-Shayea, 2011; Amato et al., 2013; Lee & Lee, 2003; Polat & Gunes, 2007; Wu et al., 1993). Along the systems formed over training of the chosen techniques, it is aimed to have as accurate as intelligent diagnosis infrastructure depending on the data sets of objective disease. It seems that there are many different types of medical and biomedical applications of Artificial Intelligence but diagnosis has a remarkable popularity because of the importance of 'early diagnosis of diseases', which is a vital factor for living organisms including humankind.

As associated with the explanations above, the objective of this chapter is to provide an alternative intelligent diagnosis system for detecting diabetes according to some given input data. In detail, the work is the continuation of a previously done work (Kose et al., 2015) and it focuses on some more aspects of the used Artificial Intelligence techniques. As different, some alternative parameter values and approaches have been used for the formed system, within this study. In detail, the diagnosis system is formed by a model of Support Vector Machines (SVM), which is trained by Vortex Optimization Algorithm (VOA). The system generally has a simple structure but employs the problem-solving approach of classification for reaching to its main objective. Along the chapter, background and details of the system and information about performed experiments are provided.

Considering the topic of the chapter, the remaining content is organized as follows: The next section provides essential information about the formed system, employed Artificial Intelligence techniques under it, in order to enable readers to have enough information about what has been done in the study. Following that, the third section explains some experimental operations and provides the obtained findings. Next, the fourth section focuses on some future research ideas and finally, the chapter ends with the last section on a brief discussion regarding to conclusions.