

## Chapter 19

# A Case-Based-Reasoning System for Feature Selection and Diagnosing Asthma

**Somayeh Akhavan Darabi**  
*Azad University of Tehran Shomal, Iran*

**Babak Teimourpour**  
*Tarbiat Modares University, Iran*

### ABSTRACT

*Asthma is a chronic disease of the airways in the lungs. The differentiation between asthma, COPD and bronchiectasis in the early stage of disease is very important for the adoption of appropriate therapeutic measures. In this research, a case-based-reasoning (CBR) model is proposed to assist a physician to therapy. First of all, features and symptoms are determined and patients' data is gathered with a questionnaire, then CBR algorithm is run on the data which leads to the asthma diagnosis. The system was tested on 325 asthmatic and non-asthmatic adult cases and the accuracy was eighty percent. The consequences were promising. This study was performed in order to determine risk factors for asthma in a specific society and the results of research showed that the most important variables of asthma disease are symptoms hyper-responsive, frequency of cough and cough.*

### INTRODUCTION

Asthma is the most prevalent chronic disease in children and adolescents which causes much morbidity increase, mortality and health care expenditure. In addition to the mortality augmentation caused by this disease, asthma has a lot of effects on the life quality and children's educational activities. It is clear that false diagnosis and inappropriate therapy are two factors which help morbidity and mortality increase in asthmatic illness which both occur for the reason of lack of knowledge in the patients and the families. Studies show that there is a considerable difference between accepted asthma prevalence by physicians and the asthma related to symptoms in medical researches which it shows the lack of asthma recognition by physicians in Iran (Tootoonchi, 2004). By better identification of pathogenic mechanisms

DOI: 10.4018/978-1-5225-2515-8.ch019

in asthma ailment and the efficient communication in effective variables in asthma and determining the most important of them, one can promote people and patients' knowledge and this trend causes the disease symptoms and the asthmatic patient's life quality to be connected intensity as scoring searches. Feedbacks with their significance accept the transferable relationships (Akhavan Darabi et al., 2014). Asthma has also more morbidity in the developed countries, but it has more asthmatic mortalities which can be ascribed to the third world countries. The other reasons can be attributed to the nonexistence of sufficient specialists, the lack of necessary facilities for diagnosis and the ignorance of people in this field which is more significant than other reasons.

The prevalence of asthma varies widely in different regions of the world due to distinct genetic, environmental and occupational risk factors. However, this disparity appears to be closing as the prevalence in high-income countries is reaching a plateau, whereas the prevalence in low and middle-income countries continues to rise. Worldwide, it is estimated that approximately 334 million people currently suffer from asthma, and 250,000 deaths are attributed to the disease each year. The prevalence of the disease is continuing to grow, and the overall prevalence is estimated to increase by 100 million by 2025 (Yolanda Smith & BPharm, 2016).

Within the medical community, there has been significant research into preventing clinical deterioration among hospital patients. Data mining on electronic medical records has attracted a lot of attention, but it is still at an early stage in practice. Clinical study has found that 4–17% of patients undergo cardiopulmonary or respiratory arrest while in the hospital (Commission, 2008). Early detection and intervention are essential to preventing these serious, often life-threatening events. Indeed, early detection and treatment of patients with sepsis has already shown promising results, resulting in significantly lower mortality rates (Joans and Brown, 2008).

Case based reasoning (CBR) technique is one of the data mining tools which are applied for the medical diagnosis, anticipating the chronological order and so forth.

## **LITERATURE REVIEW**

There are different kinds of studies for Data Mining techniques in medical databases. We identify the following categories:

### **Data Mining Techniques and Healthcare**

Lee et al. (2015), used new data mining mechanism for the purpose of asthma attack disease prediction. These two methods are called the tree decision depended upon the law-based pattern. The accuracy of this system is 84.12 percent.

Nordquist et al. (1996), studied about the rendering of the learning operation. As a matter of fact, the aim was to determine the success level of performing the learning process on the basis of the sample. In another article, Chae and Hoo (1996), compared the two nervous lattices algorithms and case based reasoning (CBR).

Misra and Dehuri (2007), in their study, Functional Link Artificial Neural Network for Classification Task in Data Mining created a Functional Link Artificial Neural network and compared its classification performance with other machine learning algorithms. Their FLANN has given 21.87% misclassification performance and MLP has given 24.8% classification performance.

14 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/a-case-based-reasoning-system-for-feature-selection-and-diagnosing-asthma/186951](http://www.igi-global.com/chapter/a-case-based-reasoning-system-for-feature-selection-and-diagnosing-asthma/186951)

## Related Content

---

### Aligning Aggregate Planning with (s,S) Inventory Model in a Stochastic Demand Environment

Shantanu Shankar Bagchiand Rik Paul (2018). *International Journal of Strategic Decision Sciences* (pp. 29-44).

[www.irma-international.org/article/aligning-aggregate-planning-with-ss-inventory-model-in-a-stochastic-demand-environment/198944](http://www.irma-international.org/article/aligning-aggregate-planning-with-ss-inventory-model-in-a-stochastic-demand-environment/198944)

### An Improved Measurement Model for Internal Integration: A Systems and Contingency Approach

Abirami Radhakrishnan, Sheela Thiruvadiand Dessa David (2013). *International Journal of Strategic Decision Sciences* (pp. 85-105).

[www.irma-international.org/article/an-improved-measurement-model-for-internal-integration/102603](http://www.irma-international.org/article/an-improved-measurement-model-for-internal-integration/102603)

### Overview of Decision Support Systems Applied to Construction

(2016). *Decision Support for Construction Cost Control in Developing Countries* (pp. 77-94).

[www.irma-international.org/chapter/overview-of-decision-support-systems-applied-to-construction/147432](http://www.irma-international.org/chapter/overview-of-decision-support-systems-applied-to-construction/147432)

### An Empirical Study of Group Awareness Information in a Web-Based Group Decision Support System

Nipat Jongsawatand Wichian Premchaiswadi (2010). *International Journal of Decision Support System Technology* (pp. 16-40).

[www.irma-international.org/article/empirical-study-group-awareness-information/46636](http://www.irma-international.org/article/empirical-study-group-awareness-information/46636)

### Rough Set Theory

Malcolm J. Beynon (2008). *Encyclopedia of Decision Making and Decision Support Technologies* (pp. 783-789).

[www.irma-international.org/chapter/rough-set-theory/11321](http://www.irma-international.org/chapter/rough-set-theory/11321)