Chapter 3

Early Diagnostics Model for Dengue Disease Using Decision Tree-Based Approaches

Shalini Gambhir
SRM University, India

Yugal Kumar
Jaypee University of Information Technology, India

Sanjay Malik
SRM University, India

Geeta Yadav
Manav Bharti University, India

Amita Malik
Deenbandhu Chhotu Ram University of Science and Technology, India

ABSTRACT

Classification schemes have been applied in the medical arena to explore patients’ data and extract a predictive model. This model helps doctors to improve their prognosis, diagnosis, or treatment planning processes. The aim of this work is to utilize and compare different decision tree classifiers for early diagnosis of Dengue. Six approaches, mainly J48 tree, random tree, REP tree, SOM, logistic regression, and naïve Bayes, have been utilized to study real-world Dengue data collected from different hospitals in the Delhi, India region during 2015-2016. Standard statistical metrics are used to assess the efficiency of the proposed Dengue disease diagnostic system, and the outcomes showed that REP tree is best among these classifiers with 82.7% efficient in supplying an exact diagnosis.

DOI: 10.4018/978-1-5225-7131-5.ch003
INTRODUCTION

Dengue is a life threatening disease prevalent in several developed as well as developing nations. This is a virus born disease caused by the breeding of Aedes mosquitoes. Presently, in most regions of the tropics, epidemics are near peak transmission before they are acknowledged and supported as a viral infection. It is mostly too late to implement effective preventive steps that could represent an efficient impact on transmission. To master this situation the surveillance and diagnosis of Dengue should be proactive. The most important concern in developing the dengue diagnostic model is timely prediction of the disease, as its initial symptoms are similar to some other infections (Santosh Kumar et al., 2017; Chopra et al., 2014; Muniaraj, 2014; World Health Organization, 2009,2007). The aim of the survey is to diagnose patients as “Dengue Positive” group or “Dengue Negative” on the basis of preliminary symptoms. To address this concern different machine learning techniques for dengue fever classification are used such as Naïve Bayes (NB) classifier (Tu et al., 2009) Decision Tree (DT) (Palaniappan & Awang, 2009), K-Nearest Neighbor (KNN) Technique (Jonsson & Wohlin, 2004), Multilayered Technique, Support Vector Machines (SVM) (Andreeva, 2006) and so along. These techniques can then be assessed based on several performance measures like Accuracy, Precision, Sensitivity, Specificity and Negative rate. This chapter offers a Decision Tree (DT) based dengue diagnostic model. This model can help medical staff to forecast early and accurate diagnosis of dengue using health and medical related data of patients. Moreover, this information can analyze data in different situations and also draws out a pattern of behaviors of patients. The primary aim of Decision Tree (DT) based diagnostic system is to create a model for early detection and diagnosis of dengue disease. Further, three different tree classifiers namely J48, Random tree and REP tree were evaluated and compared with SOM, Logistic regression and Naïve Bayes for precise diagnosis of dengue positive patients. The aims of the proposed chapter by using the real world dengue disease data from the different hospitals located in Delhi (India) are as follows:

1. Using the real world dengue disease data from the different hospitals located in Delhi (India).
2. To apply the DT technique for precise detection of dengue positive patients.
3. To develop a diagnostic model based on machine learning techniques for early detection and diagnosis of dengue disease and furthermore for the assistance of physicians.
4. To validate the results of the proposed diagnostic model.
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