

## Chapter 26

# ACO\_NB–Based Hybrid Prediction Model for Medical Disease Diagnosis

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### ABSTRACT

*In recent years, a huge increase in the demand of medically related data is reported. Due to this, research in medical disease diagnosis has emerged as one of the most demanding research domains. The research reported in this chapter is based on developing an ACO (ant colony optimization)-based Bayesian hybrid prediction model for medical disease diagnosis. The proposed model is presented in two phases. In the first phase, the authors deal with feature selection by using the application of a nature-inspired algorithm known as ACO. In the second phase, they use the obtained feature subset as input for the naïve Bayes (NB) classifier for enhancing the classification performances over medical domain data sets. They have considered 12 datasets from different organizations for experimental purpose. The experimental analysis advocates the superiority of the presented model in dealing with medical data for disease prediction and diagnosis.*

### INTRODUCTION

In recent years, the world has encountered huge challenges with respect to early detection and prediction of diseases (Ilayaraja & Meyyappan, 2013). A useful matching pattern, related information or information extraction is not at all a simple task. Due to unavailability of related tools and technique, the world

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is facing problem in medical field. As the medical data belong to natural domain, therefore there is a possibility for the dataset for being imbalance, impure and may have vagueness. Due to above mentioned points and due to less information available in the literature, it is quite difficult to develop a disease prediction model for predicting the diseases (Matsumoto et.al. 2002).

In the recent past, due to the development of new technologies and related research, extracting medical data and availability of the same is easier than earlier. With availability of data, authors can now help in the discovery of disease diagnosis which can directly contribute in the knowledge discovery related to medical diseases and practitioners. As said earlier, the availability of medical data will help to improve the disease diagnosis and will help in the treatment methodology for numbers of diseases. Now days, several new technologies such as Cloud computing, IoT and Big data has emerged as a boom for information retrieval and mining of medical data. Many authors have proposed a centralized medical database for the recording and analysis of medical data at one place. These centralized databases are considered with the application of new technologies such as Cloud Computing and IoT (Aswin & Deepak, 2012). If authors can able to develop any such kind of medical centralized database for keeping the health records of the patients and related diseases details, then it will be easier for the doctors and medical practitioners to cure the disease (Seera & Lim, 2014). Industries and organizations have to come forward in order to build such kind of centralized system for medical data. Similarly, authors need to have some decision support tools for stepping forward in the direction of medical disease diagnosis. Furthermore, this can also be achieved if authors implement or use the Artificial Intelligence techniques. In the literature, a number of decision support tools have been proposed. Seera and Lim (Seera & Lim, 2014). have proposed a fuzzy min-max neural network which came out to be an efficient hybrid classification system for medical data. Another proposal given by Kahramanli and Allahverdi (Kahramanli & Allahverdi 2008) which is based on the application of artificial and fuzzy neural network. This classification system is developed for the diagnosis of diabetes and heart diseases. Similarly, in 2011 Lee and Wang (Lee & Wang 2011) designed a fuzzy based expert system to diagnosis diabetes. In 2014, another such kind of diseases prediction system was purposed by Kalaiselvi and Nasira (Kalaiselvi & Nasira, 2014). The presented method in (Kalaiselvi & Nasira, 2014) gives a model which is useful for diabetes diagnosis as well as cancer disease prediction. The model was based on Adaptive Neuro Fuzzy Inference System (ANFIS). Many review and comparisons were also presented by various authors round the globe for Medical Disease Diagnosis. In (Garg et.al 2005) Garg et al. presented an extensive review which shows the importance of computerized clinical decision support systems on patient outcomes and practitioner performances. Similarly, Kawamoto et al.(Kawamoto et.al. 2005) presented a systematic review for identifying the important feature and parameters in order to improve and enhance the clinical practices using decision support system. Another approach was presented by Narasinga rao et al. (Narasinga rao et al. 2009), who designed a decision support system for diabetes with the application of multilayer neural networks. Moving further, authors in (Srimani & Koti, 2014) used a rough set method for producing optimal rule sets for medical related data. Ye et al. (Ye et al 2002) made research and development for finding the degree of malignancy in brain glioma by using fuzzy sets. As said in the previous paragraphs, Syeda-Mahmood (Syeda Mahmood 2015) has given a plenary talk on the role and application of machine learning algorithms in modern clinical decision support systems. Waghlikar et al. (Waghlikar et al. 2012)has made a survey report on modeling paradigms for medical diagnostic decision systems. Recently, an investigation for developing an intelligent system were purposed with the help of computer vision and image procession (Martis et.al 2015). Similar to the above concept presented in (Martis et.al 2015), Rajinikanth et al. (Rajinikanth et al. 2017) also presented an approach for segmentation of the

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