PREFACE

With the evolu on of Ar cial Intelligence, development of decision support systems in various elds became an area of great interest. Inven on of Ar cial Intelligence makes it possible to implant thinking mechanism in machine so that it can take decision as and when necessary. Various issues related to health care sectors, such as inadequate domain experts, poor infrastructure, and huge workload, demand the incorpora on of ar cial intelligence in medical science for convenience as well as to provide be er services. The decision support system may help health professionals (i.e. doctors, nurses etc) in making decisions while diagnosing and managing diseases.

Early detec on of diseases and proper treatments are solicited for survival of pa ents. The proposed systems based on so compu ng techniques may be useful in this context. These intelligent automated systems may assist personnel related to healthcare service to diagnose new pa ents accurately with improved diagnos c speed. Moreover these systems can be used to train students or general physicians to diagnose pa ents with problems requiring a specialist. To overcome the problems in medical diagnosis few tasks have been taken into considera on as discussed in the chapters of the research work.

Chapter 1 presents di erent sources of inexact informa on in medical diagnosis and the di cul es due to this cause. The need of decision support system and how it can be useful in medical domain are also discussed. The objec ves of our study are described in this chapter. Finally, the advantages which have been expected from the proposed work are discussed. Chapter-wise summary of the research work is also presented in this chapter.

Domain related facts and gures are presented in chapter 2. Medical knowledge on breast cancer, cardiac arrhythmia, and hepa s disease are discussed. Incidence rate, mortality rate, and morbidity rate of the said diseases are described sta s cally as well as graphically in global and Indian perspec ve. Issues related to the diseases are also reported. Finally, discussions have been made to jus fy the requirements of alterna ve medical diagnosis system.

Chapter 3 presents various so compu ng techniques, such as fuzzy expert system, gene c algorithm, and ar cial neural network, used in diagnosing diseases. Intelligent models using these techniques as proposed by literatures and the corresponding outcomes are presented in tabular form. Di erent forms of ar cial neural network, node func ons, and machine learning algorithms, such as

incremental backpropaga on learning network (IBPLN), and Levenberg – Marquardt (LM) algorithms, are also described in this chapter.

Chapter 4 discusses various steps to prepare data, which is needed to develop reliable intelligent automated systems. Data preprocessing steps and its usefulness are discussed in this chapter. Feature selec on techniques, such as correla on-based feature subset selec on (CFS), rough set (RS), principal component analysis (PCA), and gene c algorithm (GA), are described. Finally, missing value handling techniques are analyzed sta s cally to implement appropriate method during analysis of data.

Studies on performance predic on parameters to judge intelligent models are presented in chapter 5. A set of such parameters are proposed to measure the performance of predic ve models.

Chapter 6 presents various steps in designing intelligent automated systems to diagnose breast cancer based on UCI breast cancer data set. So compu ng techniques, such as CFS, RS, PCA, IBPLN, and LM algorithm, are implemented in designing the proposed system. Finally, experimental results, compara ve study in terms of performance measures and observa ons are presented.

Chapter 7 provides implementa on of so compu ng techniques, such as GA, CFS, IBPLN, and LM algorithm, to develop intelligent automated system to predict cardiac arrhythmia. Outcomes of simula ons are summarized in tabular form. The results are compared in terms of accuracy, sensi vity, speci city and area under ROC curve. Observa ons on the study are also presented.

Chapter 8 discusses two di erent approaches that have been a empted to diagnose hepa s disease. Implementa on of mul ple imputa ons using EMB approach to handle missing values in the data set is also presented. Features are selected using CFS and RS methods. Machine learning algorithms, such as IBPLN, and LM algorithm, are use for classi ca on. Finally, experimental results and observa ons have been presented.

Chapter 9 presents how we accomplish our objec ves as men oned in chapter 1. It is the nal chapter of our research work. Future scopes of the study are also discussed in this chapter.