**Abstract**

Nowadays rate of death is increased due to the rapid growth of cardiovascular diseases. Due to the above reason, diagnosing the cardiovascular heart disease becomes very important in medical field. The subset features which are considered as vital role in disease diagnosis are identified for the same disease in modern medicine. Currently, many data mining techniques related to different types of heart disease diagnosis were presented by several authors. Existing methods mainly concentrated on high accuracy and less time consumption and it uses many different types of data mining techniques. This work consists of three major steps such as missing data imputation, high dimensionality reduction or feature selection and classification. The above steps are performed using a dataset called cardiovascular heart disease dataset with 500 patients and 14 features and it utilizes several effective features. Because of incomplete data collections Real time datasets often reveal unaware missing feature’s patterns. First step consists of the Expectation Maximization (EM) algorithm which fits an independent component model of the data. This increases the possibility of performing Modified Independent Component Analysis (MICA) on imperfect observations. Bat Imperialist Competitive Algorithm (BICA) based feature selection method is proposed to improve the dataset. BICA is an evolutionary algorithm which is based on the development of human's socio-political. In this algorithm an m number of features and the N number of cardiovascular heart disease observations are used as initial population which is called as countries. A classification approach is introduced with Genetic Fuzzy based Improved Kernel Support Vector machine (GF-IKSVM) classifier and a BICA based feature selection for the classification of cardiovascular heart disease dataset. BICA is used for feature selection methods to reduce number of features which indirectly decreases the important diagnosis tests required to the patients. The proposed method achieves 94.4% accuracy, which is higher than the methods used in the literature. This GFIKSVM classifier is well-organized and provides good accuracy results for cardiovascular heart diseasediagnosis.