Chapter 9
Cardiac Image-Based Heart Disease Diagnosis Using Bio-Inspired Optimized Technique for Feature Selection to Enhance Classification Accuracy

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ABSTRACT

In this chapter, chimp optimization algorithm (ChOA) a bio-inspired optimized technique are proposed for selection of features to increase the classification accuracy of heart disease diagnosis. In this approach, noises contained in the cardiac image are removed using median filter initially. Then, GLCM features are extracted from the cardiac image. Among the extracted features, optimal features are chosen using ChOA algorithm. These selected features are taken as input to the classifier. In this approach, support vector neural network (SVNN) is used as a classifier. The classifier classifies the image into normal and abnormal. Simulation results depict that the ChOA-based SVNN performs better than the conventional SVNN, ANN, KNN, and SVM in terms of accuracy.

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INTRODUCTION

Heart disease portrays an extent of condition that impacts the heart. The term cardiovascular illness is regularly utilized with cardio vascular diseases (CVD). The blood to the heart is given by coronary reserve courses and restricting of coronary veins is the huge justification for cardiovascular breakdown. Heart disease prediction is considered as one of the fundamental subject in the section of analytics of data. The huge justification for heart attack in USA is artery disease. There are a few primary reasons for heart disease. Some of them might be elevated cholesterol levels, high sugar, CVD, smoking, lack of physical activities and use of alcoholic drinks. Feature extraction and selection are significant stages for prediction of heart disease (Hajar, 2017) (Ali et al., 2019). An ideal set of feature ought to have compelling and separating features, while generally decrease the features redundancy speed to keep away from "revile of dimensionality" issue. Feature selection methodologies regularly are applied to investigate the impact of insignificant features on the presentation of classifier frameworks (Gu et al., 2018; Liu & Tang, 2013; Suganya et al., 2016). In this stage, an ideal subset of features which are fundamental and adequate for tackling an issue is chosen. Feature selection works on the algorithms accuracy by lessening the dimensionality and eliminating unwanted features (Aloysius George, 2013; Jeong et al., 2012; Ramola et al., 2020; Rodríguez, 2019; Shen et al., 2012; Singh et al., 2015; Vivan, 2019).

Lot of prediction approaches have been presented by the researchers for heart disease classification. For example, Jalil Nourmohammadi-Khiarak et al (Nourmohammadi-Khiarak et al., 2020) have selected optimal features using imperialist competitive algorithm with meta-heuristic algorithm. Besides, for classification, they have used K-Nearest Neighbour algorithm. For diagnosis of heart disease, Kauser Ahmed P and D. P. Acharjya (Acharjya, 2020) have presented a hybrid method. Using cuckoo search algorithm, important features have been chosen. Then, these features were analyzed with the rough set originating rules. Gautam Srivastava et al (Reddy et al., 2020) have proposed an adaptive genetic algorithm with fuzzy logic structure for predicting heart disease. For feature selection, they have used rough sets. As well as, for classification, they have used fuzzy rule. The rules of fuzzy system were enhanced using adaptive genetic algorithm. R. Thanga Selvi and I. Muthulakshmi (Selvi & Muthulakshmi, 2021) have introduced optimal Artificial Neural Network (ANN) based big health application framework for diagnosis heart disease. The proposed model included two stages that were distance based misclassified instance removal as well as teaching and learning based optimization scheme for ANN. The proposed model was performed on both online and offline prediction phases. A. Sheryl Oliver et al (Oliver, 2021) have presented Regressive Learning-Based Neural Network (RLBNN) classifier for diagnosis heart disease. For heart disease

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