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DATA CLASSIFICATION PERTAINING TO HEART DISEASES USING HYBRID CHICKEN SWARM OPTIMIZATION WITH ARTIFICIAL NEURAL NETWORK (HCSOANN)

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Abstract:
The classification of medical data is the demanding challenge to be addressed among all research issues since it provides a larger business value in health analytics environment. Classification is a mechanism that labels data enabling economical and effective performance in valuable analysis. Research has indicated that the quality of the feature may cause a backlash to the classification performance. This research work initiate a hybrid method named Hybrid Chicken Swarm Optimization with Artificial Neural Network (HCSOANN) for identifying appropriate feature subsets related to target class and given to classifier model to enhance the performance. The Chicken Swarm Optimization which works well in a data mining optimization environment with minimum running time makes the choice of a subset of features by maintaining precision between the user and the databank, and Artificial Neural Network, a deep learning method makes an efficient classification of the data mining. The proposed research work explores the impact of feature selection process since efficiency is mandatory when a sample heart diseases feature is shared by a user for the choice of relevant features from databank and vice versa. Qualitative assessment of proposed Hybrid Chicken Swarm Optimization with Artificial Neural Network classification mechanism has been made with classification accuracy is 94.7% and better precision time respectively. Statistical analysis of accuracy values and computational time portrays that the proposed schemes provides compromising results over existent methods.

Keywords: Cardiovascular Disease, Hybrid Chicken Swarm Optimization with Artificial Neural Network, False Positive Rate.

I.INTRODUCTION

Data mining illuminates the excessive amount of dataset by comprehensive analysis arising from uncontrollable hike of global data. Data analytics have exposed the hidden patterns and secretive associations between the values. The growth of volume, variety and velocity has made great challenges in the environment of big data analytics. During recent times, the quick development of websites has raised the volume of ample information that advances to the complication in the prediction of patterns. Excessive amount of data traffic and the different categories of data like text, image, audio, video etc. have triggered the use of the word big data that accords with excessive data extraction by collection and analyzing from website especially medical field [1]. The amount of data stored and transfer between the devices have shown increase due to accelerated growth of various medical data. The ample datasets are mostly well defined in the machine learning under unstable hike of universal heart diseases data. Data creation, data accession, data analysis and data storage in the traditional datasets are complicated due to the large magnitude [2].Many machine learning approaches for diagnosis the disease heart, stroke, cancer and diabetics with poor accuracy. In the medicinal field, expeditious diagnosis known for accuracy and provision of the correct treatment are key responsibilities and it can be achieved by categorizing different heart diseases from an extensive database [3].

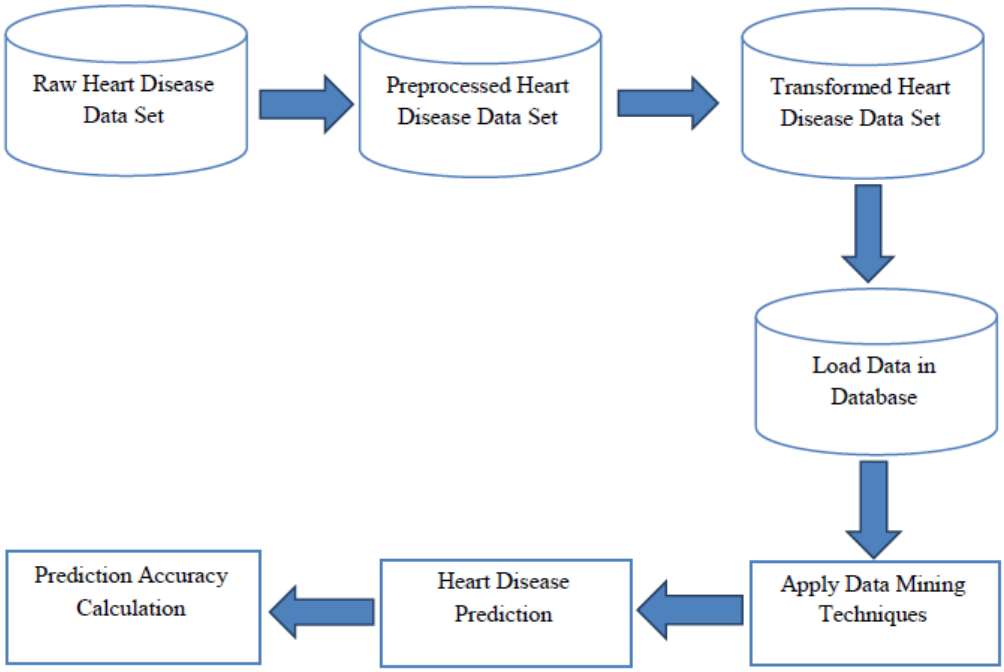

Figure 1 heart disease Prediction Systems

The discovery of interested fields from the medical dataset is reserved for different issues and such difficulties are labeled as classification problems and it is a significant research field in medicinal practice, required to develop effective and efficient classifier for the heart diseases prediction. Heart diseases issues addressed to the control over the classification performance is same for the partitioning of the poses of the human test set and the viewpoints related to the probe and training dataset [4]. The proposed Hybrid Chicken Swarm Optimization with Artificial Neural Network discusses the aforesaid issues with a reasonable feature extraction and learning procedures. The technical addition of local nary established feature extraction and feature established heart diseases classification is mixture of novel Pattern feature extraction and deep learning setup later to pre-processing level has the greatest influence to the proper classification of defect levels regardless of the dimensionality levels along with minimal run time [5].

The reminder of this research is organized as. Section2, heart diseases prediction and its related work, Section 3 discussed to swarm intelligence with artificial neural network algorithm, section 4 presents proposed system and existing systems experimental results comparison. Finally, section 5 provides the concluding remarks and future scope of the work.

II.LITERATURE REVIEW

The classical methods existing machine learning approach in the functional level of heart diseases dataset classification, feature extraction and the influence of the classifier on anomaly prediction are briefly discussed here.

M. Anbarasi et al., (2010) have suggested The classification performance of genetic algorithm is enhanced by affine frameworks and the calculation of Euclidean distance. The prediction efficacy of nearest neighbours correspondent to the target pixels are used for enhancing the classical sparse models. The integration of neighbours by the pixels for the construction of the novel set enhanced the differentiation performance. The preset surface architectures and temporary associations are required for the alterations of appearance or temporary information's of UCI dataset classification.

Jyoti et al., (2011) have suggested The Constructive Divergence (CD) method is extended by them encoded the various feature types concurrently. The alignment challenge has not been investigated in the past works. In patch based illustrations, the robustness contrary to the misalignment provides efficient performance of UCI wiscons in heart diseases dataset compared to the various machine learning approach by Ahmad Taher Azar et al., (2014). For offering exact treatment and instantaneous diagnosis appliances, CAD (Computer Aided Diagnosis) provides a great influence on medicinal image processing. The extensive appearance changes and the structural divergence have made brain tumor diagnosis a nitpicking challenge Ramiro et al., (2016).

Krishnaiah et al., (2016) have suggested two-tier classification established on the heart diseases dataset in adaptive segmented approaches. The clustering technique adaptive pillar k-means has been used for pre-processing the segmental images. The DWT (Discrete Wavelet Transform) is utilized for estimation of the feature vector. Finally the K-NN (K-Nearest Neighbour) method is utilized for attaining classification accuracy. Electrical features such as permittivity and conductivity of the human body prediction are nitpicking challenges in proposed system. The allocation of edges incorporate the efficacy of method accomplished Gabor transform by extracting this information. In pattern recognition, appliances are needed for enhancing the performance of classification the development of K-NN by M. Chakarverti et al., (2019).

For heart MRI images, high level features are learnt from fusion of ensemble learning with an unsupervised DBN, the SVM, Neural Network and tree approaches introduced by Guijun Chen et al., (2015) and P. Filzmoser et al., (2004) an efficient classification performance was achieved through the choice of either any MRI or a specific CT image set and effective creation of discriminant features. The dimensionality, complication in classifying the tumor or affected parts from heterogeneous data and robustness again

noise abnormalities offer challenges of a great magnitude underlined from the traditional methods by review. An innovative method is introduced in this work to mitigate the challenges in the existent techniques. Data mining mostly deals with unlabeled data. In such cases, proper classification and feature extraction have compelling roles in which researchers fail. The consideration of heterogeneous heart diseases data instead of homogeneous heart diseases data for the classification of medical dataset is needed. The focus of researchers is on improving the classification accuracy rather than giving prime importance to classification of the data.

III.SYSTEM DESIGN

3.1 Dataset: Dataset for the breast cancer are generated from heart diseases dataset for UCI providing the justification for the proposed performance B. Tarle and S. Jena., (2017). The performance of proposed HCSOANN is validated using parameters like classification accuracy, macro-averaged F1 score and running time with 14 types of attributes.

3.2 HCSOANN Description: This is a artificial neural network based on feed forward probability. The N nodes in input layer (on left) –feature vector is formed through one of the N-input features. These can be termed as fan-out nodes as each input feature node branches to entire nodes in hidden and every hidden layer receives complete input feature vector. In a single group of hidden layers, each node corresponds to a number of observations that are taken for training. These in turn correspond to a Gaussian function which centers on its feature vector that is associated in the k th class B. Tarle and S. Jena., (2017).

In the hidden layer k number groups are available. The functional values are fed to all of the Gaussians in a class group and retaining same output layer node for that class. Hybrid chicken swarm optimization –ANN algorithm is the basis for Hybrid algorithm which can classify instances of data. An ANN algorithm helps in creating to modify the network and monitor through the training phase. The nodes in these HCSOANNs are sigmoid in nature. Back propagation network is a network of simple processing elements which work together in producing an output; HCSOANN can be scholarly known by carrying out back propagation algorithm.

For broad spectrum classification issues HCSOANN acts as a primary tool. When there is continuous output, HCSOANN performs prediction and when there is distinct value for the output classification is performed. Because of its ability in configuring the neurons weights, HCSOANNs are formed through neurons and their connection lines. Neuron is a small unit that is involved in information process and forms the basis for the performance of HCSOANN. The main features are considered in the mathematical model that is proposed for neuron and they act as interconnected processing elements which work with one another in solving a problem.

Three parts are required in Proposed experimenting HCSOANN:

- Training is the first part
- Validation is the second part
- Testing is the third part

HCSOANN based on decision making acts a vital role in medicine in enhancing reliability of healthcare of the general population. It can uncover unusual abnormal condition, as clinicians do not have information bank on the entire prediction of disease even in specific domain. The HCSOANN model is made easy by the availability of large patient data in electronic form, so as to detect accurately the variability of physiological parameters during arrhythmia, which is the primary symptom in the heart disease diagnosis. The fundamental steps followed in the application of HCSOANN in heart disease diagnosis are showed in Figure 1.

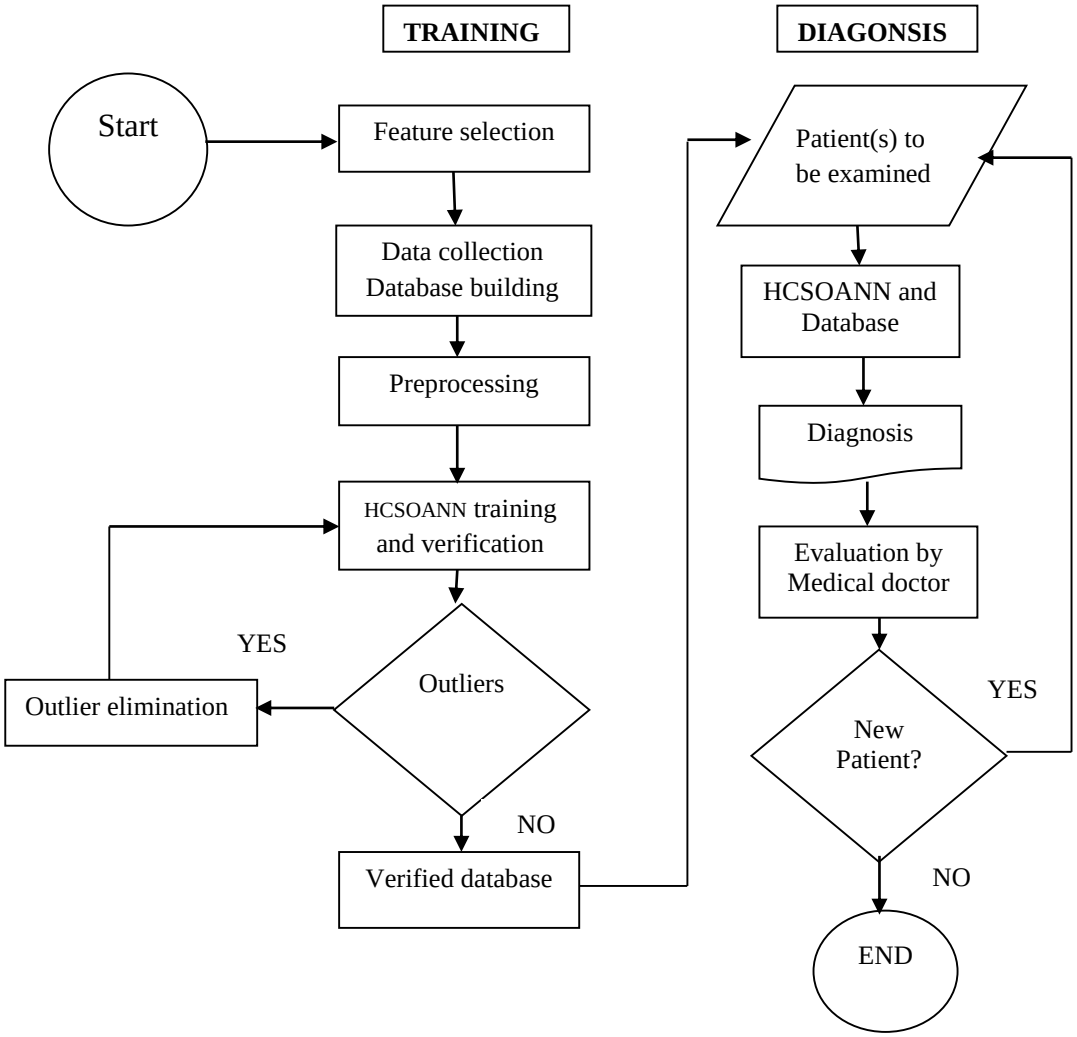

Fig 2 HCSOANN Process Flow

Diagnoses that are HCSOANN model-based seem to be more accurate than those done by clinicians in certain cases; moreover, fault tolerance is yet another feature of HCSOANN. In places where there are more noise patterns pertaining to information and is not certain, HCSOANN can fit well. HCSOANN differs from other traditional methodologies in employing training by examples in order to solve issues than a standard algorithm, as it is an information processing technology.

INPUT: Heart Disease UCI dataset

OUTPUT: Classification result

Step1: Start keeping first attributes and the class attribute.

Step2: Compare the attribute name from the key1 list and key2 list, where key1 is the list to store attributes names based on the ascending order of the entropy value, and key2 is the list to store attributes names in original order.

Step3: both are same then remove the attributes from the dataset and also remove the attribute from the key2 list and evaluate.

Step4: Calculate extracted feature in each instances attribute values.

Step5: Compare average feature extracted values.

Step6: Compute covariance matrix

Step7: calculate overall mean and standard deviation and generate classification result

Step8: optimization each parameter and generate μ, б, α values

Step9: do step until last attributes in the dataset.

Step10: final classification result

Figure 3 pseudocode for HCSOANN prediction Model

Figure 3 referred as the proposed modal pseudocode for heart diseases pridction, A Artificial neural network cannot be initialized with prior knowledge, and thus the network must learn from scratch. Real time optimization is difficulties to rectify, and many medicinal fields to pact Non deterministic Polynomial NP problems. The proposed system optimize the weight of the ANN structure, using chicken swarm optimization (CSO) are proposed efficiently.

IV.RESULT AND DISCUSSION

Proposed hybrid artificial neural network with chicken swarm optimization, effectively deal with UCI Heart disease dataset, in the tool of PYTHONIDE 3.6 and classified results are discussed in this section. Two different models have achieved an average accuracy of 94.7% which were developed through diagnosis of heart diseases prediction. The figure 4 shows the confusion matrix values for proposed true, false, positive and negative values. These values are estimated based on the heart diseases dataset 14 types of attributes, 14 types of dataset attributes are processed to artificial neural network to generate the classification result is optimized using food gathering based chicken swarm optimization algorithm.

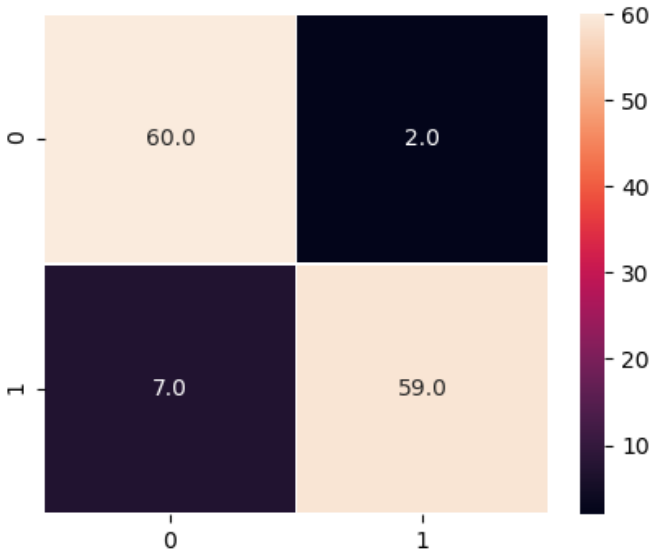

Figure 4 normalized HCSOANN confusion matrix predicted values

The proposed hybrid artificial neural network with chicken swarm optimization (HCSOANN) classifier accuracy, recall, precision, support and f measure in terms of worst case (0), best case (1), micro average, macro average and weighted average as shown in Table 1. From the table values are tabulated in each 14 instance attribute on the UCI heart disease dataset. Based the values accuracy calculated using based on the figure 4 confusion matrix.

Table 1 Classification Report for HCSOANN Model

Subject	**precision**	**recall**	**f1score**	**support**
Worst case	77	88	85	25
Best cast	98	96	98	85
micro average	93	93	93	99
macro average	89	91	91	99
weighted average	95	93	94	99
Accuracy: 94.740625				

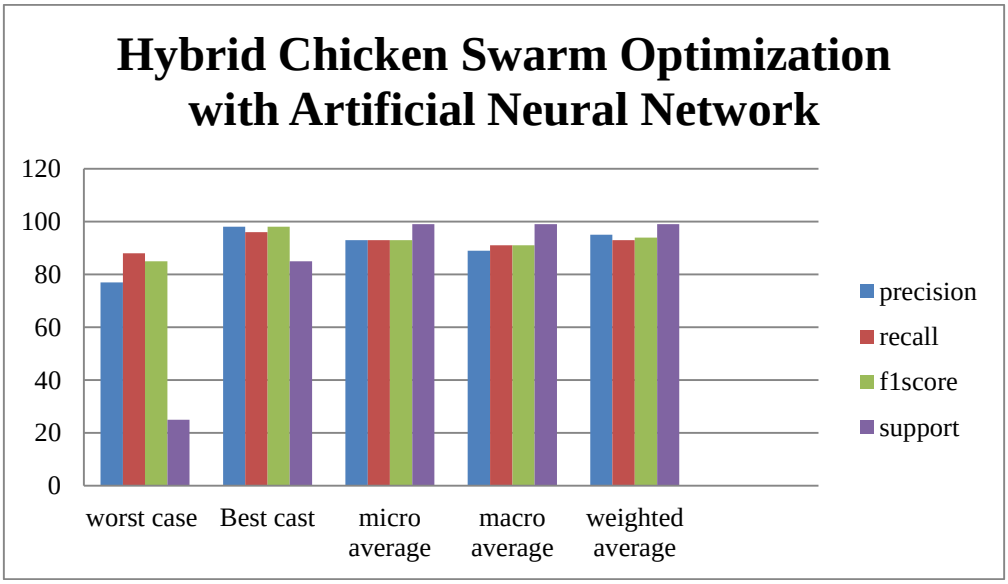

Figure 5 HCSOANN confusion matrix predicted values

The figure 5 shows the graphical representation for recall, precision, support and f score values in terms of 0, 1, micro average, macro average and weighted average in terms of 14 heart diseases attributes. The proposed hybrid HCSOANN method periodically

increases the sequences for with all quality matrix comparatively conventional methods. Table 2 shows the efficiency Comparison for proposed hybrid chicken swarm optimization with artificial neural network (HCSOANN) and conventional methods Neural Network (NN), Decision Tree (DT) and Support Vector Machine (SVM).

Table 2 Proposed Algorithm models compression with existing result

Algorithm	**Accuracy /Efficiency**
Support Vector Machine	89.66
Neural network	88.32
Decision Tree	87.66
HCSOANN	94.70

The figure 6 shows the accuracy comparison for proposed system and existing system, from the result of accuracy proposed hybrid chicken swarm optimization with artificial neural network (HCSOANN) highest classification result 94.70% achieved, other conventional methods only SVM 89.66% NN 88.32% and Decision Tree 87.66% accuracy values predicted. The proposed system HCSOANN accuracy is 5.04 % higher than the conventional highest accuracy value of support vector machine (SVM).

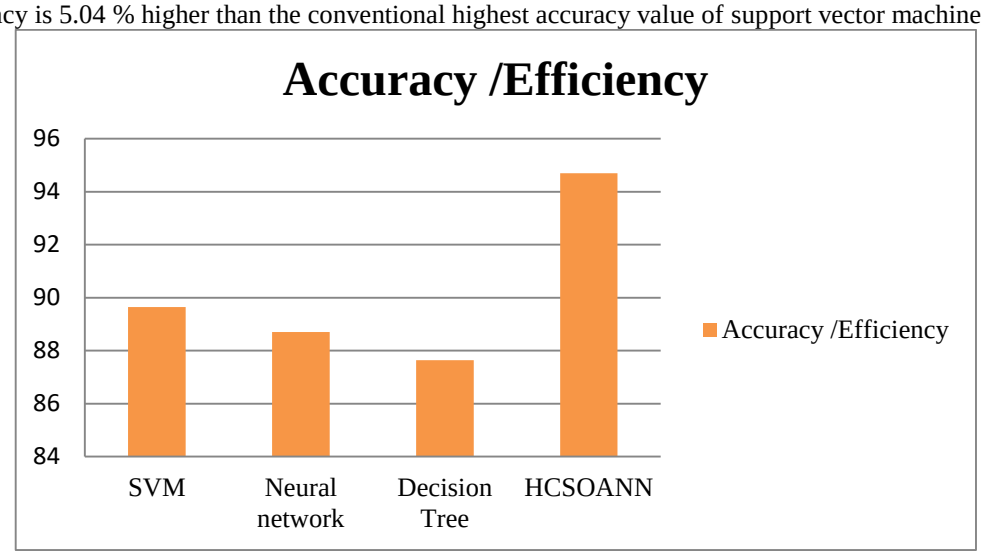

Figure 6 Accuracy Comparison for HCSOANN and conventional system

This section shows that HCSOANNs can be applied to diseases that are different, for existing, detecting heart diseases or CAD, Typically, conventional only below 90% accuracy could be achieved which even proposed system exceeded in 94% of the cases. This shows that HCSOANN has better potential in CVD diagnosis**.** Comparatively other conventional methods proposed system more efficiency and time consumption for predict the final result with better classification result.

V.CONCLUSION

Heart diseases are a major cause of death that warrants the need for an early detection the world over. A forecasting system of heart disease assisted by computers will help cardiologists diagnose these diseases successfully. By means of eliminating these qualities that are now redundant, their performance in classification is enhanced with a huge reduction in the cost of classification. CSO is a population that has its basis on the approach to optimization duly inspired by the searching behavior of certain animals and their group living theory. In this work, a hybrid CSO-ANN has been rightly proposed by the modification of equations of solution search for properly assimilate data of its global best(g_{best}). The Hybrid CSO-ANN algorithm, tends to take merits of various information in the global best for the purpose of guiding and searching of various new candidate solutions for further improving exploitation. Their results have proved that this HCSOANN has a higher accuracy of classification by about 5.04% for the SVM, about 6.38% for the NN and by about 7.04 % for the DT.

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