IMPROVING DETECTION PERFORMANCE OF ARTIFICIAL NEURAL NETWORK BY SHAPLEY VALUE EMBEDDED GENETIC FEATURE SELECTOR

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Abstract: This work is motivated by the interest in feature selection that greatly affects the detection accuracy of a classifier. The goals of this paper are (i) identifying optimal feature subset using a novel wrapper based feature selection algorithm called Shapley Value Embedded Genetic Algorithm (SVEGA), (ii) showing the improvement in the detection accuracy of the Artificial Neural Network (ANN) classifier with the optimal features selected, (iii) evaluating the performance of proposed SVEGA-ANN model on the medical datasets. The medical diagnosis system has been built using a wrapper based feature selection algorithm that attempts to maximize the specificity and sensitivity (in turn the accuracy) as well as by employing an ANN for classification. Two memetic operators namely "include" and "remove" features (or genes) are introduced to realize the genetic algorithm (GA) solution. The use of GA for feature selection facilitates quick improvement in the solution through a fine tune search. An extensive experimental evaluation of the proposed SVEGA-ANN method on 26 benchmark datasets from UCI Machine Learning repository and Kent ridge repository, with three conventional classifiers, outperforms state-of-the-art systems in terms of classification accuracy, number of selected features and running time.

Key words: *feature selection, shapley values, genetic algorithm, artificial neural network, medical data mining, classification*

Received: April 25, 2014 **DOI:** 10.14311/NNW.2016.26.010
Revised and accepted: February 25, 2015

1. Introduction

Data mining application in medicine has proved to be a successful strategy in the areas of medical services including prediction of usefulness of surgical procedures, clinical tests, medication procedures , and the discovery of associations among

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