

APPLICATION OF NEURAL NETWORK TO CLINICAL DATA FOR THE DIAGNOSIS OF TWO FORMS OF HEPATITIS

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Abstract

The purpose of this research work is to investigate the ability of neural network to discriminate the two subtypes, mild and severe form, of chronic active hepatitis, on the basis of laboratory clinical data base. The optimal parameters are identified for the suggested neural networks (NN) like Multi Layer Perceptron (MLP), Radial Basis Function (RBF) and Principal Component Analysis (PCA). The three optimal NN models are chosen, which are tested exhaustively on the available data set for classification of two forms of hepatitis such as mild or severe. Different methods are used for data partitioning, and rigorous experimentation is carried out on different data sets in order to prove the efficacy and robustness of NN. The various methods used are differential learning, leave 'n' out and multifold cross validation. The classification results of neural networks are compared with the classification results of statistical classification tree method. The results show that the designed MLP neural network based DSS (Decision Support System) clearly outperforms the other NNs with respect to various performance measures such as classification accuracy, MSE and area under the ROC curve. MLP NN could correctly predict the two categories of hepatitis as 92.30% and 95.91% for severe and mild respectively, as against other NN models and statistical classification tree method. Moreover, the area under the ROC curve for MLP NN based classifier is observed as 0.9835 as against other NN models and statistical classification tree method.

Keywords: Multi-layer Perceptron Neural Network, Radial Basis Function, PCA, Classification Tree, Hepatitis diagnosis