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Using Bio-geographical Algorithm in Optimizing Neural Network for the Diagnosis of Breast Cancer

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Abstract

Introduction: Breast cancer is the most common cancer in women. Accurate classification of breast cancer has a key role in medical diagnosis. Hence, researchers seek optimized methods to improve tumor diagnosis.

Methods: The current study presents bio-geographical based optimization neural network for classifying data as benign and malignant using principal component analysis in preprocessing stage and updating weights concurrently. The presented algorithm was assessed using the data from Wisconsin databank.

Results: Classification accuracy in a normal state, that is, without applying principal component analysis and an optimization algorithm, and applying only neural network at a ratio of %70 to %30 from training and testing set is %97.2. Accuracy reaches %98.5 after applying principal component analysis and decreasing features from nine to eight. Finally, using bio-geographical based optimization algorithm with a 10-fold cross validation, accuracy reaches %100, which is significantly more successful than other similar studies.

Conclusion: Applying this algorithm can optimize the performance of the neural network. The optimal performance of this method is revealed by comparing the proposed method with the non-optimized method and the approach which used only PCA and neural network method. The results suggest that the method presented in this paper had a high accuracy in classifying breast cancer data and can be used for its diagnosis.

Keywords: Bio-geographical Based Optimization, Principal Component Analysis, Multi-layer Perceptron, Back Propagation Method.

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