ORIGINAL ARTICLE

Implementing a Decision Support System Based on Probabilistic Neural Network for Diagnosing Breast Cancer Type

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Abstract

Introduction: Breast cancer is the most prevalent type of cancer in women. Timely diagnosis of cancer can increase the chances of a patient's life expectancy. Artificial Neural Networks are the modern methods of modeling and forecasting. The purpose of this study is diagnosing benignity or malignancy of breast cancer tumors. For this purpose a support decision system (DSS) based on PNN designed.

Methods: In this research, a PNN was devised which, based on input variables, helps predict the type of breast cancers. The proposed system relied on the available data of 699 cases of patients with breast cancer that were stored in UCI Machine Learning Repository. The existing data in the reservoir were preprocessed and the data were then normalized through the linear method. To implement the network, the applications and functions in Matlab were used, and 65% of the data were used for the network training phase, whereas the remaining 35% were used for network testing phase. Nine clinical variables were considered as the network inputs. Criteria for sensitivity, specificity, and accuracy were used to evaluate the test phase of the network.

Results: After the DSS simulation using PNN, the parameters of sensitivity, specificity, and accuracy were found by the system to be 1, 0.98, and 0.99, respectively.

Conclusion: The results showed PNN performance in the detection of breast cancer better and stronger than other artificial neural networks. The network implementation in this article has more speed in training phase, and generalization is better than similar research.

Keywords: Specificity, Sensitivity, Breast Cancer, Decision Support System, Probabilistic Neural Network.