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Selection of Relevant and Effective Features in Detection of Breast Cancer using Parametric Learning Methods

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Abstract

Introduction: Breast cancer is the most common cancer in women. Timely and accurate diagnosis of breast cancer is one of the major challenges in this regard. FNA is a less expensive, easy and fast method for an accurate diagnosis of breast cancer. An efficient system for detection of breast cancer with high accuracy can be designed using the features extracted from FNA testing and machine learning techniques.

Methods: In this study, 683 samples of benign and malignancy with 9 characteristics from Wisconsin Breast Cancer Dataset in UCI were used. Then selection of efficient features was done using forward feature selection and classification of breast tumors was done using parametric methods such as quadratic classifier, linear classifier and nearest mean classifier.

Results: Quadratic classifier using forward feature selection has the best performance compared with other methods in detection of breast cancer. This method with the selection of four features namely Uniformity of cell size, Bare nuclei, Bland chromatin and Mitoses achieved accuracy of 98.90٪ and sensitivity of 97.98%. Also in all methods, Uniformity of cell size and bare nuclei has the highest performance compared with other features.

Conclusion: The results of this study showed that forward feature selection and parametric techniques can be used in diagnosis of breast cancer and selection of effective features. It seems that these features are one of the most important factors to help diagnose of breast cancer.

Keywords: Breast cancer, machine learning, parametric methods, feature selection.