ABSTRACT

Each year around the world, millions of women develop new cases of breast cancer. Mammograms can be used to check for breast cancer in women who have no signs or symptoms of the disease. Screening mammograms usually involve two X-ray pictures, or images, of each breast. Screening mammograms can also find Micro CalCifications (MCCs) - tiny deposits of calcium that sometimes indicate the presence of breast cancer.

Diagnostic Mammogram can also be used to check for breast cancer after a lump or other sign or symptom of the disease. If calcifications are grouped together in a certain way, it may be a sign of cancer. If the MCCs have a suspicious look and pattern, a biopsy will be recommended. For MCCs, the interpretations of their presence are very difficult because of its morphological features. The dense tissues especially in younger women may easily be misinterpreted as MCCs due to film emulsion error, digitization artefacts or anatomical structures such as fibrous strands, breast borders or hypertrophied lobules that almost similar to MCCs.

There are many methods of micro-calcifications detection in mammograms, including traditional image processing methods, filtering, threshold algorithm, neural network, Support Vector Machine (SVM), etc. In this work parallel neural network is proposed for the prediction of MCCs. Calcification often associated with non-cancerous pattern. A mass is suspicious indicator of breast cancer. Feature extraction is the first step in breast cancer detection. Texture feature is important for image classification. Gabor filters with Discrete Cosine Transform are used for feature extraction.
from mammograms in this work. The classification process submits these object vectors as inputs to a multilayer perceptron that learns, using the back-propagation training algorithm, to separate them into normal and abnormal categories.

The multilayer structure of neural networks of type Feed-forward Perceptron can be considered as a powerful tool in the field of non-parametric approximation. This research proposed a Multi-Layer Perceptron Neural Network (MLPNN) to improve mammogram images classification. MLP networks normally have three layers of processing elements with only one hidden layer, but there is no restriction on the number of hidden layers.

Genetic Algorithms (GA) solve optimization problems by mimicking the natural selection process. GA is a common optimization technique. It belongs to the family of evolutionary algorithm and originated from Darwin’s theory of natural selection and evolution. GAs offer a particularly attractive approach to multi-criteria optimization. The GA is used for the optimal feature selection.

Finally, a GA based weight selection for MLPNN is proposed to improve the classification for mammogram images. A subset of Mini Mammographic Image Analysis Society (MIAS) was utilized for evaluation. Experiments conducted using different feature selection methods with the proposed method and compared the results. Results demonstrate that the classification accuracy of proposed MLPNN GA feature selection and GA weight selection achieves the best accuracy of 98.36%.