



MEDICAL X-RAY MAMMOGRAPHIC IMAGE
ENHANCEMENT USING FEED FORWARD NEURAL
NETWORK AND PARTICLE SWARM OPTIMIZATION
TECHNIQUES

By

Ahmad Ziad Fouta

Supervisor: Dr. Nedhal Al-Saiyd

This Thesis was submitted in partial fulfillment of the requirements for the
degree of M.Sc.

In Computer Science

At

Deanship of Research & Graduate Studies

Applied Science Private University

Amman – Jordan

May 2016

Medical X-Ray Mammographic Image Enhancement using Feed-Forward Neural Network and Particle Swarm Optimization Techniques

By: Ahmed Ziad Abu-Fouta

Supervised by: Dr. Nedhal A. Al-Saiyd

ABSTRACT

The goal of optimization algorithms is to find the "optimal" or "near-optimal" solution among a finite or infinite number of possible solutions, and this is achieved by minimizing or maximizing an objective function.

To go beyond the limitations of traditional techniques of image enhancement, this thesis proposes applying an efficient algorithm that uses Particle Swarm Optimization (PSO) technique to resolve the optimization problem for selecting the weights of feed-forward neural network (FFNN). PSO is used to direct the search towards promising weighting points in FFNN, which in traditional techniques requires exhaustive search, and too long time to obtain such solution.

An optimization engine that uses PSO in FFNN in training is also used to enhance the visual quality of the medical X-Ray mammographic images, which will help physicians and technician in detecting and diagnosing the breast cancer. In this new approach, the optimal sequence of the applying combination of filters is found, which reduce the mean square error and increase the signal to noise ratio.

However, to the best of our knowledge, the applications of the particle swarm optimization (PSO) on image enhancement are rare.

Based on different subjective and objective metrics, PSO shows good results with fitting problems and enhances the medical mammographic images.

Keywords:

Image Enhancement, Neural Networks, Particle swarm optimization.