ABSTRACT

Polycystic Ovary Syndrome (PCOS) is the most common endocrine disorders affected to female in their reproductive cycle. PCO (Polycystic Ovaries) describes ovaries that contain many small cysts/follicles, 2-9 mm in diameter. Currently, these cysts are identified manually by doctor vision. This thesis conducts some experiments to simulate follicle detection to help doctor to identify the cysts and to reduce the burden of doctor diagnosis. A new modified non parametric fitness function of PSO (Particle Swarm Optimization) image clustering for follicles segmentation is proposed. The new modified fitness function uses Mean Structural Similarity Index (MSSIM) and Normalized Mean Square Error (NMSE) to produce more convergent cluster on ultrasound images.

In this thesis, the performance of this proposed fitness function and the one of the previous study [17] in term of producing convergent solution of image clustering are compared. The experimental results show that the proposed fitness function produces more convergent solution than previous fitness function [17] when they are applied on ultrasound images. The optimum number of cluster (k) which produces closest follicular size of identified follicle compared to the actual size is also investigated. From the experiments, the optimum number of follicle is achieved by 8 clusters. This thesis also evaluates the classification performance of follicle and non-follicle based on significant geometrical features of identified dark regions. There are three classifiers used in this thesis: Logistic Regression, Support Vector Machine using RBF and linear kernels, and Backpropagation Neural Network using TRAINLM and TRAINGDX training functions. Backpropagation neural network with TRAINLM achieves the highest F-Measure of 0.83 among other classifiers used in this thesis.

Keywords : Polycystic Ovary, follicle, Particle Swarm Optimization, fitness function, Logistic Regression, Support Vector Machine, Backpropagation Neural Network.