The elapsed time required for reconstruction of the four different algorithms is shown in table 3. Obviously, LBP is the most fast because it is a non-iterative algorithm. The number of iterations for Landweber and Newton-Raphson algorithms are greater than that for the designed algorithm. This shows that the designed algorithm convergence is faster than that for Landweber and Newton-Raphson algorithms.

5. Conclusions

In this paper, we have introduced an ECT image reconstruction algorithm based on LS-SVM and LA-ADPSO. This algorithm can be divided into two stages: LS-SVM exercise forecast stage and LA-ADPSO search stage. In LS-SVM exercise forecast stage, in order to overcome the soft field nature of ECT sensitivity field, we took LS-SVM to exercise for the errors and apply exercise results to construct the fitness function of the particle swarm optimization. In LA-ADPSO search stage, we introduced Lotka-Volterra model into PSO, so the diversity of particles is great increased. We adopted cooling process functions to replace the inertia weight function and constructed the time variant inertia weight function featured in annealing mechanism. Meanwhile, it employs the LA-ADPSO procedure to search for the optimized resolution of Electrical Capacitance Tomography (ECT) for image reconstruction. The experimental results show that this algorithm is featured in quick convergence rate and higher imaging precision.

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