Each algorithm runs 20 times.

As shown in table 1, the experiment results indicates that TaskScheduler-T algorithm randomly generates feasible testing scheduling sequence in parallel, and gets the optimal solution by exhausting them. Although this method can find optimal solution each time, the time consumption by it is intolerable when the size of the problem to be solved reaches certain extent. As for the other two algorithms, the PSO-SA is superior to PSO in time consumption and precision. It can be seen from Fig. 1 that PSO-SA method finds the optimal solution in 13th generation. By contrast, the PSO method finds it in the 28th generation, which indicates that the searching capability of PSO-SA is higher than that of PSO.

Table 1. Experimental results

Algorithm	Total Testing Time	Fitness Value	Average Resolving Time (sec.)	Success rate
TaskScheduler-T	62	0.5167	3	1
PSO	59	0.4916	2.3	0.92
PSO-SA	59	0.4916	1.2	0.96

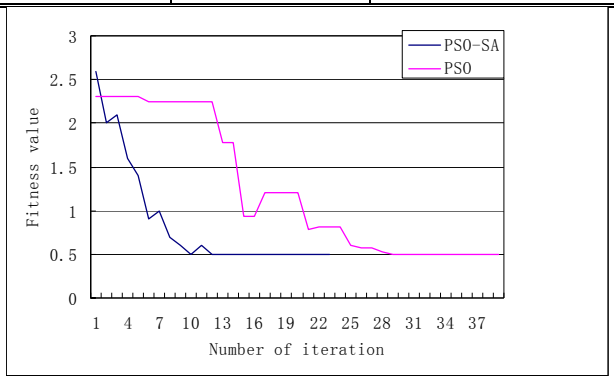

Fig.1. Fitness value tendency of PSO and PSO-SA

Conclusion

For the purpose of avoiding interference between each parallel testing tasks in test progress, this paper analyzes the testing process by dividing it into testing atoms, and makes the parameter set as the basic unit for each testing atom resource allocation so as to avoid interference. By means of modeling the parallel testing and with the object of minimizing the total testing time, it puts forward the parallel testing task scheduling algorithm on basis of improved particle group algorithm. The experimental results verify that this method can be efficiently applied in parallel testing optimal scheduling.

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References

[1] William A Ross. The Impact of Next Generation Testing Technology on Aviati on Maintenance[A]1 AUTOTESTCON pr ceedings, IEEE, 2003.

[2] Anderson J L Jr. High performance missile testing [A]. AutotestCon Proceedings [C]. IEEE, 2003 , Page(s): 19 - 27:

[3] R M Karp. Reducibility among Combi natorial Problems[M] .Raymond E Miller and James W Thather: eds. Complexity of Computer Computations, Plenum Press, 1972. 85- 103.

[4] Gao Lin, Xu Jin. A DNA algorithm for graph node co loring problem[J] . Acta Electronica Sinica, 2003, 31(4) : 494- 497.

[5] P Galinier, J K Hao. Hybrid evolutionary algorithms for graph coloring[J] . Journal of Combinatorial Optimization, 1999, 3:379- 397.

[6] Anna M, Adam P B, Celia A G. Improve graph colouring with linear programming and genetic algorithms[A] . Proceeding of the 2000 Genetic and Evo lutionary Computation Conference [C] . Las Vegas, Nevada, USA, 2000. 240- 245.

[7] Hu Yu . Colored Petri net based modeling of parallel automatic testing systems[D]. Chengdu: School of Automation, University of Electronic Science and Technology of China, 2003.