Abstract

This paper addresses the problem of static load balancing in heterogeneous distributed computing systems taking into account both memory and communication capacity constraints. The load balancing problem is first modeled as an optimization problem. Then, a heuristic approach, called Adaptive Genetic Algorithm (AGA), is proposed to solve the problem. The
performance of the proposed algorithm is evaluated by simulation studies on randomly
generated instances and the results are compared with that obtained by applying both the
Genetic Algorithm (GA) and the Simulated Annealing (SA). Also, the qualities of the results are
compared with the optimal solutions that obtained by applying the Brach-and-Bound (BB)
algorithm.

Reference

- C.-C. Hui and S. T. Chanson, “Allocating Task Interaction Graph to Processors in
Heterogeneous Networks,” IEEE Transactions on Parallel and Distributed Systems, Vol. 8, No.
- M. Kafii and I. Ahmed “Optimal Task Assignment in Heterogeneous Distributed
- A. Tom and C. S. R. Murthy “Optimal task allocation in distributed systems by graph
matching and state space search,” J. of Systems and Software, Vol. 46, No. 1, pp. 59–75, April
1999.
- Nimeen A. Bahnasawy, Gamal M. Atiya, Mervat Mosa and Magdy A. Koutb, “A Modified
A* Algorithm for Allocating Tasks in Heterogeneous Distributed Computing Systems”
- G. Atiya and Y. Hamam “Static Task Assignment in Distributed Computing Systems,” A
book chapter in ”Information processing: Recent Mathematical Advances in Optimization and
- G. Atiya and Y. Hamam. “Optimal Allocation of Tasks onto Networked Heterogeneous
Computers using minimax Criterion,” International Network Optimization Conference (INOC'03),
Load Balancing on Distributed Memory Systems,” Proceedings of the Eight Symposium on
- L. Wang, H. J. Siegel, V. P. Roychowdhury, and A. A. Maciejewski, “Task Matching and
Scheduling in Heterogeneous Computing Environments Using a Genetic-Algorithm-Based
- J. Aguilar and E. Gelenbe, “Task Assignment and Transaction Clustering Heuristics for
Balancing,” Proceedings ECIT2004 - Third European Conference on Intelligent Systems and
- Bibhodatta Sahoo, Sudipta Mohapatra, and Sanjay Kumar Jena, "A Genetic Algorithm
Based Dynamic Load Balancing Scheme for Heterogeneous Distributed Systems" Proceedings
of the International Conference on Parallel and Distributed Processing Techniques and


**Index Terms**

Computer Science

Distributed Systems

**Key words**

Load Balancing

Simulated Annealing

Genetic Algorithm

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