Effect of population size in heterogeneous machines in a distributed EA

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ABSTRACT

This paper shows the population size adaptationt taking into account the... Two problmes have been tested. Results show that adapting this parameter decreases the time to obtain the optimum.

Categories and Subject Descriptors

H.4 [**Information Systems Applications**]: Miscellaneous; G.1.6 [**Mathematics of Computing**]: NUMERICAL ANALYSIS—*Optimization*

General Terms

Algorithms

Keywords

distributed algorithms, island model, migration rate, migration policies

1. INTRODUCTION

2. STATE OF THE ART

In past blabla... heterogeneous parameters... [1]

2.1 Experimental setup

The algorithm to improve is a steady-state genetic algorithm. Parameters are described in Table 1. A ring topology has been used with the order N N N N . Because the operating system heterogeneity the ANONYMOUS framework, based in Java, has been used. To avoid bottlenecks, asynchronous migration is performed (sending the best individual after certain number of generations).

The problems to evaluate are the MMDP and OneMax.

To test the algorithm two different computational systems have been used: an *heterogeneous cluster* and an *homogeneous cluster*. The first one is formed by 4 different computers with different processors, operating systems and memory. The latter is a cluster formed by WHATEVER. Table **??**computers shows the CARACTERISTICAS of each system.

Each different configuration has been tested 30 times.

Table 1: Parameters used

Name	Value
Total individuals	256
Population size in HoSi	64
Population size in HeSi	12 12 12 12
Crossover rate	0.5
Mutation rate	1/l
Selection	2-tournament
Generations to migrate	64

Table 2: Parameters used

2.2 Results

Leyenda: HoSi = Homogeneous size. HeSi = Heterogeneous size. HoHa = Homogeneous hardware. HeHa = Heterogeneous hardware.

Table **??** shows...

2.2.1 MMDP Problem

Figure tal shows...

2.2.2 OneMax Problem

The differences with the previous problem is... In this case results show...

3. CONCLUSIONS

Very beautiful work

4. ACKNOWLEDGMENTS

Thanks to everybody

5. REFERENCES

[1] Yiyuan Gong and Alex Fukunaga. Distributed island-model genetic algorithms using heterogeneous parameter settings. In *Proceedings of the IEEE Congress on Evolutionary Computation, CEC 2011, New Orleans, LA, USA, 5-8 June, 2011*, pages 820–827. IEEE, 2011.

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Table 3: Results for the MMDP problem.

Configuration	Max. generations	TOTAL GENS	Total evaluations	time
HoSi/HoHa	107334,46	393119,86	25273201,06	237759,43
HoSi/HeHa	146401,48	380967,25	24382416,51	136914,03
HeSi/HoHa	149732,6	438171,16	24430043,46	245776,93
HeSi/HeHa	96051,5	289282,3	21784528,66	109875,76

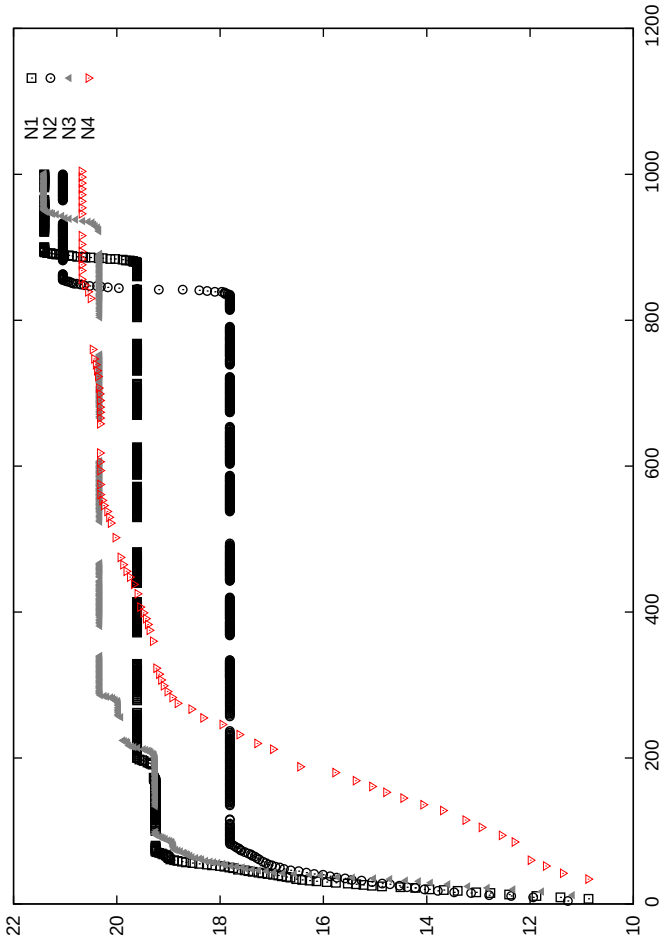

Figure 3: First 1000 millis of execution of the four nodes of the heterogeneous system with the same population sizes.

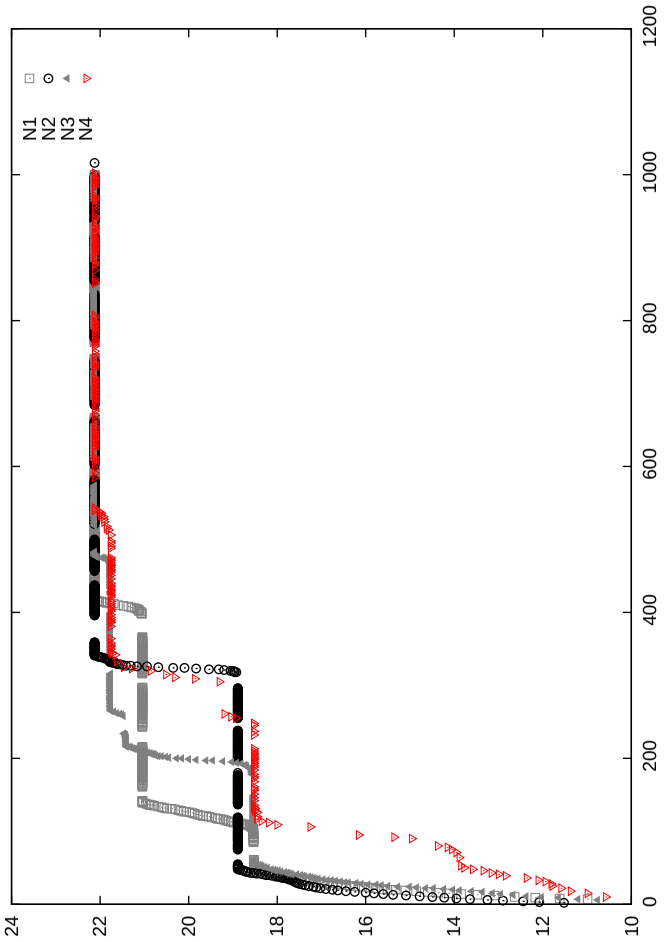

Figure 4: First 1000 millis of execution of the four nodes of the heterogeneous system with different population sizes.

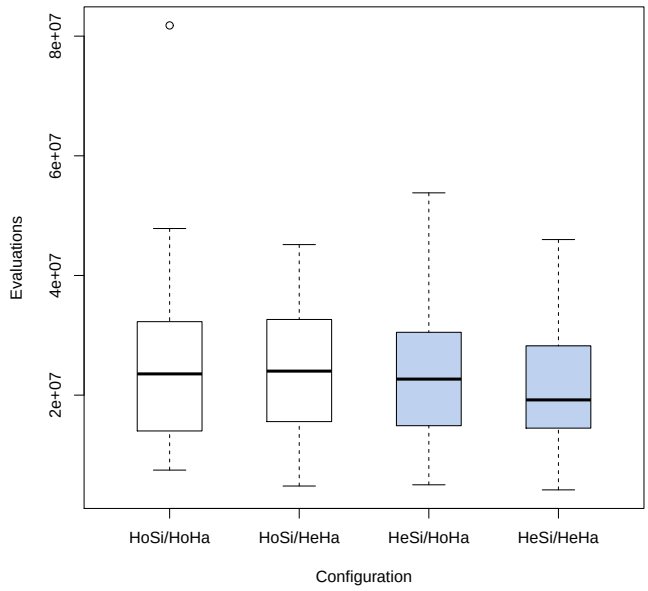

Figure 1: Number of evaluations for MMDP problem.

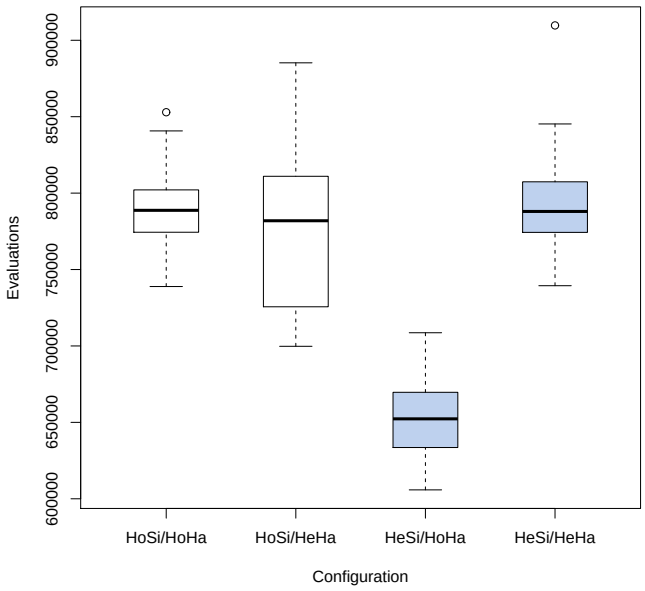

Figure 5: Number of evaluations for OneMax problem.

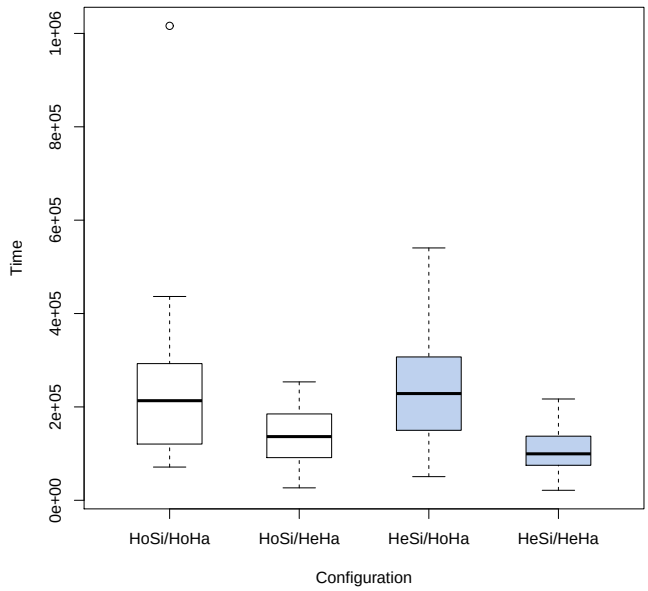

Figure 2: Time to obtain the optimum in the MMDP problem (millis).

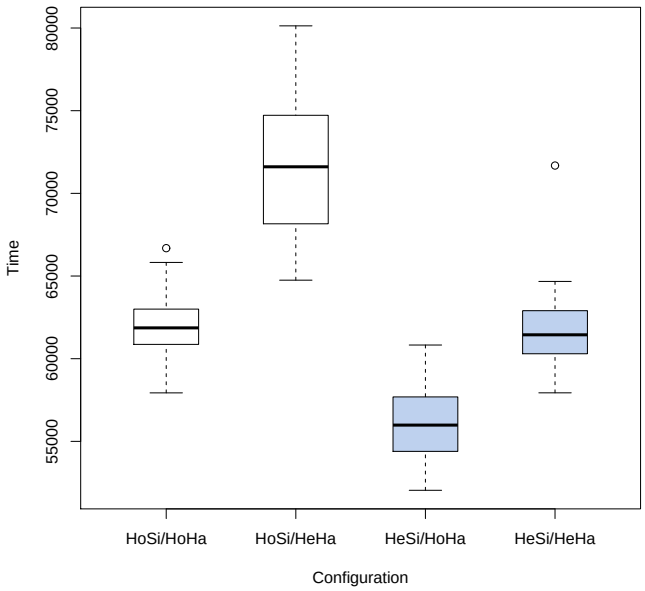

Figure 6: Time to obtain the optimum in the OneMax problem (millis).