



Executive Summary

TITLE: **D3.5.1: Incorporating information into metaheuristics to design self-adaptive algorithms**

PAPERS RELATED:

- Luque, G., and Alba, E. (2013, July). **Math oracles: a new way of designing efficient self-adaptive algorithms**. In Proceeding of the fifteenth annual conference companion on Genetic and evolutionary computation conference companion (pp. 217-218). ACM.
- Osorio, K., Alba, E., and Luque, G. (2013, June). **Using theory to self-tune migration periods in distributed genetic algorithms**. In Evolutionary Computation (CEC), 2013 IEEE Congress on (pp. 2595-2601). IEEE.

ABSTRACT:

In this deliverable a new general methodology to develop self-adaptive methods at a low computational cost is presented. Instead of going purely ad-hoc we define several simple steps to include theoretical models as additional information in our algorithm. Our idea is to incorporate the predictive information (future behavior) provided by well-known mathematical models or other prediction systems (the oracle) to build enhanced methods. We show the main steps which should be considered to include this new kind of information into any algorithm. In addition, we actually test the idea on two specific algorithm, a genetic algorithm (GA) and a distributed metaheuristic. Experiments show that our proposal is able to obtain similar, or even better results when it is compared to the traditional algorithm. We also show the benefits in terms of saving time and a lower complexity of parameter settings.

GOALS:

1. Design a methodology to incorporate (theoretical) information to build self-adaptive methods.
2. Test that methodology in several cases.

CONCLUSIONS:

1. We propose a new general methodology to develop self-adaptive methods at a low computational cost.
2. This methodology is tested in a GA to self-adapt some parameters, such as selection pressure and mutation probability.
3. We also propose a new self-adaptive distributed method in which the migration period is self-tuned during the search.
4. We also show the benefits in terms of saving time and a lower complexity of parameter settings.

RELATION WITH PAST

DELIVERABLES:

PRE: none.