Málaga, Mes de 2013

Executive Summary

TITLE: **D3.4.1 Dynamic Optimization: algorithms and their performance.**

PAPERS RELATED:

- E. Alba, A. Nakib, P. Siarry, Metaheuristics for Dynamic Optimization. Studies in computational intelligence 433, Springer-Verlag, 2012, ISBN: 978-3-642-30664-8
- B. Sarasola, K. Doerner, E. Alba, Un algoritmo de búsqueda en vecindario variable para la asignación de rutas a vehículos con pedidos dinámicos. VIII Congreso Español sobre Metaheurísticas, Algoritmos Evolutivos y Bioinspirados (MAEB 2012), Albacete, España, 2012, pp. 745-750, ISBN 978-84-615-6931-1
- B. Sarasola, E. Alba, How long should we run in dynamic optimization? In: Genetic and Evolutionary Computation Conference (GECCO 2012), pp. 665-672. Philadelphia, USA, 2012, ACM. ISBN 978-1-4503-1177-9
- Y. Bravo, G. Luque, E. Alba, Influence of the Migration Period in Parallel Distributed GAs for Dynamic Optimization, Learning and Intelligent Optimization Conference (LION 6), Paris, 2012, LNCS 7219, pp. 343-348

ABSTRACT: Many real-world problems are dynamic by nature, which means that they can change while are being solved. In these works we resumes several of the most important advances and contribute to the state-of-the-art in the domain of dynamic optimization (DO). Our proposals include new algorithms, empirical studies, and performance measures. We also published a book, providing both methodological tools and synergy to real-world applications.

GOALS:

1. Review and contribute to the state-of-the-art in the DO domain with approaches, both related to types of algorithms and the usual performance measures in the literature.

CONCLUSIONS:

1. The book published offers a single source for up-to-date information in DO. It covers the theory, applications, and design methods to review and contribute to the state-of-the-art in this area, thus becoming a required lecture for either beginners or experienced practitioners.
2. Our variable neighborhood search (VNS) algorithm for the vehicle routing problem with dynamic orders shows competitive results in comparison with current literature. Our approach was not only the fastest one among several state-of-the-art algorithms tested, an important feature in DO, but also produced three new best known solutions for the problem instances studied.
3. The migration period is an important feature of dGA for DOPs. On the one hand, a low migration period allows us to address unimodal DOPs with small changes. On the other hand, a high migration period is more robust to tackle a wide range of change severities in all DOP instances tested, enhancing the diversity and speciation features of the population.
4. The usual number of periods as stopping condition is insufficient to measure the algorithms performance in a DO, since different conclusions may be drawn depending on how long we let the algorithm run. We develop a convergence index that allows us to run the algorithm until the measure of our choice has converge to a stable state, without losing significant information.