Málaga, Mes de 2013

Executive Summary

TITLE:

D2.4.1: Elementary landscape decomposition for combinatorial optimization problems.

PAPERS RELATED:

- F.Chicano, J. Ferrer, E. Alba, Elementary Landscape Decomposition of the Test Suite Minimization Problem, Symposium on Search Based Software Engineering (SSBSE 2011), LNCS 6956, pp. 48-63, Szeged, Hungary

- D. Whitley and F. Chicano, Quasi-Elementary Landscapes and Superpositions of Elementary Landscapes, Learning and Intelligent OptimizatioN Conference (LION 6), LNCS 7219, pp. 277-291, Paris, France

- F. Chicano, and E. Alba, Elementary Landscape Decomposition of the 0-1 Unconstrained Quadratic Optimization, Journal of Heuristics 19(4):711-728

- D. Whitley, F. Chicano, Elementary Landscape Decomposition of the Hamiltonian Path Optimization, EvoCOP 2014 (accepted for publication), Granada, Spain

- D. Whitley, A. M. Sutton, G. Ochoa, F. Chicano. The Component Model for Elementary Landscapes and Partial Neighborhoods, Theoretical Computer Science (accepted for publication)

ABSTRACT:

We have derived the Elementary Landscape Decomposition of several combinatorial optimization problems. In particular: the Test Suite Minimization Problem, the Traveling Salesperson Problem, the Min-cut graph partitioning, the graph coloring problem, the max-clique problem, the 0-1 Unconstrained Quadratic Optimization and the Hamiltonian Path Optimization.

GOALS:

1. Find the elementary landscape decomposition of combinatorial optimization problems with interest for Industry and Academia.

CONCLUSIONS:

1. The Test Suite Minimization problem has a decomposition with up to n elementary components with the one-flip neighborhood, where n is the number of variables

2. The Graph coloring problem with Hamming distance 1 neighborhood, the symmetric Traveling Salesperson Problem with swaps and the min-cut graph partitioning with exchanges are elementary landscapes.

3. The 0-1 Unconstrained Quadratic Optimization with the one-flip neighborhood can be decomposed in two elementary components. The symmetric Hamiltonian path optimization is an elementary landscape with inversions and the sum of two elementary components with swaps.

RELATION WITH PAST DELIVERABLES:
none

OTHERS:
F. Chicano, L. D. Whitley, and E. Alba, A Methodology to Find the Elementary Landscape Decomposition of Combinatorial Optimization Problems, Evolutionary Computation Journal 19(4):597-637