Distance-based Exponential Probability Models for Constrained Combinatorial Problems*

*Note: The full contents of this paper have been published in the volume *Lecture Notes in Artificial Intelligence 11160* (LNAI 11160)

Josu Ceberio, Alexander Mendiburu
University of the Basque Country UPV/EHU
Donostia, Spain
josu.ceberio@ehu.eus

Jose A. Lozano
University of the Basque Country UPV/EHU
Basque Center for Applied Mathematics (BCAM)
Bilbao, Spain

***Abstract*—Estimation of Distribution Algorithms (EDAs) have already demonstrated their utility when solving a broad range of combinatorial problems. However, there is still room for methodological improvement when approaching problems with constraints. The great majority of works in the literature implement repairing or penalty schemes, or use ad-hoc sampling methods in order to guarantee the feasibility of solutions. In any of the previous cases, the behavior of the EDA is somehow denaturalized, since the sampled set does not follow the probability distribution estimated at that step. In this work, we present a general method to approach constrained combinatorial optimization problems by means of EDAs. This consists of developing distance-based exponential probability models defined exclusively on the set of feasible solutions. In order to illustrate this procedure, we take the 2-partition balanced Graph Partitioning Problem as a case of study, and design efficient learning and sampling methods to use distance-based exponential probability models in EDAs.**

***Index Terms*—Constraint, estimation of distribution algorithm, distance-based exponential model, Graph Partitioning Problem**