RECENT ADVANCES IN EVOLUTIONARY COMPUTATION FOR PERMUTATION PROBLEMS

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Permutation-based optimization problems are a class of combinatorial optimization problems that naturally arises in many real world applications and theoretical scenarios where an optimal ordering or ranking of items has to be found with respect to one or more objective criteria. Some popular examples are: flowshop scheduling problem, traveling salesman problem, quadratic assignment problem and linear ordering problem.

Since the first paper on the traveling salesman problem in 1985 by Goldberg, permutation problems have been recurrently addressed in the field of Evolutionary Computation (EC) from a wide variety of perspectives. Evolutionary algorithms, fitness landscape analysis, genotypic representations or probabilistic modeling of permutations are only a few of the topics that have been discussed in the literature.

The permutations space has very distinguishable properties not present in other combinatorial spaces, thus making it a very special case where ideas and concepts originated from classical mathematic fields, such as algebra, geometry, and probability theory, can be exploited and used in the design of new meta-heuristics and genetic operators. All these aspects have recently motivated a strong and ongoing research interest towards permutation problems in EC. Therefore, the special session aims to highlight the most recent advancements in the field and to bring together the EC researchers working in all the aspects of permutation problems.

Topics

- EC applications to the flowshop scheduling problem
- EC applications to the traveling salesman problem
- EC applications to the linear ordering problem
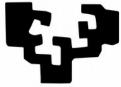
- EC applications to the quadratic assignment problem

- EC applications to any kind of single or multiple objective(s) permutation-based optimization problem

- Novel permutation-based optimization problems in EC

- Fitness landscape analysis of permutation-based optimization problems

- Theoretical analysis of permutation search spaces, meta-heuristics and hardness of problem instances

- Algebraic models for EC in permutation-based search spaces

- Probabilistic models for EC in permutation-based search spaces

- Permutation genotypic representations for EC techniques

- Experimental evaluations and comparisons of EC techniques for permutation-based optimization problems