Competition on Permutation-based Combinatorial Optimization Problems

Leticia Hernando, Josu Ceberio, Alexander Mendiburu, Jose A. Lozano

Intelligent Systems Group
Department of Computer Science and Artificial Intelligence
University of the Basque Country UPV/EHU

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The Aim

To obtain an overview of the performance of heuristic and metaheuristic algorithms on permutation problems

Submissions

- Submission 1. Mirah Alves and Romario Rogerio. *Greedy Randomized Adaptive Search Procedure (GRASP).*

- Submission 2. Mikel Artetxe. *A Randomized Tabu Search-based Memetic Algorithm for permutation-based combinatorial optimization problems.*

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Due to a lack of proposals we could not carry out the competition.

In the future, we will consider focusing on a particular problem, and provide more time to develop competitive proposals.

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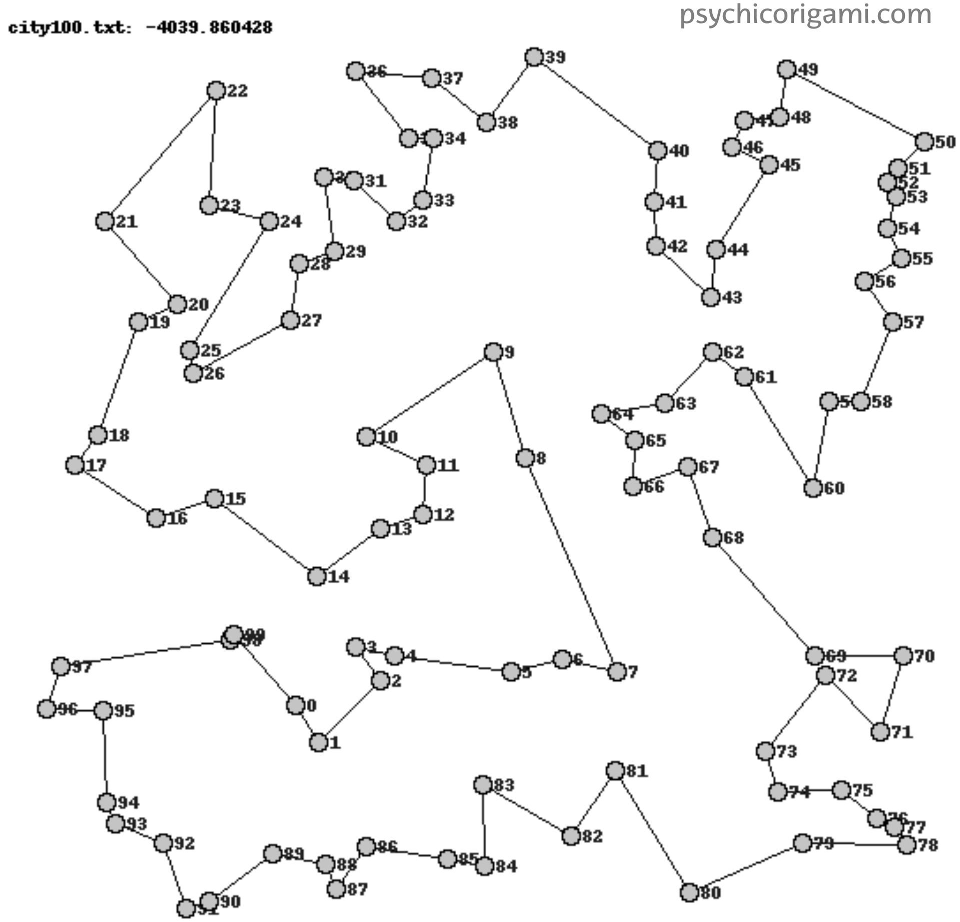

TSP, QAP, PFSP, LOP, API

Permutation-based Problems

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- Coded naturally as permutations.
- Do no belong to the discrete and continuous domain problems.

The Problems

- Travelling Salesman Problem (TSP).
- Quadratic Assignment Problem (QAP).
- Linear Ordering Problem (LOP).
- Permutation Flowshop Scheduling Problem (PFSP).

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- Artificial Permutation Instances

L. Hernando, A. Mendiburu and J. A. Lozano, *A Tunable Generator of Instances of Permutation-based Combinatorial Optimization Problems*, 2014.

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Aim:

- To generate instances with specific complexities
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Inspiration:

- The landscape generator for continuous domains of *Gallagher et al.*
- Instead of using the *Gaussian* distribution, the *Mallows* model for permutation domains is used.

The Mallows model

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The Mallows model

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σ → Central permutation

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$d(\pi,\sigma)$ → Distance metric

$\psi(\theta)$ → Normalization function

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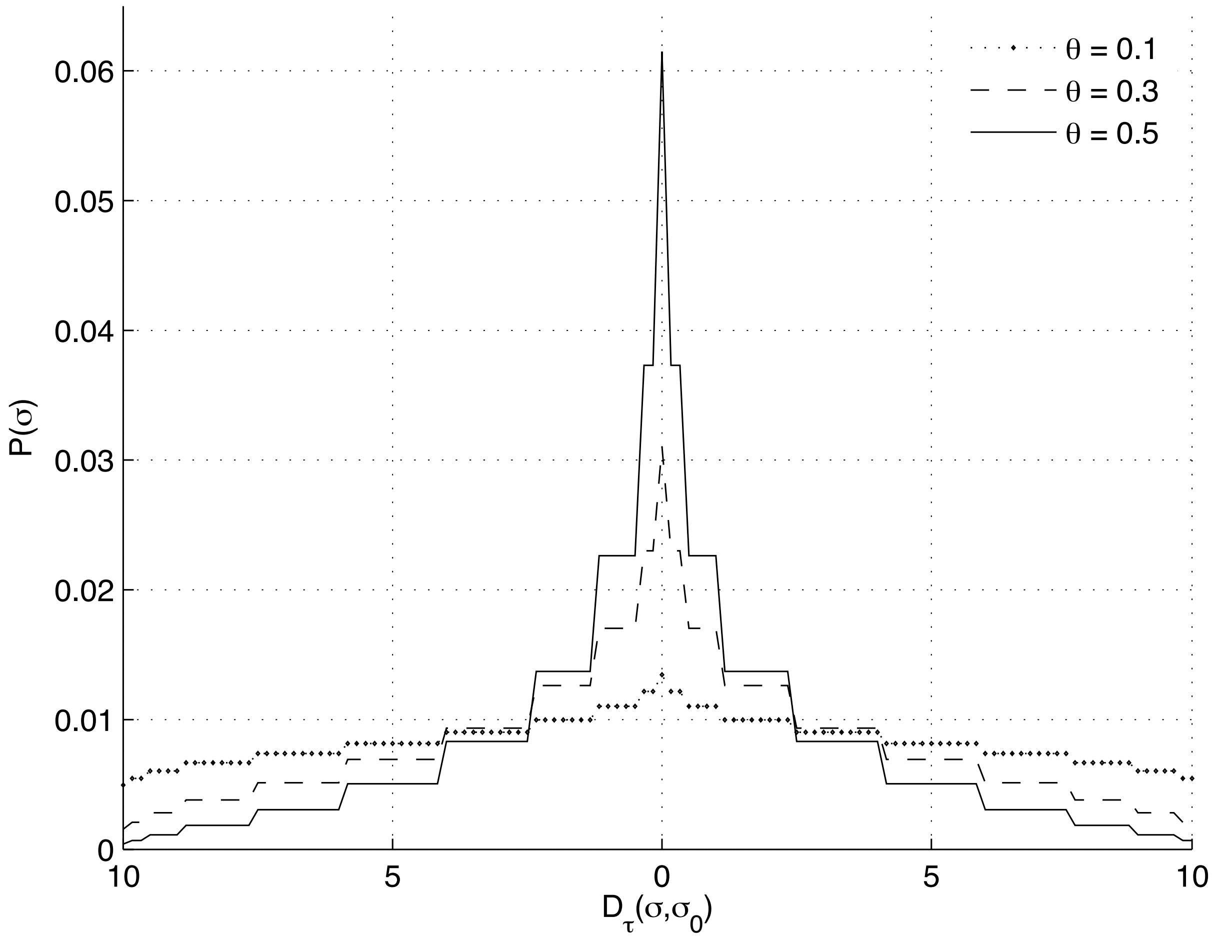
The Mallows model



Instance Generator

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- The fitness value of each permutation *π* is calculated as:

$$f(\pi) = \max_i \{\omega_i P_i(\pi | \sigma_i, \theta_i)\}$$

Particularities

By tuning the parameters, different shapes of landscapes can be generated.

- Fix the number of local optima (Mallows models)

- Define the size of the attraction basins of the local optima by tuning the spread parameters and the weights.

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Thank you for your attention !!

Comments, suggestions, questions...
competition.gecco2014@ehu.es
Or
contact with me!

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Universidad del País Vasco
Euskal Herriko Unibertsitatea