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A HETEROGENEOUS CELLULAR PROCESSING ALGORITHM FOR MINIMIZING THE POWER CONSUMPTION IN WIRELESS COMMUNICATIONS SYSTEMS.

Autor(es): Terán-Villanueva, J David; Fraire Huacuja, Héctor Joaquín; Carpio Valadez, Juan Martín; Pazos Rangel, Rodolfo; Puga Soberanes, Héctor; José Martínez Flores, José A

In this paper, the NP-hard problem of minimizing power consumption in wireless communications systems is approached. In the literature, several metaheuristic approaches have been proposed to solve it. Currently a homogeneous cellular processing algorithm and a GRASP algorithm hybridized with path-relinking are considered the state of the art algorithms. The main contribution of this paper is the analysis of five main characteristics for a heterogeneous cellular processing algorithm, based on scatter search and GRASP. A series of computational experiments with standard instances were carried out to assess the impact of each one of these characteristics. Among the main analyses we found particularly interesting a time reduction by 74.24 %, produced by the stagnation detection characteristic. Also the communication characteristic improves the quality of the solutions by 24.73 %. The computational results show that our heterogeneous cellular processing algorithm is a good alternative for solving the problem. The proposed algorithm finds 34 new best known solutions, which is 27 % of the instances with unknown optimal values. A Friedman hypothesis test was carried out to validate that two state-of-the-art algorithms and the proposed algorithm are statistically equivalent.

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LOWER AND UPPER BOUNDS FOR THE MASTER BAY PLANNING PROBLEM

Autor(es): Cruz-Reyes, Laura; Hernández, Paula Hernández; Melin, Patricia; Mar-Ortiz, Julio; Huacuja, Héctor Joaquín Fraire; Soberanes, Héctor José Puga; Barbosa Juan Javier González

In this work we tackle the problem of the stowage of containers on a ship, the so-called Master Bay Planning Problem (MBPP). This is an important hard combinatorial optimization problem in the context of maritime port logistics which has proven to be really difficult to solve. We propose two new lower bounds and two new upper bounds which are useful to solve it. In order to test both the efficiency and the effectiveness of the bounds proposed, we conduct an experiment over three different sets of instances. This allows us to determine the specific conditions in which the bounds can be used.

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TWO NEW EXACT METHODS FOR THE VERTEX SEPARATION PROBLEM

Autor(es): Huacuja, Héctor Fraire; Castillo-García, Norberto; Rangel, Rodolfo A Pazos; Flores, José Antonio Martínez; Barbosa, Juan Javier González; Valadez, Juan Martín Carpio

The Vertex Separation Problem (VSP) is an NP-hard combinatorial optimization problem in the context of graph theory. Particularly, VSP belongs to a family of linear ordering problems in which the goal is to find the best separator of vertices in a generic graph. In the literature reviewed, we only found two exact methods based on integer linear programming (IP) formulations. The main contribution of this paper is that we have extended the available exact methods by proposing an ad hoc branch and bound algorithm (BBVSP) and a new IP formulation (IPVSP). The experimental results show that BBVSP is the best method since it found the largest number of optimal solutions and achieved the lowest computing time. More precisely, BBVSP found 100 optimal values out of 108 instances evaluated, which represents an effectiveness of 92.6%. BBVSP also achieves a saving of time of about 91.1% with respect to the best exact IP formulation found in the literature.

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A GROUPING GENETIC ALGORITHM WITH CONTROLLED GENE TRANSMISSION FOR THE BIN PACKING PROBLEM

Autor(es): Quiroz-Castellanos, Marcela; Cruz-Reyes, Laura; Torres-Jimenez, Jose; Gómez S., Claudia; Fraire Huacuja, Héctor J.