

In this study, the one-dimensional Bin Packing Problem (BPP) is approached. The BPP is a classical optimization problem that is known for its applicability and complexity. We propose a method that is referred to as the Grouping Genetic Algorithm with Controlled Gene Transmission (GGA-CGT) for Bin Packing. The proposed algorithm promotes the transmission of the best genes in the chromosomes without losing the balance between the selective pressure and population diversity. The transmission of the best genes is accomplished by means of a new set of grouping genetic operators, while the evolution is balanced with a new reproduction technique that controls the exploration of the search space and prevents premature convergence of the algorithm. The results obtained from an extensive computational study confirm that (1) promoting the transmission of the best genes improves the performance of each grouping genetic operator; (2) adding intelligence to the packing and rearrangement heuristics enhances the performance of a GGA; (3) controlling selective pressure and population diversity tends to lead to higher effectiveness; and (4) GGA-CGT is comparable to the best state-of-the-art algorithms, outperforming the published results for the class of instances Hard28, which appears to have the greatest degree of difficulty for BPP algorithms.

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SEMANTIC REPRESENTATIONS FOR KNOWLEDGE MODELING OF A NATURAL LANGUAGE INTERFACE TO DATABASES USING ONTOLOGIES

Autor(es): González, Juan J; Florencia, Rogelio; Fraire, Héctor J; Pazos, Rodolfo A; Cruz-Reyes, Laura; Gómez, Claudia

Despite the large number of Natural Language Interfaces to Databases (NLIDB) that have been implemented, they do not guarantee to provide a correct response in 100% of the queries. In this paper, we present a way of semantic modelling the elements that integrate the knowledge of a NLIDB with the aim of increasing the number of correctly-answered queries. We design semantic representations in order to: a) model any relational database schema and its relationship with the natural language and b) add metadata to natural language words to enable our NLIDB to interpret natural language queries that contain superlatives. We configured our NLIDB in a relational database that we migrated from Geobase and used the Geoquery250 corpus to evaluate its performance. We compare its performance with the interfaces ELF, Freya and NLP-Reduce. The results indicate that our proposal allowed our NLIDB to obtain the best performance.

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ANT COLONY SYSTEM WITH CHARACTERIZATION-BASED HEURISTICS FOR A BOTTLED-PRODUCTS DISTRIBUTION LOGISTICS SYSTEM

Autor(es): Gómez S., Claudia G. ; Cruz-Reyes, Laura; González B., Juan J.; Fraire H., Héctor J.; Pazos R., Rodolfo A.; Juan J. Martínez P.

The aim of this paper is to show the solution of the Vehicle Routing Problem with Time Windows (VRPTW) as a key factor to solve a logistics system for the distribution of bottled products. We made a hybridization between an Ant Colony System algorithm (ACS) and a set of heuristics focused on instance characterization and performance learning. We mainly propose a method to make a constrained list of candidate customers called Extended Constrained List (ECL) heuristics. Such a list is built based on the characterization of the time-window and the geographical distribution of customers. This list gives priority to the nearest customers with a smaller time window. The ECL heuristics is complemented by the Learning Levels (LL) heuristics, that allows the ants to use the pheromone matrix in two phases: local and global. In order to validate the benefits of each heuristics, a series of computational experiments were conducted using the standard Solomon's benchmark. The experimental results show that, when the ECL heuristics is incorporated in the basic ACS algorithm, the number of required vehicles is reduced by 28.16%. When the LL heuristics is incorporated, this reduction increases to 36.83%. The experimentation reveals that, by a suitable characterization, preexisting conditions in the instances are identified in order to take advantage of both of the ECL and LL.

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IMPROVING THE BIN PACKING HEURISTIC THROUGH GRAMMATICAL EVOLUTION BASED ON SWARM