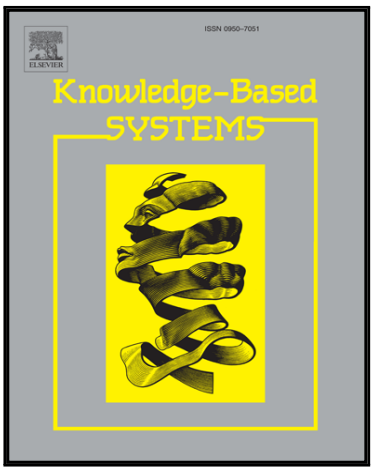

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A novel version of simulated annealing based on linguistic patterns for solving facility layout problems

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Abstract

The paper presents a novel version of the simulated annealing algorithm based on linguistic patterns (LP) and fuzzy theory approach. The article describes shortly the linguistic patterns and shows on a simple illustrative example the idea of using the Łukasiewicz formula as a criterion for the facility layout optimization. Next, the detailed description of our LP version of simulated annealing is presented. The influence of the proposed algorithm parameters on the effectiveness of our approach is then examined in a simulation experiment involving four different types of facility layout problems. The outcomes from the first experiments are used for optimally setting the parameters of our proposal in the second simulation study focused on verifying its effectiveness for objects with uniform and variable sizes. The obtained results show that the presented procedure, apart from producing decent results in terms of the classic goal function and the linguistic pattern criterion, provided solutions that were qualitatively different than those generated by a crisp version.

Keywords

facility layout problem, linguistic patterns, fuzzy sets, simulated annealing, optimization