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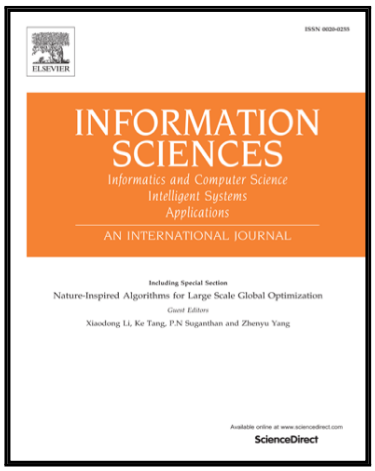

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A Novel Hybrid Genetic Local Search Algorithm for Feature Selection and Weighting with an Application in Strategic Decision Making in Innovation Management

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Abstract

In some applications, one needs not only to determine the relevant features but also provide a preferential ordering among the set of relevant features by weights. This paper presents a novel Hybrid Genetic Local Search Algorithm (HGA) in combination with the k-nearest neighbor classifier for simultaneous feature subset selection and feature weighting, particularly for medium-sized data sets. The performance of the proposed algorithm is compared with the performance of alternative feature subset selection algorithms and classifiers through experimental analyses in the various benchmark data sets publicly available on the UCI database. The developed HGA is then applied to a data set gathered from 184 manufacturing firms in the context of innovation management. The data set consists of scores of manufacturing firms in terms of various factors that are known to influence the innovation performance of manufacturing firms and referred to as innovation determinants, and their innovation performances. HGA is used to determine the relative significance of the innovation determinants. Our results demonstrated that the developed HGA is capable of eliminating the irrelevant features and successfully assess feature weights. Moreover, our work is an example how data mining can play a role in the context of strategic management decision making.

Keywords:
Feature Subset Selection, Feature Weighting, Hybrid Genetic Local Search Algorithm, Strategic Decision Support, Innovation Management, Data Mining

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