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Applied Soft Computing

Special Issue:

Optimisation Methods & Applications in Decision-Making Processes

Guest Editors:
Arijit Bhattacharya, Sani Susanto, John Geraghty and Paul Young

Applied Soft Computing

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AIMS AND SCOPE

Description
Applied Soft Computing is an international journal promoting an integrated view of soft computing to solve real life problems. Soft computing is a collection of methodologies, which aim to exploit tolerance for imprecision, uncertainty and partial truth to achieve tractability, robustness and low solution cost. The focus is to publish the highest quality research in application and convergence of the areas of Fuzzy Logic, Neural Networks, Evolutionary Computing, Rough Sets and other similar techniques to address real world complexities. **Applied Soft Computing** is a rolling publication: articles are published as soon as the editor in chief has accepted them. Therefore, the web site will continuously be updated with new articles and the publication time will be short.

Major Topics
The scope of this journal covers the following soft computing and related techniques, interactions between several soft computing techniques, and their industrial applications:

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- Fuzzy Computing
- Neuro Computing
- Evolutionary Computing
- Probabilistic Computing
- Immunological Computing
- Hybrid Methods
- Intelligent Agents and Agent Theory:
- Causal Models
- Case-based Reasoning
- Chaos Theory
- Interactive Computational Models

The application areas of interest include but are not limited to:

- Decision Support
- Process and System Control
- System Identification and Modelling
- Optimisation
- Signal or Image Processing
- Vision or Pattern Recognition
- Condition Monitoring
- Fault Diagnosis
- Systems Integration
- Internet Tools
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- Robotics
- Motion Control and Power Electronics
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- Telecommunications
- Consumer Electronics
- Industrial Electronics
- Manufacturing Systems
- Power and Energy
- Data Mining
- Data Visualisation
- Intelligent Information Retrieval
- Bio-inspired Systems
- Autonomous Reasoning
- Intelligent Agents

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Editorial

Special issue on optimisation methods & applications in decision-making processes

Introduction

Decision-making and optimisation are oft studied subjects and the scopes of these areas are vast. Decision-making is a natural phenomenon, and in nature is a self-adaptive process. Further, decision-making and optimisation techniques require cognisance of the issues of human values, ethics and activities. These "human interferences" compound the inherent complexities of goal-oriented decision-making processes. One such problem is encountered while developing a robust large-scale optimisation/decision-making unit that optimises the controlling parameters, under uncertainty and complex multi-objective criteria. This Special Issue brings together researchers working on the development of decision-making and optimisation techniques for enhancing the performance of modern operational research systems in the field of engineering, business and management. The focus of the Special Issue is to present the current trends in the development of optimisation techniques and their application in decision-making processes. A balanced set of new research has been selected that addresses real world complexities in the arena of decision-making and optimisation using MCDM/MADM methods, fuzzy methods, hybrid methods, multi-objective programming, evolutionary algorithms, ACO, PSO and DEA.

This special issue includes thirty contributions, grouped into seven categories:

1. Multi-criteria decision-making processes,
2. Fuzzy decision-making and optimisation methods,
3. Multi-objective programming and related issues,
4. Genetic algorithms,
5. Hybrid genetic algorithms,
6. Swarm intelligence, and
7. Meta-modelling & other heuristics.

Contributions mainly present either a novel approach applied to a problem or a state-of-the-art method utilised for solving industrial management, logistics and supply-chain problems. A brief outline of the contributions included in this Special Issue is delineated below.

Organisation of the special issue

Section 1 – multi-criteria decision-making processes

The first paper contains a broad spectrum of human values, ethics and activities in considering the structures of decisions in order to serve the needs of decision makers. *Saaty* and *Begicevic* identify three lists of human values and activities for decision-making purposes. The manuscript opens up several new research agendas relating to aspects of ethics, values and human activities in decision-making.

The second paper raises issues of inconsistency in pair-wise reciprocal matrices of Analytic hierarchy Process (AHP). These issues lead *Yuen* to propose an objective hierarchy model – Analytic Hierarchy Prioritization Process (AHPP) – in order to approximate the real priority vectors by selecting the most appropriate prioritization operator from candidate alternatives. It has been argued that AHPP is one of the methods to address the prioritization problem so as to make better decisions. It has been also indicated that the most appropriate prioritization operator is dependent of the content of the reciprocal matrix of the AHP model.

In the third paper, *Dey* reports an integrated risk management framework, for managing project risks, in order to analyse risk across project, work package and activity levels. The paper integrates AHP and risk map methodologies. The proposed framework suggests mitigation measures for technical, organisational and environmental risk factors thereby providing the dynamic decisions during project planning phase. The paper also develops some new research directions in the field.

Zammori in the fourth paper reports that, in addition to complex decision-making procedures, both AHP and Analytic Network Process (ANP) can be used as forecasting models effectively. A global view of AHP & ANP and its credibility in dealing with complex real life decisions subjected to a diversity of influences is also illustrated. The paper examines the potential of the AHP and ANP models to help discern states and situations as well as to predict outcomes. One example uses AHP to predict the Democratic nominee in the 2008 United States presidential election and the overall election winner. In another example, ANP predicts the market share for ski equipment.

The fifth paper of Bhattacharya et al. report a hierarchical concurrent engineering approach integrating AHP with Quality Function Deployment (QFD) in combination with Cost Factor Measure (CFM) for ranking and selecting candidate-suppliers under multiple, conflicting-in- nature criteria environment. Engineering requirements and customer requirements governing the selection decision have been identified. The hierarchical QFD methodology allows the Decision-Maker (DM) to rank the candidate-suppliers considering both CFM and the subjective factors. Experimental validation of the methodology is conducted with design of experiments.

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