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EDITORIAL

Editorial

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I am happy to present a compilation of 7 papers of diverse topics related to memetic computing. It has been a rewarding exercise selecting the papers to be included for this issue since the papers which have been accepted for publication demonstrate the aspects of memetic computation encumbering the many facets of problem-solving and representations. It is also evident that from the number of submissions received, the areas of technical focus linked to memetic computation will continue to grow.

The first paper of this issue focuses on symbolic regression using genetic programming (GP) based classifier, i.e., M3GP (multi-dimensional multi-class genetic programming with multi-dimensional populations). GP is known to be a powerful technique for symbolic regression but with a tendency to generate complex non-linear regression models. Here, the authors Munoz and co-workers extended the M3GP for symbolic regression. The extended M3GP generates regression models that are parametrically linear, which is more desirable for many real-world problems. To achieve this, they incorporated local searches into their memetic GP. They reported results with more accurate models for synthetic and real-world benchmark problems.

The work by Wang et al. describes a fault diagnostic framework based on a novel dual-ELMs (extreme learning machines) for feature extraction and fault pattern recognition. To validate their work, they applied the diagnostic framework on a test rig for vibration analysis. The motivation behind their work is for condition monitoring of wind turbine drive-train. With manual inspections, it is unlikely to achieve the desired objective of real-time compound-fault monitoring.

In recent years, brain storm optimization (BSO), a novel evolutionary algorithm inspired by the way humans carry out brainstorming process has emerged as a viable alternative to deal with premature convergence and local optima trapping tendency that plagued genetic algorithms. In this paper by Yan and co-workers, they proposed a swarm intelligence based BSO to solve the inversion problem of pre-stack amplitude variations with offset (AVO) elastic parameters. The AVO technique is based on elastic wave theory. It is used to determine lithological characteristics and physical parameters which combined with seismic, geological and logging information can be used for prediction in oil and gas exploration. They reported significant improvement in outcome based on experimental results.

There are many practical engineering problems that involve optimization with respect to multiple objectives concurrently. The paper by Lara et al. deals specifically with multi-objective evolutionary algorithms (MOEA) for solving multi-objective problems (MOP). MOEA typically rely on powerful multi-objective stocastic local search (MOSLS) for faster convergence. For this to be effective, it is typical that operators that induce variations in the evolving population play and important role. Here, the authors studied the implications of MOSLS for constrained MOP and proposed movements between subspaces during the search. The emphasis of choosing neighbourhood samples to effect movement along the Pareto front is highlighted in the paper.

The paper by Shang et al. proposed a location-based DNA matching algorithm for hyperspectral image classification. In principle, the large number of spectral values for pixels give higher certainty for correct classification. However, practical issues including lack of labelled samples, large number of spectral band, variations due to environmental conditions remain as challenges. Their approach is based on evolutionary algorithm with segmented sub-tasks to manage the requirements of large number of labelled samples and inseparability of the spectral values. They validated their approach with simulation results, comparing with 3 state-of-the-art algorithms.

Feature selection is an important step which serves to reduce data dimensionality and ultimately, better classifier's accuracy and efficiency. Harmmami et al. in their paper proposed a 3-objective evolutionary algorithm hybrid approach which include two filter objectives and one wrapper

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objective. The filters are statistical based while the computationally expensive wrapper is evaluation based which involve applying the feature set on the given dataset. They validate their approach on benchmark datasets of different dimensions with competitive experimental results.

The final paper in this issue by Xue and Chen deals with the ontology heterogeneous problem of semantic web. Matching ontologies is a complex and time-consuming task. They proposed a hybrid population-based incremental learning algorithm for selection, combining and tuning of ontology matchers. To manage the memory requirement of evolutionary algorithms (EA), the authors used probabilistic representation of the population for the optimization process with a local search strategy incorporated within it. This results in runtime improvement and evaluation based on test cases showed the competitiveness of their work compared to other EA-based approaches.

The successful publication of each issue of this journal involves the effort of many people. In particular the editors tasked with the role of managing the review of the papers submitted and the anonymous reviewers who evaluate the technical content of each paper are crucial in the whole evaluation process. Their hard work and dedication is the key to maintaining the quality and standing of this journal. I gratefully acknowledge their contributions.