Editorial

Meng-Hiot Lim¹ · Yew-Soon Ong¹ · Steve Gustafson²

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The field of memetic computation has been seeing a steady and gradual increase in activities since the inception of this journal 6 years ago. It is therefore reasonable to assume that the focus on meme-centricity as the main driver in computational problem-solving is set to establish a stronger foothold. In an earlier survey paper published in IEEE Trans. On evolutionary Computation (Vol 15.5, 2011), an opening phrase in the article goes like this: “Memetic computation is a paradigm that uses the notion of meme(s) as units of information encoded in computational representations for the purpose of problem-solving. It covers a plethora of potentially rich meme-inspired computing methodologies, frameworks and operational algorithms including simple hybrids, adaptive hybrids and memetic automaton.” Meanwhile, a general definition from the IEEE CIS ETTC Task Force described memetic computing as “...a broad subject which studies complex and dynamic computing structures composed of interacting modules (memes) whose evolution dynamics is inspired by the diffusion of ideas.” Notwithstanding, the term meme therefore requires further clarifications. In a paper published in IEEE Computational Intelligence Magazine (Vol 5.2, 2010), citing the works of other researchers, “memes” was described in a much broader context as “constellation of activated neuronal synapses in memory or information encoded in neural structure”, “contagious information pattern that replicates by parasitically infecting human minds”, “memory item, or portion of an organism’s neurally-stored information”, “ideas, the kind of complex idea that forms

itself into a distinct memorable unit”, “any kind, amount, and configuration of information in culture that shows both variation and coherent transmission”, “unit of information in a mind whose existence influences events such that more copies of itself get created in other minds”, to “genotype as mental representation, and phenotype as implemented behavior or artifact” and even as “hierarchically arranged components of semantic memory, encoded by discrete neural circuits”. Basing on these definitions of memetic computation as a starting point, the broad and encumbering reach of this field is evident from the many papers that have been published in this journal.

To conclude the year of 2015, we put together this year-end issue with four articles; the first three papers describing engineering applications while the fourth paper in the field of binary space optimization. As with many articles published earlier, the link to memetic computation may not be that explicit. Yet, based on the notion of memes as put forth earlier, it is clear that many of the works reported directly or indirectly draw on the notion of memes as mechanisms or units within the problem-solving engine.

The first paper by Lin, Wang and Rong deals with the manifestation of memes as fuzzy rules in solving engineering problem. Sensors are crucial and integral parts of an aircraft. In this work, the authors present a novel scheme for diagnosing sensor failures in a flight control system. A faulty sensor that churns out unreliable measurements hence inaccurate readings, can lead to closed-loop instability if left undetected. Using a novel scheme that involves self-organizing fuzzy systems, rules are updated by trial and error. The diagnosis of sensor failure is achieved by analyzing the residual signals between estimated states and measurements from the sensors. They demonstrated the applicability of their approach through simulation whereby successful detection of hard and soft failures of gyros was achieved.

✉ Meng-Hiot Lim
EMHLIM@ntu.edu.sg

¹ Singapore, Singapore

² New York, USA

The second paper is on mobile robots navigation. Mohanty and Parhi present a hybrid methodology of cuckoo search and adaptive neuro-fuzzy inference for path-planning. Autonomous robot navigation is challenging from an optimization standpoint, since one has to plan the path of the robot based on various constraints and requirements. The problem becomes even more complex with unknown or unmapped environment and the planning involves multiple robots. This paper makes an attempt to use cuckoo search algorithm to train the premise part of the neuro-fuzzy inference system. Through a series of simulations and experimental results on physical robots in a laboratory setting, the authors showed the effectiveness of their approach compared to other existing methods.

The next paper by Li et al. describes how evolutionary multi-objective optimization coupled with ensemble learning can be effective in the detection of changes in synthetic aperture radar (SAR) images. The main idea is to distinguish through clustering the changes between images, with tradeoff between filtering off noise and preserving details. A selective ensemble strategy is then be applied on the intermediate clustering results. They experimented with real SAR images and showed that their proposed method was able to reduce the effect of speckle noise, enhancing the clustering performance.

The final paper of this issue by Salman et. al. describes the application of adaptive probabilistic harmony search in solving several well-known binary optimization problems. In their approach, they use a sampling of good vectors in

the population to drive the adaptation of expected values of search probability distribution. It was noted that due to the inherent weaknesses of standard harmony search, researchers have devised different schemes to improve on the standard pitch adjustment operation which is claimed to be ineffective for binary domain optimization problems. They applied the technique to solve several well-known binary optimization problems such as max-one, knapsack and several others. They further demonstrated the effectiveness of their technique in a real-world problem of satellite broadcast scheduling.

We thank the authors for contributing their works in this issue and are grateful to the Editors who managed the review process in a professional manner. More importantly, we acknowledge the invaluable contributions of the reviewers who carefully scrutinized the papers to ensure their publication worthiness. The authors no doubt benefitted from their critical comments and constructive feedback. The year 2015 has been a significant milestone year. It marks the beginning of the journal being tracked in SCI indexing with the initial impact factor of 1.0. On behalf of the Editorial Board, we also take this opportunity to thank all the authors whose papers have been published in the earlier issues of this journal.

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