



Soft Computing (2010 Impact Factor: 1.512)

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Special Issue on “Bio-inspired Algorithms with Structured Populations”

March 31st 2012

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PAPER SUBMISSION DEADLINE ~~February 15th 2012~~ March 31st 2012

AIM AND SCOPE

Bio-inspired Algorithms (EA, PSO, ACO, ...) are powerful optimization tools that are able to find good solutions in reasonable time for complex NP problems. Since they are approximation techniques, it is essential for a high performance/accuracy to find a proper equilibrium between the exploration and the exploitation of the search space.

Among the many ways to get this proper balance, it is well known that establishing some structure on the individuals in the population may help EA, PSO and other algorithms to achieve a better exploration-to-exploitation tradeoff. The two main ways to structure the population are coarse- and fine-grained topologies. In coarse-grained algorithms, the population is partitioned into several smaller sub-populations that are independently managed. This way, different sub-populations will hopefully explore different areas of the search space, and sub-populations communicate among them with a given frequency to exchange information about their explored region. In the case of fine-grained algorithms, sub-populations are reduced to (usually) only one single individual each, and they keep tightly communicating with neighboring sub-populations. The pursued effect is that exploitation of the search space is performed inside neighboring sub-populations, while exploration is enhanced thanks to the isolation of distant sub-populations in the resulting topology (in the borders of such neighborhoods).

Another important advantage of using structured populations is that, since they are decentralized, the parallelization of the algorithm is straightforward. Therefore, the advantages of using structured populations are complemented with a potentially efficient parallel implementation.

The most well-known implementations of coarse- and fine-grained populations in the literature are distributed and cellular topologies, respectively. However, there are many other topologies that can be used, like small-world, free-scale, or random networks, to name a few. Example algorithms are cellular GAs, Fully Informed PSO, distributed ACO, and DEGL, a DE with a neighborhood-based mutation operator.

TOPICS

This special issue is an excellent opportunity to get together researchers that are interested and active in the field of adding decentralized population structures to their favorite algorithm. The topics covered by this special issue include, but are not limited to:

- Fine-grained and coarse-grained bio-inspired algorithms
- Any kind of structured-population metaheuristic
- New population topologies
- Dynamic population topologies
- Characterization and performance analysis of population topologies
- Hybrid fine- and coarse-grained topologies
- Exploration/exploitation balance management
- New algorithmic improvements
- Theoretical studies
- Robustness and performance guarantee
- Self-adaptation at low overhead costs
- Heterogeneous algorithms
- Parallel and massively parallel designs
- Multi-objective optimization with structured population algorithms
- Memetic algorithms
- Niching techniques in combination to a structured population
- Constraint handling
- Application to dynamic and uncertain environments
- Review and perspectives
- Complex problems and real-world applications solved with structured populations

IMPORTANT DATES

Paper submission: ~~February 15, 2012~~ ~~March 31, 2012~~

Initial notification: ~~May 15, 2012~~ June 30, 2012

Rebuttal submission: ~~June 15, 2012~~ July 31, 2012

Final notification: ~~September 15, 2012~~ October 31, 2012

Expected publication: Mid 2013

NOTES FOR PROSPECTIVE AUTHORS

We are looking for novel outstanding high quality contributions. Submitted papers should not have been previously published nor be currently under consideration for publication elsewhere.

All papers are refereed through a strict review process. A general guide for authors and other relevant information for submitting papers are available on the Soft Computing journal website:

<http://www.springer.com/engineering/computational+intelligence+and+complexity/journal/500>

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