Special Session Proposal for the IES 2014

Title:

Collaborative Learning and Optimization

Area of Coverage:

Learning and optimization are two essential tasks that computational intelligence aims to address. Numerous techniques have been developed for these two purposes separately. In fact, learning and optimization are closely related. On the one hand, learning can be formulated as a model-centric or data-centric optimization problem, and accordingly solved by optimization techniques. On the other hand, optimization can be regarded as an adaptive learning process, and thus tackled by learning methodologies. Recent years have seen remarkable attempts at collaborative learning and optimization. For instance, learning classifier systems, evolutionary neural networks, evolutionary ensemble learning, evolutionary kernel machines, evolutionary clustering, evolutionary data generation and extraction for learning, supervised classifiers' domain of competence analysis using evolutionary multi-objective optimization, theoretical analysis of optimization techniques using learning theory, optimization by building and using probabilistic models, self-adaptive and tuning-free optimization, ensemble optimization, statistical analysis of evolutionary computation, automatic heuristic design, etc. These research efforts have leaded to a great deal of cutting-edge techniques in the corresponding research fields. Nowadays, the emergence of more and more complex problems in real-world applications insistently calls for in-depth investigations of synergy between learning and optimization. Moreover, feasibility of implementing collaborative learning and optimization techniques on massive parallel systems must be seriously taken into account to ensure that large-scale problems can be solved in a reasonable time. This symposium aims at providing a forum for academic and industrial researchers from both learning and optimization communities to review the past effort, to report the latest progress, and to explore the future direction of synergy between techniques from these two areas.

The scope of this special session covers, but is not limited to:

- Learning based on data-centric optimization
- Learning based on model-centric optimization
- Learning based multi-objective optimization
- Competence analysis of learners using optimization techniques
- Automatic selection of learning or optimization techniques

- Theoretical relationship between learning and optimization
- Optimization based on state-of-the-art learning techniques
- Self-adaptive and tuning-free optimization based on learning models
- Analysis of optimizers using statistical & machine learning techniques
- Collaborative learning and optimization on massively parallel systems
- Real-world Applications of collaborative learning and optimization techniques.

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