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Proposed Special Session on
Evolutionary algorithms for multiobjective optimization
at
17th International Conference on Intelligent Systems Design and Applications
South Asian University, Delhi, India.
December 14-16, 2017

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Objectives of the Session

Evolutionary Algorithms, since their origin in 1950s, has come a long way and ascertained several evolutionary multi-objective optimization (EMO) methodologies. EMO specifically deals with decision making algorithms in complex conflicting situations with two or more objective functions. The development and extension in EMO techniques are due to its wide application by computer scientists, engineers, operations researchers and biologists alike across the spectrum of human endeavor. Hence a research horizon is certainly open to the researcher and scientists dealing with the vector of decision variables of theoretical and practical nature.

In an EMO methodology, evolutionary algorithms are applied to stochastic data sets that simulate the natural evolution process. Such algorithms include Genetic Algorithm (GA), simulated annealing, tabu search, ant colonies, artificial bee colonies (ABC), neighborhood-based search, teaching-learning based optimization (TLBO) are few to count.

Diversified applications of EMO techniques are established through their successful implementation to conflicting objectives problems with proved performance in accordance to run-time complexity, limit behavior and quality measures. These applications comprise of machining process optimization, routing-scheduling of vehicles, economics and financial planning, civil resource allocation, stochastic optimization, model predictive control, image processing and so on. Since the discovery of space mapping, surrogate modeling and space mapping exploit evolutionary design optimization techniques in designing microwave components and antennas. However, the understanding of EMO in relevance of problem structure and the metaheuristics associated performance is in its infancy. Improved evolutionary optimization algorithms with least sensitivity to decision variables are yet to be discovered.

It is expected from the research papers in this special session to enable the frontline end users dealing with large number of variables with conflicting objectives to optimize their resources, hence to maximize the profit with least penalties. The review papers of the special session on EMO will thrust the researchers and scientists to identify the novel multi-objective optimization algorithms as robust

and powerful tools to cope-up with rapidly changing parameters and variables.

Scope

This session has to integrate the latest evolutionary multi-objective optimization algorithms, their metaheuristics with the size of the Pareto front, including the search space size, the objectives correlation and their conflicting complexity. Variety of evolutionary algorithms with respect to its structural characteristics and behavioral performance will provide rational tools to the upper level management for decision making in complex situations.

Topics of interest include, but are not limited to:
- Multiobjective problem structure analysis
- Algorithm performance
- Algorithm behavior analysis
- Search space analysis, fitness landscapes
- Scalability in the search space (large-scale optimization) and in the objective space (many-objective optimization)
- Theoretical developments
- Classification of multiobjective problem structure / algorithm performance
- Automated tuning and control of parameters
- Neighborhood structures and efficient algorithms for searching them
- Variation operators for evolutionary and other stochastic search methods
- Comparisons between different (also exact) techniques
- Hyperheuristics

Contribution to the main conference

The main focus of the EMO session is to present the most recent advances in the EMO field to researchers. Significant research outcomes are emerging in EMO hence the integration of the upcoming EMO session into the mainstream ISDA 2017 conference is therefore a nice opportunity to bring together researchers from the main research fields in multiobjective optimization.

Expected Outcome from the Special Session

The session will be used to facilitate the establishment of a collaborative group of researchers interested in this area. Papers and presentations delivered for the session will be collated for a special journal issue (to be advised). All papers submitted to special session will be reviewed using the same process as of the conference.

Special Session Chairs

Professor Akila Muthuramalingam,
KPR Institute of Engineering and Technology, Coimbatore, India

Professor Ramzan Muhammad,
Maulana Mukhtar Ahmad Nadvi Technical Campus, Malegaon, India

Special Session Committee

Professor Bommanna Raja Kanakaraj, KPR Institute of Engineering and Technology, Coimbatore, India
Professor Ramesh .L, Dr. M.G.R. Educational and Research Institute, Chennai, India
Professor Sumathi .A .C, PSG Institute of Technology and Applied Research, Coimbatore, India