

IEEE Transactions on Evolutionary Computation

Special Issue on Understanding Complex Evolutionary Systems

Call for Papers

I Aim & Scope

Recent advances in simulation methodologies and increasing computing speed have led to the development and application of evolutionary systems to solve complex real-world problems in a variety of settings that include engineering, biology, and economics among others. The increasing complexity of these systems has made them more difficult to analyze in-depth. There is an inherent danger in building complex evolutionary systems without a thorough understanding and an acknowledgment that such systems could behave in novel, unexpected, or potentially hazardous ways. This special issue focuses on the theory of complex evolutionary systems and the development and application of tools that advance understanding, control, and reliability of complex evolutionary systems. The aim is to highlight the latest advances in theory, methods of analysis, and standardization of tools for such systems. Topics of interest for this special issue include:

- Techniques for the automatic analysis of the results of evolutionary computation. Such techniques include but are not limited to clustering, fingerprinting and other feature extraction techniques, and performance based testing.
- Techniques for visualization. Targets of visualization include individual evolved solutions, collections of evolved solutions, aspects of the dynamics of evolution, and fitness landscapes. Submissions in this area should be useful for comparing or understanding the results of evolution, improving the performance of evolutionary algorithms, understanding the geometry of fitness landscapes, or illuminating the dynamics of evolution.
- Techniques for automatic or semi-automatic selection or generation of representations for use in evolutionary computation. Techniques for comparing representations including representation independent features, performance based comparison, and theoretical structures that can be used to design or understand representations.
- Analysis of the structure of evolved populations. An evolved population may contain thousands of individuals but only a few basic types. Techniques for locating representatives of fundamental types, understanding their relationship within a fitness landscape, and for forcing the locating of new types, such as techniques generalizing or improving niche specialization.
- Understanding of the behavior and dynamics of evolved agents. This includes both agents that solve a problem and agents that interact with one another, such as game playing agents. Contrasting different methods agents discover for solving problems, comparing the strategies and competitiveness of evolved game playing agents.

II Important Dates

20 January 2012:	Submission deadline
1 April 2012:	Notice of first round reviews
1 June 2012:	Revision due
15 July 2012:	Final notice of accept/reject
1 Sept 2012:	Final manuscript due

Tentative date for publication of the special issue is December 2012.

III Submission

Manuscripts should be prepared according to the instructions of the “Information for Authors” section of the journal, available at <http://iee-cis.org/pubs/tec/authors/>. Submissions should be done through the IEEE TEVC journal website: <http://mc.manuscriptcentral.com/tevc-ieee> and clearly indicate “Special Issue on Understanding Complex Systems” in the comments to the Editor-in-Chief. Submitted papers will be reviewed by at least three reviewers. The submission of a manuscript implies that it is the authors original unpublished work and is not being submitted for possible publication elsewhere.

IV Guest Editors

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