**PROPOSED SIS SPECIAL SESSION**

Hybrid Cultural Algorithms: Beyond Classical Cultural Algorithms

**Aim**

Cultural Algorithms are computational models of Cultural Evolution. As such they provide a framework within which experiences of problem solvers embedded in a social fabric influence the collective knowledge of that group, its Culture. Culture is viewed as a network of passive and active knowledge sources. These knowledge sources are able integrate this knowledge, either individually or collectively, into their structure using data mining and machine learning tools. This updated Cultural Knowledge then is used to direct the modifications to individuals and their plans in the population space. Cultural Algorithms are an ideal framework for problems that require large amounts of domain knowledge to direct the collective decisions of individuals in the population. As such Cultural Algorithms have been successfully applied to problems in complex hierarchical systems characterized by large and extensive data sets (big data), many domain constraints, multiple objectives, and multiple agents within a large and spatially distributed social network.

Cultural Algorithm can also provide a flexible framework for hybridization with other socially motivated technologies such as particle swarm optimization, differential evolution, ant colony optimization, and co-evolutionary approaches among others. These hybrid systems have required extension to Classical Cultural Algorithms such as multi-population and multi-belief spaces, novel approaches to using belief space knowledge to drive evolutionary search. This special session is designed to provide an overview of the diverse hybrid approaches that have been proposed beyond the classical Cultural Algorithm. Cultural Algorithm designers are invited to submit their latest extensions and share a glimpse of the future of Cultural Algorithms.

**Scope**

This special session will focus on **all** aspects of Cultural Algorithms theory and application. Topics of interest may cover, but are not limited to the following:

* Big Data and Analytics with Cultural Algorithms,
* Social Intelligence in Networks,
* Brainstorming in Cultural Systems,
* Bio-informatics applications,
* Multi-Cultural systems and subcultures,
* Multi-Objective Optimization,
* Many Objective Optimization,
* Multi-population, multi-Agent Systems,
* Ecosystem Modelling and Virtual World Applications,
* Hybrid System Learning Systems,
* Distributed Computing,
* Social Intelligence in Games and Auctions,
* Cloud Computing applications,
* Constrained Optimization,
* Real-World Applications,
* Crowd Sourcing,
* Hybrid agent populations: GA, GP, Neural, and Fuzzy agents.
* Education.
* Deep Learning in Cultural Algorithms.
* Hierarchical Swarms.

**Organizer:**

Name: Dr. Robert G. Reynolds (Senior Member, IEEE)

Affiliation: Dept. of Computer Science, College of Engineering, Wayne State University and University of Michigan-Ann Arbor.

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**Dr. Robert G. Reynolds** received his Ph.D. degree in Computer Science, specializing in Artificial Intelligence from the University of Michigan, Ann Arbor. He is currently a professor of Computer Science and director of the Artificial Intelligence Laboratory at Wayne State University. He is a Visiting Research Scientist with the Museum of Anthropology at the University of Michigan-Ann Arbor, and a member of the Complex Systems Group. His interests are in the development of computational models of cultural evolution for use in the simulation of complex organizations and in computer gaming and virtual world applications. Dr. Reynolds produced a framework, Cultural Algorithms, in which to express and computationally test various theories of social evolution using multi-agent simulation models. He has applied these techniques to problems in social evolution including the origins of the state; discovery of ancient hunting sites underneath Lake Huron; the emergence of prehistoric urban centers; the origins of language and culture, and the disappearance of the Ancient Anazazi in Southwestern Colorado using game programming techniques. He has co-authored three books in this area that include the following; *Flocks of the Wamani* (1989, Academic Press), with Joyce Marcus and Kent V. Flannery; *The Acquisition of Software Engineering Knowledge* (2003, Academic Press), with George Cowan; and *Excavations at San Jose Mogote 1: The Household Archaeology* with Kent Flannery and Joyce Marcus(2005, Museum of Anthropology-University of Michigan Press).

**Co-Organizers:**

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**Interested Authors:**

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**Thaer Jayyousi, Wayne State University**

**Leonard Kinniard-Heether, Ford Motor Company.**

**Joyce Marcus, University of Michigan**

**John O’Shea, University of Michigan.**

**Marcus Randolph, TARDEC Corporation.**

**Faisal Waris, General Motors.**