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Non-Direct Encoding Method Based on Cellular Automata to Design Neural Network Architectures

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Abstract
Architecture design is a fundamental step in the successful application of Feed forward Neural Networks. In most cases a large number of neural networks architectures suitable to solve a problem exist and the architecture design is, unfortunately, still a human expert's job. It depends heavily on the expert and on a tedious trial-and-error process. In the last years, many works have been focused on automatic resolution of the design of neural network architectures. Most of the methods are based on evolutionary computation paradigms. Some of the designed methods are based on direct representations of the parameters of the network. These representations do not allow scalability; thus, for representing large architectures very large structures are required. More interesting alternatives are represented by indirect schemes. They codify a compact representation of the neural network. In this work, an indirect constructive encoding scheme is proposed. This scheme is based on cellular automata representations and is inspired by the idea that only a~few seeds for the initial configuration of a cellular automaton can produce a wide variety of feed forward neural networks architectures. The cellular approach is experimentally validated in different domains and compared with a direct codification scheme.

Twins: Scalable 2-Hop Structured Overlay Network

J. HU, H. ZHANG, W. ZHENG

Abstract
In this paper we propose a new structured overlay network, which is more efficient and scalable than previous ones. We call it Twins, because its routing table consists of two parts, one containing nodes with common prefix and the other containing nodes with common suffix. Twins routes messages to their destinations in just 2 hops even in a very large scale and the overhead is very low. When deployed in a peer-to-peer system with 5 000 000 nodes, each node receives only 6 messages per second for routing table maintenance. This cost, as well as routing table size, varies as a O(\sqrt N) function to the overlay scale, so Twins can also run well in an even larger environment.

Computing Epistasis of Template Functions Through Walsh Transforms

M. T. IGLESIAS, C. VIDAL, A. VERSCHOREN

Abstract
Template functions have been introduced as a class of test functions, allowing to study the convergence behaviour of genetic algorithms. In this note, we show how to use Walsh transforms to calculate the normalized epistasis of these functions.

A Hierarchical Component-based WebGIS and Its Key Technologies

Y. W. LUO, L. DING, X. L. WANG, W. J. WANG, Z. Q. XU

Abstract
A practical hierarchical component-based WebGIS model referred to as Geo-Union is presented. Geo-Union consists of four layers: storage layer, service layer, component layer and application layer. Service layer is partitioned into another two layers: Geo-Union client and Geo-Union server. The architectures and object diagram of each layer in Geo-Union are discussed in details. After that, four key technologies adopted in Geo-Union (spatial data model, ORDB, spatial index and spatial cache) are summarized and analyzed, especially the spatial cache framework of Geo-Union. At last, some future works in WebGIS, such as interoperability, security, distributed computing and intelligent computing, are indicated and simply explored.

Production Scheduling with Complex Precedence Constraints in Parallel Machines

K. El RAHEB, C. T. KIRANOUDIS, P. P. REPOUSSIS, C. D. TARANTILIS

Abstract
Heuristic search is a core area of artificial intelligence and the employment of an efficient search algorithm is critical to the performance of an intelligent system. This paper addresses a production scheduling problem with complex precedence constraints in an identical parallel machines environment. Although this particular problem can be found in several production and other scheduling applications; it is considered to be NP-hard due to its high computational complexity. The solution approach we adopt is based on a comparison among several dispatching rules combined with a diagram analysis methodology. Computational results on large instances provide relatively high quality practical solutions in very short computational times, indicating the applicability of the methodology in real life production scheduling applications.

Genetic Algorithms As a Model of Musical Creativity -- on Generating of a Human-Like Rhythmic Accompaniment

M. DOSTÁL

Abstract
This article introduces a genetic algorithm based system intended for automated generating of a realistic rhythmic (drum set) accompaniment. Present systems do not insist on the natural music criteria and realistic (human-like) result. They generate a rhythmic accompaniment regardless to the other instruments used. The fitness operators are mostly based on manual evaluation by user. The system described in this paper uses automatic fitness evaluator and prefers some of the natural music criteria. Accompaniment is generated with regard to a harmonic-accompaniment instrument (HAI).