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CIS Publication Spotlight

IEEE Transactions on Neural Networks and Learning Systems

Neural-Fitted TD-Leaf Learning for Playing Othello with Structured Neural Networks, by S. van den Dries and M.A. Wiering, *IEEE Transactions on Neural Networks and Learning Systems*, Vol. 23, No. 11, Nov. 2012, pp. 1701–1713.

Digital Object Identifier: 10.1109/TNNLS.2012.2210559

"A methodology for quickly learning to play games at a strong level is developed. The methodology consists of a novel combination of three techniques, and a variety of experiments on the game of Othello demonstrates their usefulness. Structures or topologies in neural network connectivity patterns are used to decrease the number of learning parameters and to deal more effectively with the structural credit assignment problem, which is to change individual network weights based on the obtained feedback. Furthermore, the structured neural networks are trained with the novel neural-fitted temporal difference (TD) learning algorithm to create a system that can exploit most of the training experiences and enhance learning speed and performance. Finally, the neural-fitted TD-leaf algorithm is used to learn more effectively when look-ahead search is performed by the game-playing program. Extensive experimental study indicated that the proposed method outperforms linear networks and fully connected neural networks or evaluation functions evolved with evolutionary algorithms."

Nonnegative Blind Source Separation by Sparse Component Analysis Based on Determinant Measure, by Zuyuan Yang, Yong Xiang, Shengli Xie, Shuxue Ding, and Yue Rong, *IEEE Transactions on Neural Networks and Learning Systems*, Vol. 23, No. 10, Oct. 2012, pp. 1601-1610.

Digital Object Identifier: 10.1109/TNNLS.2012.2208476

"The problem of nonnegative blind source separation (NBSS) is studied, where both the sources and the mixing matrix are nonnegative and sparse component analysis is employed. A determinant-based sparseness measure, named D-measure, is introduced to gauge the temporal and spatial sparseness of signals. Based on this measure, a new NBSS model is derived, and an iterative sparseness maximization (ISM) approach is proposed for this model. In the ISM approach, the NBSS problem is solved by row-to-row optimizations with respect to the unmixing matrix, and then the quadratic programming (QP) technique is used to optimize each row. Furthermore, the source identifiability and the computational complexity of the proposed ISM-QP method are analyzed. The new method requires relatively weak conditions on the sources and the mixing matrix, has high computational efficiency, and is easy to implement. Simulation results demonstrate the effectiveness of the method."

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IEEE Transactions on Fuzzy Systems

On the Fundamental Differences Between Interval Type-2 and Type-1 Fuzzy Logic Controllers, by Wu D., *IEEE Transactions on Fuzzy Systems*, Vol. 20, No. 5, Oct. 2012, pp. 832-848.

Digital Object Identifier: 10.1109/TFUZZ.2012.2186818

"Interval type-2 fuzzy logic controllers (IT2 FLCs) have recently been attracting a lot of research attention and many reported results have shown that IT2 FLCs are better able to handle uncertainties than their type-1 (T1) counterparts. Consequently, the Author provides two fundamental differences between IT2 and T1 FLCs: (1) Adaptiveness, meaning that the embedded T1 fuzzy sets is used to compute the bounds of the type-reduced interval change as input

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The aeronautical and aerospace engineering fields offer highly complex search spaces with different sources of difficulty.

changes; and (2) Novelty, meaning that the upper and lower membership functions of the same IT2 fuzzy set may be used simultaneously in computing each bound of the type-reduced interval. The author also presents several methods to visualize and analyze the effects of these two fundamental differences, including the control surface, the P-map, the equivalent generalized T1 fuzzy sets, and the equivalent PI gains."

Participatory Learning of Propositional Knowledge, by Yager, R.R., *IEEE Transactions on Fuzzy Systems*, Vol. 20, No. 4, Aug. 2012, pp. 715-727.

Digital Object Identifier: 10.1109/TFUZZ.2011.2182199

"The objective of this paper is to extend the participatory learning paradigm (PLP) to environments in which the author is interested in learning information and knowledge expressed in terms of declarative statements. First of all, the author recalls the basic idea of participatory learning, which stresses the important role of what is already believed in all aspects of learning process. Then, the representation of declarative-type binary knowledge within Zadeh's framework of approximate reasoning has been discussed. He also looks at the approximate reasoning inference mechanism and its capability for weighted propositions. To achieve the objective of this paper, several essential ideas such as consistency, compatibility, and commitment has been introduced. The author then provides a version of the PLP that is appropriate for the task of learning declarative knowledge. Central to this is the new updation algorithm is introduced. Finally, the author looks at the dynamic performance of this framework. A particularly notable feature is the unlearning and then learning that takes place when the external environment changes."

IEEE Transactions on Evolutionary Computation

Differential Evolution with Neighborhood Mutation for Multimodal Optimization, by B. Qu, P. Suganthan, and J. Liang, *IEEE Transactions on Evolutionary Computation*, Vol. 16, No. 5, Oct. 2012, pp. 601-614.

Digital Object Identifier: 10.1109/TEVC.2011.2161873

"In this paper a neighborhood mutation strategy is proposed and integrated with various niching differential evolution (DE) algorithms to solve multimodal optimization problems. Twenty-nine problem instances are used to evaluate the proposed algorithm. Comparisons are made with a number of state-of-the-art multimodal optimization approaches and the experimental results suggest proposed DE algorithm provides better and more consistent performance. A survey on niching algorithms and their applications is also included."

Multiobjective Evolutionary Algorithms in Aeronautical and Aerospace Engineering, by A. Arias-Montano, C. Coello Coello, and E. Mezura-Montes, *IEEE Transactions on Evolutionary Computation*, Vol. 16, No. 5, Oct. 2012, pp. 662-694.

Digital Object Identifier: 10.1109/TEVC.2011.2169968

"The aeronautical and aerospace engineering fields offer highly complex search spaces with different sources of difficulty, which are amenable to the use of alternative search techniques such as metaheuristics, since they require little domain information to operate. This paper presents a taxonomy and a comprehensive review of applications of multiobjective evolutionary algorithms (MOEAs) used in aeronautical and aerospace design problems. The review includes both the characteristics of the specific MOEA adopted in each case, as well as the features of the problems being solved with them. The advantages and disadvantages of each type of approach are also briefly addressed. The authors provide a set of general guidelines for using and designing MOEAs for aeronautical and aerospace engineering problems."

IEEE Transactions on Computational Intelligence and AI in Games

Beyond Skill Ratiwng: Advanced Matchmaking in Ghost Recon Online, by Delalleau, O.; Contal, E.; Thibodeau-Laufer, E.; Ferrari, R.C.; Bengio, Y.; Zhang, F., *IEEE Transactions on Computational Intelligence and AI in Games*, Vol. 4, No. 3, Sept. 2012, pp.167-177.

Digital Object Identifier: 10.1109/TCIAIG.2012.2188833

"Player satisfaction is particularly difficult to ensure in online games, due to interactions with other players. Current matchmaking approaches consider only skill levels and aim to match players of a similar standard to ensure a balanced game. This paper shows that better matchmaking can be achieved by considering additional factors, and that a neural network can be trained to optimize player satisfaction in this way."

IEEE Transactions on Autonomous Mental Development

Context-Based Bayesian Intent Recognition, by R. Kelley, A. Tavakkoli, C. King, A. Ambardekar, M. Nicolescu, and M. Nicolescu, *IEEE Transactions on Autonomous Mental Development*, Vol. 4, No. 3, Sept. 2012, pp. 215-225.

Digital Object Identifier: 10.1109/TAMD.2012.2211871

"To build robots that reliably function in the human social world, we must

develop models that robots can use to mimic the intent recognition skills found in humans. A framework is proposed that uses contextual information in the form of object affordances and object state to improve the performance of an underlying intent recognition system. This system represents objects and their affordances using a directed graph that is automatically extracted from a large corpus of natural language text. The proposed approach was validated on a physical robot that classifies intentions in a number of scenarios."

IEEE Transactions on Autonomous Mental Development Special Issue on Microdynamics in Interaction: Capturing and Modeling Early Social Learning

We solicit papers that show approaches to bridging macro- and micro-level behavioral research on the "social interaction loop" that supports early learning. By "social interaction loop" we mean action sequences during interactions between learners and teachers, and the content and qualities of those interactions. For example, how is the information available for a new learner selected and shaped by a parent or teacher? How do learners display their knowledge or ability, and how do teachers pick up on this information, and adapt to it? The phenomena of interest prototypically focus on human infants and parents, but the same questions can be asked about non-human juvenile-adult dyads, or robot learners with human teachers. A major focus is to precisely quantify and describe what the interaction provides—that is—the specific events and mechanisms that support social learning and adaptation.

The contributions should exemplify diverse approaches to studying learning through real-time, contingent, reciprocal interaction (or "co-action"). The focus should be on bridging macro- and micro-level data, analysis, and/or explanation. Macro-level investigations use broad categories of behaviors that unfold over second or minutes, and/or gross changes over developmental or training time (weeks; months). Micro-level investigations describe the details of precise behaviors (or physiological changes), measured in fractions of seconds, that "shape" the (macro-level) interactions. This special issue is intended to show new approaches to "closing the loop" between macro- and micro-level observations of interactions.

Editors: Gedeon Deák, UCSD, and Katharina J. Rohlfing, Bielefeld University

Two kinds of submissions are possible:

- Regular papers, up to 15 double column pages, should describe new empirical findings that utilize innovative methodological and/or analytic techniques for extracting structure from rich, high-dimensional behavioral data.
- Correspondence papers, up to 8 double column pages, can focus on one of three more limited goals: modeling, methods, or theoretical perspectives into social interaction loops, and the importance of bridging micro- and macro-level explanations.

Instructions for Authors:
http://cis.ieee.org/ieee-transactions-on-autonomous-mental-development.html
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When submitting manuscripts, please also copy deak@cogsci.ucsd.edu and kjr@uni-bielefeld.de.

Timeline:
15 January 2013: Deadline for paper submission
15 April 2013: Notification of the first round of review results
15 July 2013: Final version
September 2013: Printed publication

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