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EDITORIAL

Expert systems: Special issue on "New trends and Innovations in Intelligent Distributed Computing"

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Distributed Systems current face new challenges of adapting and reusing research results in the area of Intelligent Systems. Intelligent Systems use methods and technology derived from Knowledge-based and Computational Intelligence. Distributed Computing develops methods and technology to build systems composed of collaborating components. The fast growth of both Big Data and Data Mining have created interesting challenges for classical methods, algorithms, and frameworks from Distributed Computing, which makes especially interesting analysis and research into new trends and innovations that have recently appeared in this area.

This special issue welcomed submissions of original papers introducing research results on all the aspects covering the roles of Knowledge and Intelligence in Distributed Systems, ranging from concepts and theoretical developments to advanced technologies and innovative applications. This issue presents a expanded versions of these papers from the best of those presented at the 10th International Symposium on Intelligent Distributed Computing (IDC 2016), which was held in Paris (France).

After several rounds of review, five papers have been accepted for publication. The contributions from these papers can be summarized as follows:

- The paper entitled "A Heuristic Approach to the Multi-Criteria Design of IaaS Cloud Infrastructures for Big Data Applications," authored by Arosteguia, Torre-Bastida, Bilbao, and Ser (2018), presents a methodology to optimize the definition of IaaS cloud models for hosting Big Data platforms following a threefold criterion: cost, reliability, and computing capacity. The methodology relies on a multiobjective heuristic algorithm that optimizes jointly these conflicting objectives towards the achievement of Pareto-optimal infrastructure solutions. The authors also define measures to quantify the aforementioned metrics over a Big Data platform hosted within an IaaS cloud model. The proposed method has been validated by using real information from the three IaaS providers (Amazon, Google, and Microsoft Azure) and three Big Data platforms (Hortonworks, Cloudera, and MapR).
- The paper entitled "Game-Theoretic Approach for the Optimal Configuration Computing of an Interopable Fleet of Unmanned Vehicles," authored by Gigante et al. (2018), proposes an architecturing approach to configure an optimal multi-UAV fleet for the accomplishment of a mission. The configuration of the fleet is the combination of the selection of the vehicles with the most suitable sensors to achieve mission objectives; the assignment of the routing plan for each vehicle. A game-theoretic approach is presented in order to solve the posed problem in a distributed and decentralized setting. The formal definition of the problem and a game-theoretic solution are proposed. In the end, preliminary simulation results are discussed.
- The paper entitled "Multi-Agent Modeling and Simulation of Graph-Based Predator-Prey Dynamic Systems: A BDI Approach," authored by Badica et al. (2018), proposes a new framework based on Belief–Desire–Intention multi-agent system for the macroscopic modelling and simulation of continuous dynamic systems. The main idea is to break down the target system model into a collection of autonomous and loosely coupled interacting components endowed with clean message-based interfaces and local intelligence. Each component is then mapped to a Belief–Desire–Intention agent that captures its state as a set of logical facts and its behavioural patterns as a set of plans. The system model can be described as a multi-agent programme that is specified using the stateoftheart Jason agentoriented programming language. The approach is evaluated by considering a generalized graph-based model of predator–prey systems. Our approach supports the configuration of the multi-agent model with various differential equations integration methods, as required by the specific problem.
- In the paper entitled "Modeling a Smart Environment for Non-intrusive Analysis of Attention in the Workplace," authored by Durães, Carneiro, Bajo, and Novais (2018), presents a nonintrusive smart environment for monitoring attention in teams of people. The presented system is able to provide real-time information about each individual as well as information about the team. Therefore, it constantly analyses the behaviour of the user and the team while interacting with the computer and, together with knowledge about the task, is able to classify attention level. The main contributions from this work could be very useful for team managers, to identify potentially distracting events, or individuals, if the attention of an individual is not at its best when performing the proposed task, its performance will be negatively affected, causing several problems.

- Finally, the paper entitled "Spatial Tuples: Augmenting Reality with Tuples," authored by Ricci et al. (2018), presents a novel perspective on space-based coordination models for situated MAS, based on spatial tuples as chunks of information situated in the physical space, providing a digital layer augmenting the physical reality. The Spatial Tuples model integrates the power of generative communication within a framework where space is modelled as a first-class entity, thus allowing for different forms of spatial coordination, useful in application domains ranging from pervasive computing to mobile-augmented reality. Motivated by the needs of mobile-augmented reality applications, Spatial Tuples explicitly aims at supporting space-aware and space-based coordination in agent-based pervasive computing scenarios. This paper presents the coordination model; its formalization as a process algebra; a library of patterns of coordination it enables; and a discussion of application scenarios, challenges, and open issues for future works.

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REFERENCES

Arosteguia, M., Torre-Bastida, A., Bilbao, M. N., & Ser, J. D. (2018). A heuristic approach to the multi-criteria design of IaaS cloud infrastructures for Big Data applications. *Expert Systems*, 35:e12259. https://doi.org/10.1111/exsy.12259

Badica, A., Badica, C., Ivanovic, M., & Danciulescu, D. (2018). Multiagent modelling and simulation of graph-based predator–prey dynamic systems: A BDI approach. *Expert Systems*, 35:e12263. https://doi.org/10.1111/exsy.12263

Durães, D., Carneiro, D., Bajo, J., & Novais, P. (2018). Modeling a smart environment for non-intrusive analysis of attention in the workplace. *Expert Systems*, 35:e12275. https://doi.org/10.1111/exsy.12275

Gigante, G., Pascarella, D., Luongo, S., Benedetto, C. D., Vozella, A., & Persechino, G. (2018). Game-theoretic approach for the optimal configuration computing of an interopable fleet of unmanned vehicles. *Expert Systems*, 35:e12293. https://doi.org/10.1111/exsy.12293

Ricci, A., Viroli, M., Omicini, A., Mariani, S., Croatti, A., & Pianini, D. (2018). Spatial tuples: Augmenting reality with tuples. *Expert Systems*, 35:e12273. https://doi.org/doi:10.1111/exsy.12273