

Adaptive Computing (and Agents) for Enhanced Collaboration (ACEC 2021)

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Abstract—The 19th edition of the “Adaptive Computing (and Agents) for Enhanced Collaboration” (ACEC) track at WETICE 2021 targets the relevant topic of adaptation in relation to tools, methods and techniques for the enterprise. The aim of the track is to bring together researches and practitioners, working on agent-based software systems and/or adaptive computing, to present results and discuss innovative ideas. This report outlines the content of the papers accepted for presentation at the track.

Keywords: *adaptive computing; agent-based computing; enterprise collaboration*

I. INTRODUCTION

Today, the pervasive software systems that characterize our everyday lives require advanced support for *dynamic*, *flexible*, and *open* collaboration. Such systems often involve components and interactions that were not foreseen at design time, and they normally have to deal with unexpected scenarios. At the same time, the level of collaboration that such systems support is largely based on *adaptive computing* and *agent* technologies. In fact, a few relevant examples of application areas where such technologies are used to support collaboration are: Computer Supported Collaborative Work, Workflow and Supply Chain Management, Automation in (Virtual) Enterprises, and Automated Composition of Distributed and Decentralized Components.

The 19th episode of the track on *Adaptive Computing (and Agents) for Enhanced Collaboration (ACEC)* at WETICE 2021 is mainly focused on the following two relevant application areas:

- Adaptive and agent-based software systems to support innovative collaboration scenarios in the enterprise; and
- Adaptive tools, methods and techniques for the organizational use of innovative software systems in the enterprise.

With reference to such important application areas, the distributed and decentralized nature of software agents, together with the synergistic integration of adaptive computing technologies, can be used to effectively provide solutions to complex problems that are often difficult to address using more traditional and rigid approaches.

II. OVERVIEW OF PAPERS

The paper “An Adaptive Approach for the Coordination of Autonomous Vehicles at Intersections” by Nicholas Glorio, Stefano Mariani, Giacomo Cabri, and Franco Zambonelli presents innovative results on intelligent vehicles and their coordination. The streets will be soon populated by multitudes of autonomous (i.e., self-driving) vehicles, calling for appropriate solutions to coordinate their collective movements in order to ensure safety and efficiency. In particular, crossing intersections can be based on a number of coordination approaches, from traditional approaches (e.g., traffic lights) to innovative approaches (e.g., dynamic negotiations among vehicles). This paper, after an introduction on the general issues associated with the management of intersections in the presence of autonomous vehicles, shows, by simulation experiments, that no single approach exhibits the best behavior for all traffic conditions and for all performance indicators. Therefore, an adaptation mechanism is proposed in the paper to enable intersections to dynamically select the most proper coordination approach depending on traffic conditions and on the performance indicator to be optimized. Simulation experiments show the effectiveness of the proposed adaptive approach.

The paper “Quality-Based Reinforcement Learning in Intelligent Opportunistic Software Composition” by Kahina Hacid, Sylvie Trouilhet, Francoise Adreit, and Jean-Paul Arcangeli addresses an interesting problem related to software composition. In the context of the Internet of Things, cyber-physical environments deal with the openness of an increasing number of devices and their associated services. Authors have already proposed to opportunistically exploit such services to build new and customized applications that suit user preferences. For that, authors have recently developed a generic solution for bottom-up opportunistic service composition based on reinforcement learning. In this paper, such a solution is extended to handle more efficiently the appearance of new components using service annotation and quality attributes to generalize and share knowledge with newly discovered services. The paper contains the description of a didactic use case for illustration and demonstration purposes.

The paper “Heterogeneous Anchor Nodes Deployment in Large Scale Outdoor Application for Wireless Sensor Networks” by Marwa Afnouch, Dhouha El Houssaini, Olfa Gaddour, and Olfa Kanoun is about a well-known problem related to Wireless Sensor Networks. Wireless Sensor Networks are getting more interest from practitioners as well as from researchers thanks to their low cost, low power, and multiple functionality. However, their performance is greatly dependent on the deployment of sensor nodes. Thus, an efficient and deterministic deployment technique is needed to enhance the performance of the network. In this paper, a new deployment strategy is proposed using hexagonal distributions. The proposed approach considers the coverage probability as well as the number of nodes. Simulation results show that the proposed approach outperforms available deployment techniques mainly in maximizing the network coverage and the nodes’ connectivity, while minimizing the number of nodes.

III. CONCLUSION

All the papers accepted for the 19th episode of the ACEC track discuss topics that are central to the aims and scope of the track. They target relevant problems related to agent-based software systems and/or adaptive computing to support enhanced collaboration, and they explicitly focus on the topics proposed in the call for papers of the track. Actually, all papers discuss topics that are likely to characterize innovative collaboration scenarios in future

enterprises, and they are all concerned with real-world issues that are, or will soon be, central to the everyday life of the people in the enterprise. The papers accepted for presentation at the track focus on the use of agent and/or Internet-of-Things technologies in the context of innovative collaboration scenarios in the enterprise, or they discuss the synergistic integration with service and component technologies in relevant application domains.

In conclusion, we firmly believe that some of the ideas and the results presented in the mentioned papers will have a strong impact on the enterprise of tomorrow and on the future applications of agent-based software systems and adaptive computing technologies.

ACKNOWLEDGMENTS

We would like to thank all the authors of the papers accepted at the track for their valuable contributions, which offer relevant points of view on the current research on collaboration in the enterprises of today, and of tomorrow. We would also like to thank all the anonymous referees who helped in the evaluation of submitted papers for their relevant comments and suggestions. Last but not least, we are very grateful to Ramana and Sumitra Reddy for making this event possible. The material produced for the presentations of accepted papers is available from the official Web site of the track

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