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Guest Editorial: Adaptive Smart Areas and Intelligent Agents

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Intelligent agents showcase adaptability as computational entities that utilize sensors and actuators to navigate and manipulate different environments in pursuit of predefined objectives. One of the promising research fields on Agents and Multi-Agent Systems is in adaptive smart areas, which refer to spatial constructs with a high need for sensorization intentionally designed to be responsive and adaptable to changing environmental conditions and user needs and preferences. Unlike environments that merely tolerate external factors, the goal is to create an intelligent environment that actively responds to changes and seamlessly accommodates the evolving requirements and challenges, ensuring optimal functionality. The integration of intelligent agents within these adaptive environments amplifies their effectiveness, creating synergies that enhance the overall adaptability and responsiveness of both the computational entities and the designed systems. This interconnected approach underscores the importance of harmonizing the design of agents and multi-agent systems in the face of diverse and evolving conditions. Research in adaptive Smart Areas integrates cost efficiency, sustainable mobility, environmental protection, and economic sustainability including intelligent agents with unlimited opportunities to display their abilities to react, plan, learn, and interact in an intelligent and rational manner.

This Special Section contains a selection of revised and extended versions of the papers presented at the first Workshop on Adaptive Smart areaS and Intelligent Agents (ASSIA) held in conjunction with PAAMS 2022, the 20th International Conference on Practical Applications of Agents and Multi-Agent Systems in L'Aquila, Italy on the 14th July, 2022. The aim of the ASSIA 2022 workshop was to propose and discuss new agent technologies aimed at fostering collaboration and coordination and providing intelligence to Adaptive Smart Areas applied to urban and rural areas, buildings, farms, and forests, among others. The use of agents in Adaptive Smart Areas tackled issues related to smart architectures, simulations, intelligent infrastructure, smart transport, robotics, and open data. The workshop also addressed specific methodological and technological issues raised by the deployment of agents in the real-world Adaptive Smart Areas. This perspective offered a unique opportunity to advance the current state of the art, while addressing ongoing challenges in the field. The ASSIA 2022 workshop, as well as the PAAMS 2022 conference in which it took place, were held in person, with a very active and lively interaction of the presenters and the audience.

Following the standard reviewing procedure of the ComSIS Journal, three papers were accepted for publication in this section, and here is a brief overview of the papers included.

The first paper titled "Evaluation of Deep Learning Techniques for Plant Disease Detection" authored by C. Marco-Detchart, J. A. Rincon, C. Carrascosa and V. Julian, embarks on a comprehensive exploration of various deep learning techniques leveraging leaf images for the autonomous detection of pests and diseases in crops. By training with pictures of affected crops and healthy crops, deep learning techniques learn to distinguish one from the other. The authors utilize the Convolutional Neural Networks (CNN) including mobile-oriented network architectures (InceptionV3, MobileNetV2, and NasNetMobile) as well as high-performance computer-oriented CNNs (EfficientNet and Efficientnet-B0 and EfficientNetV2-B0). They consider the preprocessing step inspired by the Bezdek Breakdown Structure (BBS) for edge detection as the input to their neural system and use the Gravitational Smoothing (GS) process as a conditioning step in the preprocessing. By providing a deeper understanding of the strengths and limitations of these methodologies, this research contributes to the forefront of agricultural disease detection.

The second paper titled "A Flexible Approach for Demand-Responsive Public Transport in Rural Areas' by Pasqual Martí, Jaume Jordán and Vicente Julian studies on-demand mobility in rural areas characterized by low demand, long distance among settlements, and an older population. The authors propose a heuristic demand-responsive transportation system scheduler for offline and online allocation of travel requests to vehicles and a search algorithm for feasible insertions within available itineraries and test it in simulation. The simulation results highlight the clear potential of the demand-responsive mobility paradigm to serve rural demand at an acceptable quality of service and provide a modern, dynamic, and reliable means of public transportation to rural contexts.

Finally, the third paper titled "How to Fairly and Efficiently Assign Tasks in Individually Rational Agents' Coalitions Models and Fairness Measures" titled by Marin Lujak, Alessio Salvatore, Alberto Fernández, Stefano Giordani and Kendal Cousy, studies coalitions of individually rational agents. Such coalitions can be observed in, e.g., agricultural cooperatives and taxi services. Since agents' performance, costs, and skills may vary from task to task, the decisions about individual agent-task assignment will determine the overall performance of the coalition. They propose two new models that balance efficiency and fairness and study the utilitarian, egalitarian, and Nash social welfare for task assignment in this context. Moreover, they propose three new fairness measures based on equity and equality and use them to compare the newly proposed models. Through functional examples, the authors show that a reasonable trade-off between efficiency and fairness in task assignment is possible through the use of the proposed models.