

Preface to JAISE 15(1)

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1. Thematic issue on current trends in energy management, sustainability and security for intelligent environments

The first issue of JAISE in 2023 is devoted to a Thematic Issue that explores the relationship of Intelligent Environments with energy and sustainability topics, not forgetting the security component in their development.

The increasing need to use energy resources more efficiently and effectively led to the exponential growth of studies and development of solutions to manage energy and make it more sustainable. The adaptation of these solutions to different types of environments, as well as the need to manage different resources and integrate them into the context in which they operate are challenges that need to continue to be studied in order to make environments more intelligent. It is essential to study and develop solutions capable of dealing intelligently with energy management and sustainability, so that this technology can be used on different environments and ultimately to affect positively our daily life. The purpose of this Thematic Issue is to bring to light current and future trends that address new research challenges in energy management, sustainability, adaptation, sensing, human interaction, and security in Intelligent Environments. Five papers have been selected for publication in this issue.

Data-driven evaluation of machine learning models for climate control in operational smart greenhouses, by Juan Morales-García, Andrés Bueno-Crespo, Raquel Martínez-España and José M. Cecilia, introduces the use of several Machine Learning models to optimize the energy applied in greenhouses. To this end, the models are able to forecast the temperature within the greenhouse 1 day in advance. Based on data collected from temperature and humidity sensors and meteorological information, the models indicate the control parameters of possible greenhouse actuators, such as heating or ventilation systems, to optimize energy consumption while maintaining the adequate temperature. Experimental results show that the Random Forest model allows the best optimization with prediction errors of less than 1 degree Celsius.

PAMDI: Privacy Aware Missing Data Inference Scheme for Sparse Mobile Crowd Sensing, by Tejendraku-mar Thakur and Ningrinla Marchang, investigates the viability of employing perceptual hashing to provide privacy in the context of missing data inference for spatiotemporal data in Sparse Mobile Crowd Sensing (MCS). For this purpose, the authors evaluate several linear and nonlinear regression algorithms within the PAMDI framework proposed in their work. Results from simulation using two real-world data sets show that the proposed approach is best suited for linear regression algorithms rather than nonlinear ones for missing data inference, while using the privacy mechanism does not significantly affect the accuracy of the results.

Internet of Things (IoT)-based indoor plant care system, by Gleiston Guerrero-Ulloa, Alejandra Méndez-García, Valeria Torres-Lindao, Vivian Zamora-Mecías, Carlos Rodríguez-Domínguez and Miguel J. Hornos, offers an example of sustainability in an Intelligent Environment by describing the use of Internet of Things (IoT) technology to create the P4L (Plants for Life) system. P4L's goal is to automate the care of potted plants in order to enhance air quality and make a building's indoor settings healthier, unburdening this task from the homeowner. The system

is deployed using low-cost Arduino-compatible components. Moreover, the Test-Driven Development Methodology for IoT-based Systems (TDDM4IoTS) is utilized to drive the project development. The evaluation of P4L has been conducted through a survey among developers and users, obtaining positive feedback in all the process of the methodology.

Hybrid indoor positioning for smart homes using WiFi and Bluetooth low energy technologies, by Yunus Haznedar, G. Zeynep Gurkas Aydin and Zeynep Turgut, presents an environment comprised of Beacon devices, Bluetooth intelligent devices, and Wi-Fi access points to develop an effective indoor location determination approach. It consists of two stages: First, a fingerprint method was used to collect RSSI (Received Signal Strength Indicator) data from the devices in the environment. These data are cleaned through a hybrid model consisting of Kalman Filters and Savitzky Golay Filters to minimize noise. In the second stage, KNN and SVM models are employed to obtain the inhabitant's indoor position. This approach has been evaluated in two scenarios with an accuracy between 75%–89% for the estimated location of the user.

Towards an explainable irrigation scheduling approach by predicting soil moisture and evapotranspiration via multi-target regression, by Emna Ben Abdallah, Grati Rima, and Boukadi Khoulood, focuses on predicting crop water demand by integrating two irrigation approaches: evapotranspiration and soil-based irrigation. Based on the features of these approaches, the authors propose a Multi-Target Soil Moisture and Evapotranspiration Prediction (MTR-SMET) model to determine water needs using the Food and Agriculture Organization (FAO) and soil-based methods. To make the results more accessible to end-users, such as farmers, the authors enhance their model with explainable AI techniques to provide simple visual representations of the machine learning-based irrigation approach. The accuracy of the model achieves an R2 of 0.97.

2. Upcoming issues

The following is a list of upcoming issues of JAISE:

- June 2023: Regular Issue.
- September 2023: Thematic Issue on Applications in integrated intelligent infrastructures
- December 2023: Regular Issue.

More information on call for papers of future issues is available on the webpage of JAISE at: iospress.com/journal-of-ambient-intelligence-and-smart-environments.