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PREFACE

It is our pleasure and honor to introduce this special issue of the International Journal on Artificial Intelligence Tools (IJAIT) dedicated to Artificial Intelligence Techniques for Pervasive Computing.

Pervasive or ubiquitous computing is a model of human-computer interaction in which information processing has been thoroughly integrated into everyday objects and activities. At their core, all models of pervasive computing share a vision of small, inexpensive, robust networked processing devices, distributed at all scales throughout everyday life and generally turned to distinctly common-place ends. In such a setting, devices work in concert to support people in carrying out their everyday life activities, tasks and rituals in easy, natural way using information and intelligence that is hidden in the network connecting these devices and where the technology disappears into our surroundings until only the user interface remains perceivable by users.

Pervasive computing presents challenges across computer science: in systems design and engineering, in systems modeling, and in user interface design. Furthermore, it touches on a wide range of research topics of computer science, including distributed computing, mobile computing, sensor networks, human-computer interaction, and artificial intelligence.

This special issue focuses on how Artificial Intelligence techniques of various AI sub-areas, such as Knowledge Representation and Reasoning, Machine Learning, Machine Vision, Speech Recognition, Intelligent Human-Computer Interaction, Intelligent Agents, can contribute to the vision of pervasive computing to build electronic environments that are sensitive and responsive to the presence of people, by tackling highly interesting issues, such as applications providing personalized access and interactivity to multimodal information based on user preferences and semantic concepts or human-machine interface systems utilizing information on the affective state of the user.

This issue includes articles which are extended versions of selected papers from the 5th IFIP Conference on Artificial Intelligence Applications & Innovations (AIAI 2009) held on April 23–25, 2009 in Thessaloniki, Greece. There were 113 papers from 19 countries submitted to AIAI 2009, from which 30 were accepted as full papers and 32 as short papers. From the accepted full papers, related to AI Techniques for Pervasive Computing, 7 with the higher review scores were selected and invited to be extended and submitted to this special issue.

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Finally, after two peer-review rounds, 5 of them were finally selected for this special issue.

The first article, by Adrian Stoica and Nikolaos Avouris, is in the area of *intelligent human-computer interaction*. In their article, they present an abstract architecture that supports interaction with mobile context aware applications in public digitally augmented spaces. They focus on how this architecture supports personalization of interaction and adaptation. The main goal of the architecture is to allow users to benefit of a uniform and personalized experience across different contexts and spaces. Among the concerns are: to support high interoperability and flexibility and to address issues of privacy and user control. The framework has been tested in typical augmented spaces: a library and a museum. The paper illustrates the use of the defined framework with a set of examples that cover typical situations for intra-space and across spaces usage.

The second article, by Iosif Mporas, Todor Ganchev, Otilia Kocsis, and Nikos Fakotakis, is in the area of *speech recognition*. In their article, they investigate the performance of traditional and recent speech enhancement algorithms in the adverse non-stationary conditions, which are distinctive for motorcycles on the move. The performance of these algorithms is ranked in terms of the improvement they contribute to the speech recognition accuracy, compared to the absence of speech enhancement. The experiments indicated that there is no equivalence between the ranking of algorithms based on the human perception of speech quality and the speech recognition performance. The Multi-band spectral subtraction method was observed to lead to the highest speech recognition performance.

The third article, by Charalampos Doukas and Ilias Maglogiannis, is in the areas of *machine vision* and *knowledge representation and reasoning*. In their article, they present an integrated patient fall detection system that can be used for patient activity recognition and emergency treatment. The system utilizes visual data, captured from the user's environment using overhead cameras, along with motion and physiological data, collected from the subject's body. Appropriate tracking techniques enable trajectory tracking of the subjects, while acceleration data from the sensors indicate a fall incident. Furthermore, the interpretation of biosignals, like electrocardiogram and blood oxygen saturation, indicates the severity of the incident using rule-based evaluation. The paper assesses the fall detection accuracy of several classifiers and metaclassifiers and includes, also, a user evaluation.

The fourth article, by Alexander Artikis, Anastasios Skarlatidis, and Georgios Paliouras, is in the areas of *machine learning and knowledge representation and reasoning*. In their article, they present a system for recognizing human behavior given a symbolic representation of surveillance videos. The input of the system is a set of time-stamped short-term behaviors detected on video frames, such as walking, running, standing still. The output is a set of recognized long-term behaviors, which are pre-defined temporal combinations of short-term behaviors, such as fighting, meeting, leaving an object, collapsing, walking. The definition of a long-term behavior is expressed in the Event Calculus. The paper includes experimental re-

sults concerning videos with several humans and objects, temporally overlapping and repetitive behaviors. Moreover, they discuss how machine learning techniques can be employed in order to automatically develop long-term behavior definitions.

Finally, the fifth article, by Alexander Smirnov, Tatiana Levashova, Nikolay Shilov and Alexey Kashevnik, is in the areas of *knowledge representation and reasoning* and *intelligent agents.* In their article, they present a hybrid technology for operational decision support in pervasive environments, built around a set of Web-services. The Web-services form an ad-hoc collaborative environment, the members of which are the resources of a pervasive environment and they cooperate to serve the current decision needs. Their approach focuses on information, problem-solving and acting resources and integrates several technologies, such as ontology management, context management, constraint satisfaction, Web-services, profiling, and intelligent agents. Application of the technology is illustrated by decision support for dynamic logistics.

Concluding, we would like to thank the authors of the papers for preparing extended versions of their conference papers and the reviewers for their great job that assures the high quality of the final articles. Also, we would like to thank Prof. I. Manolopoulos and Associate Prof. L. Iliadis for co-organizing AIAI 2009, whose high scientific quality standard enabled this special issue. Finally, we would like to express our appreciation to Prof. Nikolaos Bourbakis, Editor-in-Chief of IJAIT, for offering us the opportunity to edit this exciting special issue and to Assistant Prof. Ioannis Hatzilygeroudis for guiding us throughout the entire process. We really hope that the readers of this issue will find the articles quite interesting and stimulating.

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