

Preface

Special Issue on CogInfoCom and Applied Informatics

The special issue collects papers introducing advanced research achievements on the scientific discipline of Cognitive Infocommunications (CogInfoCom). Cognitive Infocommunications investigates the link between the research areas of infocommunications and cognitive sciences, as well as the various engineering applications which have emerged as the synergic combination of these sciences. The primary goal of CogInfoCom is to provide a systematic view of how cognitive processes can co-evolve with infocommunications devices so that the capabilities of the human brain may not only be extended through these devices, irrespective of geographical distance but may also be blended with the capabilities of any artificially cognitive system. This merging and extension of cognitive capabilities are targeted towards engineering applications in which artificial and/or natural cognitive systems are enabled to work together more effectively.

The content of the special issue is as following:

The paper written by T. Guzsvinecz et al. titled as “The Effect of Engineering Education on Spatial Ability in Virtual Environments” discusses that spatial skills are important in the modern world, tests that can improve them are included in the curriculum of engineering studies. The paper presents the results of a pre-test and a post-test in a self-developed virtual environment. The spatial skills of students were measured on these tests using the Mental Rotation Test (MRT), Mental Cutting Test (MCT), and the Purdue Spatial Visualization Test (PSVT). Between the pre-test and post-test, spatial ability enhancing courses were attended by the students. The paper shows that their performance on the post-test improved significantly – albeit slightly. The paper shows how this improvement differs between various user groups and test types

The paper written by T. Sipos titled as “Cognitive dissonancy on sustainable mobility from transport engineering point-of-view” aims to define sustainable mobility, particularly reference travel time recognition and its economic and cognitive impact with a particular focus on info-communication. The paper focuses on the social surplus of mobility and its effect on consumer time budget and cognitive recognition of sustainability. The paper discusses that nowadays, the added value of mobility is unquestionable; meanwhile, the increasing amount of information causes cognitive load. Travel time seems to be constant, and different mobility modes have different (environment)mental loads. Therefore an (environ)mental impact assessment is required and the always-changing environment must lead to an analysis of the effects of rational decisions.

The paper written by T. Guzsvinecz et al. titled as “The Cognitive Motivation-based APBMR Algorithm in Physical Rehabilitation” presents a new, alternative method of gesture recognition using the cognitive properties of intelligent

decision-making systems to support the rehabilitation process of people with disabilities: the Asynchronous Prediction-Based Movement Recognition (APBMR) algorithm. The algorithm “predicts” the next movement of the user by evaluating the previous three with the goal to maintain motivation. Based on the prediction, it creates acceptance domains and decides whether the next user-input gesture can be considered the same movement. The purpose of this paper besides presenting this new method is to evaluate the mean techniques. The paper concludes that the Contraharmonic mean technique gives the best average gesture acceptance rates in the ± 0.05 m and ± 0.1 m acceptance domains, while the Arithmetic mean technique provides the best average gesture acceptance rate in the ± 0.15 m acceptance domain when using the APBMR algorithm.

The paper by M. Zöldy *et al.* titled as “Modelling, Simulation and Validation of Hybrid Vehicle Fuel Consumption” discusses that controlling, influencing and managing the fuel and energy consumption and refill of hybrid vehicles will be essential in the decades of increasing vehicle autonomy not to have dried out or low battery vehicles along the roads. The paper aims to establish a fuel consumption model with the vehicles' fuel consumption influencing factors to simulate and evaluate the consumption and refill. Results were validated in proving ground tests in a high-speed handling track. As a result, the paper presents a model that enables the correct prediction of reality in a model environment. Based on this result, autonomous vehicles can be developed with real environmental effects and fuel consumption behavior.

The paper written by I. Péntek *et al.* titled as “Use of Smart City solutions supported by healthcare data during a pandemic” discusses that in recent decades, new solutions shaping smart city architecture. Data generated by healthcare and smart devices infiltrate into smart city solutions. This topic is heavily challenging and rapidly evolving. The constant and fast change in the subject technologies that implement an architecture and the sensitivity of data from human sources can be seen as key factors in these challenges. The paper presents some possibilities offered by smart city solutions in a way that can be used effectively by healthcare during a pandemic. The introduced smart ecosystem offers the possibility of cognitive supplementation of human capabilities based on general bio-sensor data. It illustrates an example of use for a healthcare workflow where service abstraction plays a key role.

The paper written by D. Mattyasovszky-Philipp *et al.* titled as “Cognitive Information Systems and related Architecture Issues” discusses that the rapid developments in information technology and business must drive the progress of Cognitive Information Systems (CIS). The paper seeks to combine multiple CIS and Understanding-based management systems concepts into a single design framework (UBMSS) based on the object-oriented paradigm. The proposed overall solution helps us comprehend CIS and UBMSS features, allowing us to build a realistic development strategy for Cognitive Information and Cognitive Management Systems (CMSs).

The paper written by L. J. Laki et al. titled as “Sentiment Analysis with Neural Models for Hungarian” discusses that sentiment analysis is a powerful tool to gain insight into the emotional polarity of opinionated texts. Computerized applications can contribute to the establishment of next-generation models that can provide us with data of unprecedented quantity and quality. In this regard the paper presents the first neural transformer-based sentiment analysis model for Hungarian language, which achieved state-of-the-art performance. The paper uses data augmentation methods, specifically machine translation and cross-lingual transfer, to increase the size of our training corpora. The paper provides evidence for the increased efficiency of the trained models if translation text is added to the training corpora. Furthermore, using the augmentation technique, we could further increase the performance of our models. The contribution of the paper is an important milestone in the advancement of sentence-level and aspect-based sentiment analysis in Hungarian language.

The paper written by D.Mohammed et al. titled as “Vehicle Automation Impact on Traffic Flow and Stability: A Review of Literature” discusses that the Autonomous vehicles (AVs) and Connected Vehicles (CVs) will improve the traffic flow though increasing road capacities and reducing travel time and congestion to a great extent. This study has selected four main factors such as travel behavior factor, the effect of platooning, travel time factor, and the effect of intersection control. These factors have been extensively argued and thoroughly discussed in this paper.

Prof. Dr. Péter Baranyi

Guest Editor