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Editorial

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Volume 22, Issue 3 of Computer Science and Information Systems consists of 15 regular articles and one special section: "Deep Meta-Learning and Explainable Artificial Intelligence (XAI): Methodologies, Interactivity and Applications" (15 articles). As always, we are thankful for the hard work and enthusiasm of our authors, reviewers, and guest editors, without whom the current issue and the publication of the journal itself would not be possible.

We are happy to announce the updated impact factors of our journal for 2024: the new two-year IF 1.8, and the five-year IF 1.5, which is a considerable increase compared to the previous year(s).

In the first regular article, "A GAN-Based Hybrid Approach for Addressing Class Imbalance in Machine Learning," Dae-Kyoo Kim and Yeasun K. Chung present an approach based on generative adversarial networks (GAN) which uses hybrid models that combine oversampling, undersampling and ensemble techniques to reduce model overfitting, i.e., bias towards the majority class on highly imbalanced data. Experimental evaluation demonstrates improved performance compared to two variants of the synthetic minority oversampling technique (SMOTE).

The second regular article, "Empirical Analysis of Python's Energy Impact: Evidence from Real Measurements" by Elisa Jimenez et al., presents a study on whether the different ways of programming in Python have an impact on the energy consumption of the resulting programs. Conclusions include: (1) compiling Python code is a good option if it is done using the py compile module, but not Nuitka, and (2) use of dynamically typed variables seems to decrease considerably the graphics and processor energy consumption.

Sergio Ferrer-Gilabert et al., in "Stages and Critical Success Factors in ERP Implementation: Insights from Five Case Studies," propose a conceptualization of the implementation stages of an enterprise resource planning (ERP) system and identify the critical factors that ensure success. This was achieved in two stages: (1) identifying the critical success factors (CSFs) through a questionnaire distributed to information systems experts, and (2) confirming the relevance of the identified CSFs in the different stages of the proposed ERP life cycle model through semistructured interviews.

"Image Clustering Using Zernike Moments and Self-Organizing Maps for Gastrointestinal Tract," by Parminder Kaur et al. proposes a novel algorithm based on unsupervised neural classifier systems for in-vivo image clustering to address the gap between image feature representations and image semantics. Visual features are represented using the wavelet transform and Zernike moments, and a self-organizing map is utilized for the clustering of images. The system is then trained for categorizing gastral images in the respective clusters using feature-based similarity.

Laura C. Rodriguez-Martinez et al., in their article "An MDA-based Requirements Analysis Process for Service-Oriented Computing Applications," identify elements from

previously proposed requirements processes in terms of phases, activities, products, and roles/viewpoints. Using these elements, a requirements analysis process based on model-driven architecture (MDA), specifically aimed at service-oriented computing (SOC) applications. The general development process is structured in two dimensions: (1) Four general activities – requirements, design, construction and operation; (2) Three MDA models – the computational independent model, the platform independent model, and the platform specific model.

"PI2M-ITGov – Panel of Indicators for Monitoring and Maintaining the Information Technology Governance: Method and Artefacts," by Altino J. Mentzingen Moraes and Álvaro Rocha presents a method which covers 12 identified information technology (IT) areas and consists of 12 key monitoring indicators (KMIs) and their 36 sub-KMIs (3 sub-KMIs for each of the 12 identified IT areas). Simulation through a case study demonstrates a high level of acceptance of the tools as a practical IT governance alternative.

The article "Delay-Aware Resource-Efficient Interleaved Task Scheduling Strategy in Spark," authored by Yanhao Zhang et al., tackles the problem of low CPU and network resource utilization in the task scheduler process of the Spark and Flink computing frameworks by proposing a delay-aware resource-efficient interleaved task scheduling strategy (RPTS). The algorithm can schedule parallel tasks in a pipelined fashion, effectively improving the system resource utilization and shortening job completion times.

In "Identification and Detection of Illegal Gambling Websites and Analysis of User Behavior," Zhimin Zhang et al. propose a machine learning method to identify illegal gambling websites sites and analyze user behavior which combines extracting key data from post messages, generating word vectors via Word2Vec with TF-IDF, feature extraction using a stacked denoising auto encoder (SDAE), primary agglomerative clustering of websites, and secondary clustering of users' operational behaviors within website clusters.

"Classification and Forecasting in Students' Progress Using Multiple-Criteria Decision Making, K-Nearest Neighbors, and Multilayer Perceptron Methods," by Slađana Spasić and Violeta Timašević, addresses the assessment of students' performance in higher education, proposing the use of the MCDM method – Promethee II to assess students' knowledge and the K-nearest neighbors (KNN) and multilayer perceptron (MLP) methods for grade classification, with the goal of tracking and diagnosing students' knowledge levels, predicting their outcomes, and providing tailored recommendations.

In their article entitled "Image Semantic Segmentation Based on Multi-Layer Feature Information Fusion and Dual Convolutional Attention Mechanism," Lin Teng et al. propose a novel image semantic segmentation model that uses the SegFormer network as the backbone, fusing multi-scale features of encoder output with overlapping features. A dual convolutional attention module is used to fuse high-level semantic information, avoiding the loss of feature information caused by up-sampling and the influence of introducing noise.

Hui Liu et al., in "Efficient Algorithms for Collecting the Statistics of Large-Scale IP Address Data," present two algorithms for collecting the statistics of large-scale IP addresses that balance time efficiency and memory consumption. The proposed solutions take into account the sparse nature of the statistics of IP addresses while maintaining a dynamic balance among layered memory blocks. Experimental results on several synthetic

datasets show that the proposed method substantially outperforms the baselines with respect to time and memory space efficiency.

In their article "PFLIC: A Novel Personalized Federated Learning-Based Iterative Clustering," Shiwen Zhang et al. propose an iterative clustering algorithm PFLIC with the goal of mitigating data heterogeneity and improving the efficiency of federated learning (FL). The approach is combined with sparse sharing to facilitate knowledge sharing within the system for personalized FL. To ensure fairness, a client selection strategy is proposed to choose relatively "good" clients to achieve fairer federated learning without sacrificing system efficiency.

"A Spatio-Temporal Graph Neural Network for EEG Emotion Recognition Based on Regional and Global Brain," by Xiaoliang Wang et al. proposes a novel multi-scale spatio-temporal graph neural networ (MSL-TGNN), which integrates local and global brain information for the task of emotion recognition from electroencephalography (EEG) data. A multi-scale temporal learner is designed to extract EEG temporal dependencies. Also, a brain region learning block and an extended global graph attention network are introduced to explore the spatial features.

The article "Boundary-Aware Semantic Segmentation of Remote Sensing Images via Segformer and Snake Convolution," by Yanting Xia et al. introduces a novel hybrid image segmentation model that combines Segformer for global context extraction with dynamic snake convolution to better capture fine-grained, boundary-aware features. An auxiliary semantic branch is introduced to improve feature alignment across scales.

Finally, "Extending Hybrid SQL/NoSQL Database by Introducing Statement Rewriting Component," by Srđa Bjeladinović, presents a process model for applying automatic hybrid statements' rewriting, extending the architecture for the hybrid database with the newly developed statement rewriting component (SRC). Test use cases were examined on the example of Oracle/MongoDB/Cassandra hybrid before and after introducing SRC, demonstrating decrease in the average execution times of the system when SRC is used.