

## Contemporary Research Trends in Computer Science and Informatics – Editorial

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In this second issue of Computer Science and Information Systems for 2022, we are happy to announce the impact factors of our journal, updated for 2021: the new two-year IF is 1.170, and the five-year IF 0.922. We would like to thank all our productive authors and diligent reviewers, whose work in challenging and exciting areas carries the impact of our journal. We hope to continue in the same direction and that the current issue will offer our readers interesting articles in contemporary and emerging research areas.

This issue consists of 22 regular articles and 2 articles in the special section containing selected and extended versions of papers published in proceedings of the International Conference on INnovations in Intelligent SysTems and Applications (INISTA) 2021. We are once again grateful for the hard work and enthusiasm of our authors and reviewers, without which the current issue, as well as the publication of the journal itself, would not have been possible.

The first regular article, “Neural Coreference Resolution for Slovene Language” by Matej Klemen and Slavko Žitnik kicks off this issue by introducing a coreference resolution dataset for Slovene language comparable to English-based corpora. The article also presents a series of analyses using various models from simple linear ones to current state-of-the-art deep neural coreference approaches, investigating robustness of the models using cross-domain data and data augmentations, thereby justifying the introduction of the new corpus with respect to an already existing smaller data set.

The second article, “A Novel Security Mechanism for Software Defined Network Based on Blockchain” by Xian Guo et al. tackles the problems of centralized software defined network (SDN) schemes by proposing a security framework for SDN based on Blockchain (BCSDN) which adopts a physically distributed and logically centralized multi-controller architecture. Simulation of the new scheme is implemented on the Mininet network emulation platform, with experiments performed to verify the solution.

In “Reasoning on the Usage Control Security Policies Over Data Artifact Business Process Models,” Montserrat Estañol et al. propose an enrichment of the standard business process model Notation (BPMN) with a UML class diagram to describe the data model, that is also combined with security policies defined using the UCON ABC framework, with the goal to provide a context where more complex reasoning (for model verification and business process validation) can be performed. This is achieved by integrating the original models, including security policies, into the BAUML artifact-centric business process modeling framework.

Guojiang Shen et al., in their article “Enhancing Interactive Graph Representation Learning for Review-based Item Recommendation” propose IGRec, a new recommendation model enhancing interactive graph representation learning for review-based item recommendation by combining information about users, items and reviews in a single

graph, fusing edge information into nodes, apply the multilayer graph convolutional network to learn the high-order interactive information of nodes, obtain the final embedding of users/items, and adopt the factorization machine to complete the rating prediction.

“A Study on Optimally Constructed Compactly Supported Orthogonal Wavelet Filters” authored by Yongkai Fan et al., designs compactly supported orthogonal wavelet filters, in which both the scaling and wavelet functions have many vanishing moments, by approximately solving a system of nonlinear equations using proposed optimization algorithms for the Gauss-Newton type method that expand the selection range of initial values.

The article “Eye Movement Analysis in Simple Visual Tasks” by Kiril Alexiev and Teodor Vakarelsky proposes two approaches for noise cancellation in eye-tracker signals and two approaches for microsaccade detection. The obtained results can be a good starting point for interpretation by neurobiologists about the causes of different types of movement and their dependence on the individuality of the observed person and the specific mental and physical condition.

Andrea Stevens Karnyoto et al., in “Transfer Learning and GRU-CRF Augmentation for Covid-19 Fake News Detection” applied BERT and GPT2 as pre-trained using the BiGRU-Att-CapsuleNet model and BiGRU-CRF feature augmentation to solve the fake news detection problem in the Constraint @ AAI2021 – COVID19 Fake News Detection in English data set. Experimental results show that the hybrid models outperform the non-hybrid baseline, and that BERT consistently outperformed GPT2, achieving accuracy of over 90%.

“Performance and Scalability Evaluation of a Permissioned Blockchain Based on the Hyperledger Fabric, Sawtooth and Iroha” by Arnold Woznica and Michal Kedziora compares different Blockchain platform implementations: Hyperledger Iroha implementing YAC consensus, Sawtooth implementing the PoET algorithm, and the Hyperledger Fabric framework implementation. Various parameters were varied and average transaction latency, network throughput, and transaction failure rate used as measures for evaluation. The results shed light on the impact of a particular parameter on the private blockchain network performance and show how they can be adjusted to improve performance.

In “PE-DCA: Penalty Elimination Based Data Center Allocation Technique Using Guided Local Search for IaaS Cloud,” Sasmita Parida et al. propose an approach to locate suitable data centers (DCs) with reduced cost, response time, and processing time for particular user requests by taking into consideration that other requests should not be penalized in terms of time and cost. The approach, Penalty Elimination-based DC Allocation (PE-DCA), addresses, computes, and eliminates the penalties involved in the cost and time through iterative technique using the defined objective and guide functions.

Fatima Zohra Merabet and Djamel Benmerzoug, in “QoS Prediction for Service Selection and Recommendation with a Deep Latent Features Autoencoder,” propose a novel framework named auto-encoder for neighbor features (Auto-NF) for predicting quality of service (QoS) values and reduce prediction error. The approach consists of three steps: extended similarity computation method to compute the similarity between users, form clusters of similar neighbors and partition the initial matrix into sub-matrices based on these clusters to reduce the data sparsity problem, and build a simple autoencoder that can learn deep features and select an ideal number of latent factors to reduce the overfitting.

“ProRes: Proactive Re-Selection of Materialized Views” by Mustapha Chaba Mouna et al. first presents a concise state of the art of the materialized view selection problem (VSP) in the database field, and then propose a proactive re-selection approach that considers three important query properties concurrently: largescale queries, query dynamism, and high query interaction. Extensive experiments are conducted using the Star Schema Benchmark data set to evaluate the effectiveness and efficiency of the approach.

Milan Segedinac et al. in “A Neuroevolutionary Method for Knowledge Space Construction” propose a novel method for the construction of knowledge spaces based on neuroevolution, where knowledge states are considered as neurons in a neural network. The main advantage of the proposed approach is that it is more suitable for constructing large knowledge spaces than other traditional data-driven methods.

The article “Hyper-graph Regularized Subspace Clustering With Skip Connections for Band Selection of Hyperspectral Image” by Meng Zeng et al. proposes a novel clustering method for band selection of hyperspectral image. The approach, hyper-graph regularized subspace clustering with skip connections (HRSC-SC), combines subspace clustering into a convolutional autoencoder by treating it as a self-expressive layer. Symmetrical skip connections are added to the networks to pass image details from encoder to decoder in order to tackle the problem of vanishing gradients.

In “Optimized Placement of Symmetrical Service Function Chain in Network Function Virtualization,” Nhat-Minh Dang-Quang and Myungsik Yoo address the problem of efficiently finding suitable placement of virtual network functions (VNFs) in network function virtualization (NFV) when linking the VNFs together as a service function chain (SFC) in situations when SFCs have a complex structure. This is achieved by formulating VNF placement as an optimization problem with symmetrical SFCs that can support both symmetric and asymmetric traffic flows.

Zeyu Sun et al., in “MEC-MS: A Novel Optimized Coverage Algorithm with Mobile Edge Computing of Migration Strategy in WSNs” propose a novel optimized coverage algorithm with mobile edge computing of migration strategy (MEC-MS) with the goal of reducing the overall number of sensor nodes. Experimental results show that the average number of working sensor nodes in the MEC-MS algorithm is 9.74% lower than that of two baseline algorithms, and the average value of network coverage is 9.92% higher.

“Recent Advancements in Privacy-Aware Protocols of Source Location Privacy in Wireless Sensor Networks: A Survey” by Pradeep Kumar Roy et al. is a review article that summarises the protocols proposed in recent research on secure location information in wireless sensor networks (WSNs). Source location privacy (SLP) is an area that attracts a lot of research attention, which a large number of solutions are provided for it. An up-to-date survey of the field does not currently, which is a gap addressed by this article.

The article “RG-SKY: A Fuzzy Group Skyline Relaxation for Combinatorial Decision Making” by Sana Nadouri et al. proposes to extend group skyline dominance by making it more demanding so that several groups leave incomparable. Then, the original group skyline will be enlarged by some interesting groups that are not much dominated by any other group. This is achieved by introducing a new fuzzy preference relation named “much preferred.”

In “An Approach to Email Categorization and Response Generation,” Sasa Arsovski et al. present the personal email responder (PER): a novel system for email categorization and semi-automatic response generation, whose key novelty is in the approach to email

categorization that distinguishes query and non-query email messages using natural language processing (NLP) and neural network (NN) methods.

Manjie Zhai et al., in their article “A Consortium Blockchain-Based Information Management System For Unmanned Vehicle Logistics” design and implement a system based on the hyperledger fabric blockchain platform to address the risks of order data leakage and tampering in the intelligent logistics distribution environment employing unmanned vehicle delivery. Experimental results show that the proposed system can maintain high throughput in a large-scale request environment under the premise of ensuring data security.

“A Dockerized Big Data Architecture for Sports Analytics” authored by Yavuz Melih Özgüven et al. describes a big data architecture based on Docker containers with Apache Spark, and evaluates the architecture on four data-intensive case studies in sport analytics, including structured analysis, streaming, machine learning approaches, and graph-based analysis.

Charbel Obeid et al., in “A Novel Hybrid Recommender System Approach for Student Academic Advising Named COHRS, Supported by Case-based Reasoning and Ontology” propose hybrid a hybrid recommender system (RS) approach named COHRS that incorporates the knowledge base (KB) and collaborative filtering (CF) recommender techniques, in the domain of student academic advising. Experimental evaluation demonstrates high accuracy of COHRS based on two criteria: the accuracy of retrieving the most similar cases and the accuracy of generating personalized recommendations.

The final regular article “A Machine Learning Approach for Learning Temporal Point Process” authored by Andrija Petrović et al. proposes a novel methodology for learning temporal point processes based on one-dimensional numerical integration techniques. These techniques are used for linearising the negative maximum likelihood (neML) function and enabling backpropagation of the neML derivatives.