

# Editor's Note

**T**HE International Journal of Interactive Multimedia and Artificial Intelligence – IJIMAI (ISSN 1989-1660) provides an interdisciplinary forum in which scientists and professionals can share their research results and report new advances in Artificial Intelligence (AI) tools or tools that use AI with interactive multimedia techniques.

This regular issue consists of 16 articles that use artificial intelligence or computational systems to come up with new solutions and solve problems more effectively. The issue showcases the use of Artificial Intelligence or computational systems that contribute to new knowledge with innovative applications. In this issue you can find different articles on game theory, models for collaborative filtering, text classification, fake news detection system, identification system, semi eager classifier, longitudinal segmented analysis, etc.

The issue begins with a review of the main studies about the Game Theory in Quantum Computers, by Raquel Pérez-Antón et al., including operational requirements and implementation details. In addition, the article describes various quantum games, their design strategy, and the used supporting tools. They also present the still open debate linked to the interpretation of the transformations of classical algorithms in fundamental game theory to their quantum version, with special attention to the Nash equilibrium.

The next article of this volume is of Jesús Bobadilla et al. The title is “Comprehensive Evaluation of Matrix Factorization Models for Collaborative Filtering Recommender Systems”. This article tested six representative matrix factorization models, using four collaborative filtering datasets. Experiments have tested a variety of accuracy and beyond accuracy quality measures, including prediction, recommendation of ordered and unordered lists, novelty, and diversity. Results show each convenient matrix factorization model attending to their simplicity, the required prediction quality, the necessary recommendation quality, the desired recommendation novelty and diversity, the need to explain recommendations, the adequacy of assigning semantic interpretations to hidden factors, the advisability of recommending to groups of users, and the need to obtain reliability values.

Then we find the work of Raúl A. del Águila Escobar et al. with the title “OBOE: an Explainable Text Classification Framework”. This article presents a text classification framework called OBOE (explanatiOns Based On concEpts), in which such ingredients play an active role to open the black-box. OBOE defines different components whose implementation can be customized and, thus, explanations are adapted to specific contexts. They also provide a tailored implementation to show the customization capability of OBOE. Additionally, they performed (a) a validation of the implemented framework to evaluate the performance using different corpora and (b) a user-based evaluation of the explanations provided by OBOE.

The following research presents: An Efficient Fake News Detection System Using Contextualized Embeddings and Recurrent Neural Network, built by Junaid Ali Reshi and Rashid Ali. This study focuses on efficient detection of fake news on social media, through a natural language processing based approach, using deep learning. For the detection of fake news, textual data have been analyzed in unidirectional way using sequential neural networks, or in bi-directional way using transformer architectures like Bidirectional Encoder Representations from Transformers (BERT). This article proposes Contextualized Fake News Detection System (ConFaDe) - a deep learning based fake news detection system that utilizes contextual embeddings generated from a transformer-based model. The model uses masked language modelling

and replaced token detection in its pre-training to capture contextual and semantic information in the text.

Miguel García García et al. present: Graffiti Identification System Using Low-Cost Sensors. This article introduces the possibility of studying graffiti using a colorimeter developed with Arduino hardware technology according to the Do It Yourself (DIY) philosophy. Through the obtained Red Green Blue (RGB) data it is intended to study and compare the information extracted from each of the graffiti present on different walls. The same color can be found in different parts of a single graffiti, but also in other graffiti that could a priori be of different authorship. Nevertheless, graffiti may be related, and it may be possible to group graffiti artists and “gangs” that work together.

We then find the article titled “PeopleNet: A Novel People Counting Framework for Head-Mounted Moving Camera Videos” by Ankit Tomar et al. This study proposes a transfer learning-based PeopleNet model to tackle people counting problem. For this, they have made some significant changes to the standard VGG16 model, by disabling top convolutional blocks and replacing its standard fully connected layers with some new fully connected and dense layers. The strong transfer learning capability of the VGG16 network yields in-depth insights of the PeopleNet into the good quality of density maps resulting in highly accurate crowd estimation.

The next research of Sami Dhahbi et al. is titled “Lightweight Real-Time Recurrent Models for Speech Enhancement and Automatic Speech Recognition”. This study proposes a lightweight hourglass-shaped model for speech enhancement (SE) and automatic speech recognition (ASR). Simple recurrent units (SRU) with skip connections are implemented where attention gates are added to the skip connections, highlighting the important features and spectral regions. The model operates without relying on future information that is well-suited for real-time processing. Combined acoustic features and two training objectives are estimated. Experimental evaluations using the short time speech intelligibility (STOI), perceptual evaluation of speech quality (PESQ), and word error rates (WERs) indicate better intelligibility, perceptual quality, and word recognition rates.

A. Suruliandi et al. present the article “Drug Target Interaction Prediction Using Machine Learning Techniques – A Review”. This article aims to explore Machine Learning (ML) techniques better for Drug Target Interaction (DTI) prediction and boost future research. Qualitative and quantitative analyses of ML techniques show that several have been applied to predict DTIs, employing a range of classifiers. Though DTI prediction improves with negative Drug Target Pairs (DTP), the lack of true negative DTPs has led to the use a particular dataset of drugs and targets. Using dynamic DTPs improves DTI prediction. Little attention has so far been paid to developing a new classifier for DTI classification, and there is, unquestionably, a need for better ones.

M. Akshay Kumar et al. present the article titled “Brain Tumor Classification Using a Pre-Trained Auxiliary Classifying Style-Based Generative Adversarial Network”. This research proposes a novel approach that uses a style-based generative adversarial network for conditional synthesis and auxiliary classification of brain tumors by pre-training. The discriminator of the pre-trained GAN is fine-tuned with extensive data augmentation techniques to improve the classification accuracy when the training data is small. The proposed method was validated with an open-source Magnetic Resonance Imaging (MRI) dataset which consists of three types of tumors - Glioma, Meningioma, and Pituitary. The proposed system achieved

99.51% test accuracy, 99.52% precision score, and 99.50% recall score, outperforming other approaches. Since the framework can be made adaptive using transfer learning, this method also benefits new and small datasets of similar distributions.

In the article titled “KoopamL: A Graphical Platform for Building Machine Learning Pipelines Adapted to Health Professionals”, F.J. García-Peñalvo et al. present a platform to assist non-expert users in defining ML pipelines in the health domain. The system’s design focuses on providing an educational experience to understand how ML algorithms work and how to interpret their outcomes, and on fostering a flexible architecture to allow the evolution of the available components, algorithms, and heuristics.

The title of the next article is “GRASE: Granulometry Analysis With Semi Eager Classifier to Detect Malware”. Mahendra Deore et al. propose a malware classification using a visualization methodology wherein the disassembled malware code is transformed into grey images. They present the efficacy of granulometry texture analysis technique for improving malware classification. Furthermore, a Semi Eager (SemiE) classifier, which is a combination of eager learning and lazy learning technique, is used to get robust classification of malware families. The outcome of the experiment is promising since the proposed technique requires less training time to learn the semantics of higher-level malicious behaviours. Identifying the malware (testing phase) is also done faster. A benchmark database like malimg and Microsoft Malware Classification challenge (BIG-2015) has been utilized to analyse the performance of the system. An overall average classification accuracy of 99.03 and 99.11% is achieved, respectively.

In the work titled “Chatbot-Based Learning Platform for SQL Training”, Antonio Balderas et al. propose a chatbot-based learning platform to assist students in learning SQL. A case study has been conducted to evaluate the proposal, with undergraduate computer engineering students using the learning platform to perform SQL queries while being assisted by the chatbot. The results show evidence that students who used the chatbot performed better on the final SQL exam than those who did not. In addition, the research shows positive evidence of the benefits of using such learning platforms to support SQL teaching and learning for both students and lecturers: students use a platform that helps them self-regulate their learning process, while lecturers get interesting metrics on student performance.

Juan Antonio Caballero-Hernández et al. show the work: Supporting Skill Assessment in Learning Experiences Based on Serious Games Through Process Mining Techniques. They propose an automated method to analyse students’ interactions and assess their skills in learning experiences based on serious games. The method takes into account not only the final model obtained by the student, but also the process followed to obtain it, extracted from game logs. The assessment method groups students according to their in-game errors and in-game outcomes. Then, the models for the most and the least successful students are discovered using process mining techniques. Similarities in their behaviour are analysed through conformance checking techniques to compare all the students with the most successful ones. Finally, the similarities found are quantified to build a classification of the students’ assessments. They have employed this method with Computer Science students playing a serious game to solve design problems in a course on databases. The findings show that process mining techniques can palliate the limitations of skill assessment methods in game-based learning experiences.

The next article of Andreas Hinderks et al. is titled “Requirements for User Experience Management - A Tertiary Study”. The work explains that when applied to User eXperience (UX), user experience management consists of a UX goal, a UX strategy, and UX resources. The authors conducted a tertiary study and examined the current

state of existing literature regarding possible requirements. They want to figure out what requirements can be derived from the literature reviews with the focus on UX and agile development. In total, they were able to identify and analyse 16 studies. After analysing the studies in detail, they identified 13 different requirements for UX management. The most frequently mentioned requirements were prototypes and UX/usability evaluation. Communication between UX professionals and developers was identified as a major improvement in the software development process.

The following research is titled “Longitudinal Segmented Analysis of Internet Usage and Well-Being Among Older Adults”. The authors Alejandro Cervantes et al. analyze a sample of 2,314 individuals, aged 50 years and older, that participated in the English Longitudinal Study of Aging. Participants were clustered according to drivers of psychological well-being using Self-Organizing Maps. The resulting groups were subsequently studied separately using generalized estimating equations fitted on 2-year lagged repeated measures using three scales to capture the dimensions of well-being and Markov models. The clustering analysis suggested the existence of four different groups of participants. Statistical models found differences in the connection between internet use and psychological well-being depending on the group. The Markov models showed a clear association between internet use and the potential for transition among groups of the population characterized, among other things, by higher levels of psychological well-being.

This issue finishes with the research titled “Modulating the Gameplay Challenge Through Simple Visual Computing Elements: A Cube Puzzle Case Study” by Jose Ribelles et al. In this work, a modulating mechanism based on visual computing is explored. The main hypothesis is that simple visual modifications of some elements in the game can have a significant impact on the game experience. This concept, which is essentially unexplored in the literature, has been experimentally tested with a web-based cube puzzle game where participants played either the original game or the visually modified game. The analysis is based on players’ behavior, performance, and replies to a questionnaire upon game completion. The results provide evidence on the effectiveness of visual computing on gameplay modulation. The findings are relevant to game researchers and developers because they highlight how a core gameplay can be easily modified with relatively simple ingredients, at least for some game genres. Interestingly, the insights gained from this study also open the door to automate the game adaptation based on observed player’s interaction.

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