

Editor's Note

THE 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.

The present volume (June 2022), consists of 20 articles of diverse applications of great impact in several fields. The issue consistently showcases the utilization of AI techniques or mathematical models with an artificial intelligence base, as a standard element. Different manuscripts on usability and satisfaction, machine learning models, genetic algorithms, computer entertainment technologies, oral pathologies, optimistic motion planning, data analysis for decision making, etc. can be found in this volume.

The volume begins with a systematic review of the literature on recommender systems that use the information on social relationships between users. As the main findings, D. Medel et al. present a complete review where social relations were classified into three groups: trust, friend activities, and user interactions. Likewise, the collaborative filtering approach was the most used, and with the best results, considering the methods based on memory and model. The most used metrics and the recommendation methods studied in mobile applications are also mentioned in this article.

Neural collaborative filtering is an important field in recommender systems, as this provides some models that obtain accurate predictions and recommendations. The following manuscript by J. Bobadilla et al. provides a proposed neural architecture; and also tests that the quality of its recommendation results is as good as the state of art baselines. Experiments have been performed making use of four popular public datasets, showing generalizable quality results. Overall, the proposed architecture improves individual rating prediction quality, maintains recommendation results, and opens the doors to a set of relevant collaborative filtering fields.

Previous articles have presented a neural architecture, but the following one presented by Z. Anari et al. proposes an appropriate membership function for fuzzy association rule mining. Membership functions have a significant impact on the outcome of the mining association rules. This study, as the first attempt, used a team of continuous action-set learning automata (CALA) to find both the appropriate number and positions of trapezoidal membership functions (TMFs). Additionally, to increase the convergence speed of the proposed approach and remove bad shapes of membership functions, a new heuristic approach has been proposed. Experiments on two real data sets showed that the proposed algorithm improves the efficiency of the extracted rules by finding optimized membership functions.

The next article by Y. Song analyses the creative methods of stimulating divergent thinking, aggregation thinking, and transformation thinking from the innovation principle of TRIZ theory as the origin, and applies them to the creative mechanism and application program of print advertising creativity. The whole process is led by rational principles of perceptual thinking, driven by specific principles of abstract images, to explore the thinking source of the creative design essence of print advertising. The theory and its application mechanism become a new thinking method and application attempt in the creative field of print advertisement.

At present accessibility in interactive applications has been profoundly improved, especially when it comes to dealing with the experiences of blind and visually impaired people while performing everyday tasks. In their work, M. Lopez-Ibanez et al. present a series

of articles that explore different trends in the field of accessible video games for the blind or visually impaired. Reviewed articles are distributed in four categories covering the following subjects: (1) video game design and architecture, (2) video game adaptations, (3) accessible games as learning tools or treatments, and (4) navigation and interaction in virtual environments. From this work, a relative stagnation in the field of human-computer interaction for the blind and visually impaired is detected.

If we go into the medical field A. Laishram et al. provide a novel approach to classify different oral pathologies using Orthopantomogram (OPG) images based on Convolutional Neural Network (CNN). Their article provides a novel approach for the classification of types of teeth (viz., incisors, and molar teeth) and also some underlying oral anomalies such as fixed partial denture (cap) and impacted teeth. In their work, an algorithm implementing CNN with Dropout and then the fully connected layer has been trained using hybrid GA-BP learning. Using the dropout regularization technique, overfitting has been avoided and thereby making the network correctly classify the objects. The CNN has been implemented with different convolutional layers and the highest accuracy of 97.92% has been obtained with two convolutional layers.

In the field of information and communication technologies, Internet of Things, Machine learning, and Cloud computing are the emerging domains. These techniques can help save the lives of millions of people in the medical assisted environment and can be utilized in the healthcare system where health expertise is less available. In this regard, J. Ahamed et al. develop an efficient cardiovascular disease prediction model for Jammu and Kashmir (India). Hence, they conclude this work by stating that the combination of IoT, Machine learning, and Cloud computing is shown to be a future reality for the prediction of diseases in general and cardiovascular diseases.

Changing to the area of sampling-based motion planning in the field of robot motion planning, the following article by L. Kenye et al. presents a new sampling-based planning strategy called Optimistic Motion Planning using Recursive Sub-Sampling (OMPRSS), for finding a path from a source to a destination without having to construct a roadmap or a tree.

Switching topics, the volume continues with an article proposed by P.S. Lamba et al. whose focus is based on a novel real-time multimodal eye blink detection method using an amalgam of five unique weighted features namely (Vertical Head Positioning, Orientation Factor, Proportional Ratio, Area of Intersection, and Upper Eyelid Radius), extracted from the circle boundary formed from the eye landmarks. Precision, recall, F1-score, and ROC curve measure the proposed method's performance qualitatively and quantitatively. Increased accuracy (of around 97.2%) and precision (97.4%) are obtained compared to other existing unimodal approaches.

Video surveillance is one of the important state-of-the-art topics to monitor different areas of modern society surveillance like the general public surveillance system, city traffic monitoring system, and forest monitoring system. Hence, surveillance systems have become especially relevant in the digital era. The need for video surveillance systems and their video analytics has become inevitable due to an increase in crimes and unethical behaviour. Thus, enabling the tracking of an individual object in video surveillance is an essential part of modern society. In this regard, in the next article, M. Adimoolam et al. propose a system that has successfully tracked multiple objects from multiple channels and is a combination of dense block, feature selection, background

subtraction, and Bayesian methods. The results of the experiment conducted demonstrated an accuracy of 98% and 1.11 prediction time and these results have also been compared with existing methods such as Kalman Filtering (KF) and Deep Neural Network (DNN).

In recent years facial verification has experienced a breakthrough, not only due to the improvement in accuracy of the verification systems but also because of their increased use. This use would extend more if the problems of complex calculation of Deep Learning models, that usually need to be executed on machines with specialized hardware, were solved. This would allow to run this software on computers with low computing resources, such as Smartphones or tablets. To solve this problem, the next article presents the proposal of a new neural model, called Light Intrusion-Proving Siamese Neural Network, LIPSNN. This new light model, proposed by A. Alcaide et al., which is based on Siamese Neural Networks, is fully presented from the description of its two-block architecture, going through its development, including its training with the well-known dataset Labelled Faces in the Wild, LFW; to its benchmarking with other traditional and deep learning models for facial verification in order to compare its performance for its use in low computing resources systems for facial recognition. It can be concluded that the LIPSNN can be an alternative to the existing models to solve the facet problem of running facial verification in low computing resource devices.

Within the same subject, the following article proposed by N.K. Benamara et al. presents a new heterogeneous face recognition approach. This approach includes four scientific contributions. To show the efficacy and the robustness of the proposed TV-CycleGAN (Cycle Generative Adversarial Network), experiments have been applied on three challenging benchmark databases, including different real-world scenarios. This approach also outperforms some recent state-of-the-art methods in terms of F1-Score, AUC/EER, and other evaluation metrics.

One of the most popular topics at present is the Internet of Everything (IoE), where all devices are connected to the web. Large-scale networking benefits the community by increasing connectivity and giving control of physical devices. On the other hand, there exists an increased 'Threat' of an 'Attack'. In their article, M. Deore et al. propose the use of a visualization technique where the disassembled malware code is converted into grey images, as well as the use of Image Similarity-based Statistical Parameters (ISSP) such as Normalized Cross-correlation (NCC), Average difference (AD), Maximum difference (MaxD), Singular Structural Similarity Index Module (SSIM), Laplacian Mean Square Error (LMSE), MSE and PSNR. Identification of malware (testing phase) is also performed in less time. The fusion of image and statistical parameters enhances the system performance with greater accuracy.

However, if we are going to discuss the topic of the national security system, one of the most dangerous situations a warship may face is a missile attack launched from other ships, aircraft, submarines, or land. In addition, given the current scenario, it is not ruled out that a terrorist group may acquire missiles and use them against ships operating close to the coast, which increases their vulnerability due to the limited reaction time. One of the means the ship has for its defense is decoys, designed to deceive the enemy missile. However, for their use to be effective it is necessary to obtain, in a quick way, a valid launching solution. In their work, R. Touza et al. design a methodology to solve the problem of decoy launching and to provide the ship immediately with the necessary data to make the firing decision.

The order in which the trajectory is executed is a powerful source of information for recognizers. However, there is still no general approach for recovering the trajectory of complex and long handwriting from static images. In the next article, M. Diaz et al. introduce a new system to estimate the order recovery of thinned static trajectories, which

allows to effectively resolve the clusters and select the order of the executed pen-downs. They expect the proposed system, whose code is made publicly available to the research community, to reduce potential confusion when the order of complex trajectories is recovered, and this will in turn make the trajectories recovered to be viable for further applications, such as velocity estimation.

Another of the most popular topics at present is machine learning-based supervised single-channel speech enhancement. It has achieved considerable research interest. M.I. Khattak et al. propose an extended Restricted Boltzmann Machine (RBM) for the spectral masking-based noisy speech enhancement which is described in their article. The results showed that the proposed method successfully attenuated the noise and gained improvements in speech quality and intelligibility over conventional approaches.

Among the various fields, one of the most sought-after fields for Artificial Intelligence models is the field of education. One of the open problems within this field is the prediction of students' grades. This problem aims to predict early school failure and dropout and to determine the well-founded analysis of student performance for the improvement of educational quality. In this regard, the work by H. Alonso-Misol Gerlache et al. provides a model which deals with the problem of predicting grades of UNIR university master's degree students, and also it is able to predict situations with an accuracy above 96%.

Within the same field, the following article proposed by A.B. Urbina Nájera et al. presents an experimental study to obtain a predictive model that allows anticipating a university dropout. The study uses 51,497 instances with 26 attributes obtained from social sciences, administrative sciences, and engineering collected from 2010 to 2019. Artificial neural networks and decision trees were implemented as classification algorithms, and also, algorithms of attribute selection and resampling methods were used to balance the main class. The model has allowed predicting an approximate number of possible dropouts per period, contributing to the involved instances in preventing or reducing dropouts in higher education.

Jumping from the education field to the business and research field, data mining makes it possible to explore and find unseen connections between variables and facts observed in different domains, helping us to better understand reality. The programming methods and frameworks used to analyse data have evolved over time. Currently, the use of pipelining schemes is the most reliable way of analysing data and due to this, several important companies are currently offering this kind of service. M. Novo-Lourés et al. focus specifically on the pipelining schemes. In this context, this study introduces different improvements, such as the design of different types of constraints for the early detection of errors, the creation of functions to facilitate debugging of concrete tasks included in a pipeline, the invalidation of erroneous instances and/or the introduction of the burst-processing scheme. Adding these functionalities, they developed Big Data Pipelining for Java, a fully functional new pipelining framework that shows the potential of these features.

Volume finishes by demonstrating a novel approach by A.J. Fernández-García et al. to support preliminary data analysis in the engineering field that enables engineers and researchers to quickly and easily analyse the potential for inferring knowledge that may lie hidden in their data. Similarly, it assists them in comparing machine learning models using different implementations from different providers of well-known algorithms, without the need of prior knowledge about how to create those models with each provider.

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