applied sciences

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Editorial

Special Issue on Applied Artificial Neural Networks

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Over the years there have been many attempts to understand, and subsequently imitate, the way that humans try to solve problems, so it can help to artificially achieve the same kind of intelligent behavior. Among these attempts, one of them has been especially successful: the artificial neural networks (ANNs), which simplify the functioning of one of the most complex organs in nature: the brain.

From its earliest approaches, these networks have provided excellent solutions in the most diverse fields of research. After overcoming a small hurdle in the last stage of their use, they have revived in recent years under the nomenclature of deep neural networks, which are based on the same bases of those of ANNs and take advantage of the emergence of new learning algorithms and the greater computational capabilities that exist nowadays.

This Special Issue is aimed to accommodate, on one hand, the latest theoretical advances in this field, such as new learning paradigms or new architectures, and on the other hand, those more recent works in the scientific field where the authors have used any of the many types of available neural networks or those new theorical proposals to reach the best results in their areas.

Eleven manuscripts were accepted in this Special Issue, most of them emphasizing the highly successful applicability of ANNs in a great variety of fields.

In the first published paper, D. Rivero et al. [1] showed a new model for music prediction that is based on using variational autoencoders for music representation in latent space to make predictions of the future note events within a musical piece. Farhadi et al. [2] developed a Matlab software that uses ANNs to classify, with a high accuracy, hazelnuts as either big, small, hollow, or damaged using audio signal processing samples as inputs that are produced by the collision of the hazelnut with a steel disk. In Chen et al. [3], the authors present their work on weather forecasting. They propose a model output deep learning method based on deep convolutional networks to enhance the forecasting accuracy of numeral weather predictions, mostly related to the observation temperatures. Gil-Cordero et al. [4] proposed a solution to help retail companies with their internationalization tasks to predict the success of their operations when entering a new country or continent. These authors used ANNs to analyze the macroeconomic indicators of retail companies to establish which of them are the most relevant to the volume and value of the private label. Hussain et al. [5] reported an approach to the COVID-19 pandemic by proposing a low-cost, rapid, scalable, and effective virus spread, control, and screening system to reduce the spread the virus that uses IoT devices for rapid screening and real-time deep learning models for face mask detection and classification. In ref. [6], Jimenez et al. analyzed the data behavior and their statistical features in order to identify the most significant factors in the training process to guarantee the best possible performance when computational intelligence techniques such as ANNs are used for data forecasting. Banjanin et al. [7] presented the development of an adaptive model (based on a multilayer perceptron) to predict the average downlink data throughput per user and the average downlink data throughput per cell in an LTE network technology and in a geo-space that includes a

Citation: Gestal, M. Special Issue on Applied Artificial Neural Networks. *Appl. Sci.* **2022**, *12*, 9551. https://doi.org/10.3390/app12199551

Received: 2 September 2022
Accepted: 6 September 2022
Published: 23 September 2022

segment of a national motorway and their access roads. Sobolewski et al. [8] showed a GMDH-type ANN (acronym of group method of data handling) to construct the best time series for the prediction of local time scales to ensure its compliance with the UTC (Universal Coordinated Time) series. Duarte et al. [9] showed how ANNs can help to detect children's syndromes such as Fetal alcohol spectrum disorder by using non-invasive data and other data such as psychometric, saccade eye movement, and diffusion tensor imaging, instead of using previous methods that relied on the imaging of children, which were more invasive and costly. Valverde et al. [10] appiedy a stochastic simulation methodology to quantify the power of the detection of the outlying mixture components of a stochastic model when clustering techniques such self-organizing maps (SOMs) are employed to make the dimension reductions and compare their performance when one or two layers are used. Finally, Maldonado-Chan et al. [11] presented a study with gated restricted Boltzmann machines (RBM). They parameterized the bilinear interactions of the gated RBM through a multimodal tensor-based Tucker decomposition to reduce the large number parameters that a fully connected multiplicative network creates which also requires a lot of memory and computations for inference and training to be performed.

Now that the submissions are closed, it only remains to thank the authors for their interest, hoping that their work will be of help and inspiration to the readers of this Special Issue. And I am sure that, somewhere out there, new research in the field of artificial neural networks will be underway that will contribute to improving the knowledge that is presented here.

Funding: This research received no external funding.

Conflicts of Interest: The author declares no conflict of interest.

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